


Annexure 10

10.0	Mandatory Disclosures				
1	Name of the Institution	ANNAMACHARYA COLLEGE OF PHARMACY			
	Address of the Institution	Thallapaka Panchayath, New Boyanapally Post, Rajampet Mandal, Kadapa District, Andhra Pradesh – 516 126.			
	Phone number with STD code	08565-251865 / 251867			
	Email	ancpaet@gmail.com			
	Fax	08565-251865			
	Website	ancpap.in			
	EAMCET / ICET / ECET / PGECET Code:	ANCP & ANCP1			
	Nearest Railway Station (dist in Km)	Rajampet Railway Station – Distance 7 Kms.			
	Nearest Airport	<ul style="list-style-type: none"> • Tirupati International Airport – Distance 82 Kms. • KADAPA Airport – Distance 63 Kms. 			
	AICTE File No.	South-Central/1-4263470551/2019/EOA			
	Date & Period of last approval	2019 to 2020			
	Type of Institution	Private-Self Financed unaided			
	Category (1) of the Institution	Non-Minority			
	Category (2) of the Institution	Co-Education			
2	Name and address of the Trust/ Society/ Company and the Trustees	Annamacharya Educational Trust 2-2-25/P/7/1, D.D. Colony, Bagh Amberpet, Hyderabad – 500 013			
	Registered with	Registrar of Societies, Hyderabad			
	Registration No. & date	135/IV/97, 13 th August, 1997			
3	Name of the Principal	Dr. Dugasani Swarnalatha			
	Address of the Principal	Annamacharya College of Pharmacy Ph.08565-251865 / Mobile: +91 9848998651			
	Email:	principal.m7@jntua.ac.in			
	Highest Degree	M.Pharm., Ph.D.			
	Field of Specialization	Pharmacognosy			
4	Name of the affiliating University	Jawaharlal Nehru Technological University Anantapur. (JNTUA)			
	Website	www.jntua.ac.in			
	Latest affiliation period	Permanent Affiliation for a period of 3 years from the academic year 2019-20 to 2021-22.			
5	Governance <ul style="list-style-type: none"> • Members of the Board and their brief background 	S.No	Name of the Member	Designation	
		1.	Dr. C. Ramachandra Reddy	Chairman	
		2.	Sri.C.Yella Reddy	Vice Chairman	
		3.	Smt.C.Shashikala	Secretary	
		4.	Mis.C.Poojitha	Joint Secretary	
		5.	Sri.C.Abhishek	Treasurer	
		6.	Sri.C.Gangi Reddy	Member	
		7.	Sri.S.V.Radha Krishna Reddy	Member	
		8.	Smt.P.Deepthi	Member	
		9.	Sri.D.Abhiram	Member	
	10.	Smt.B.Kalpalatha	Member		
		<ul style="list-style-type: none"> • Frequency of meetings & date of last meeting 	Twice in a year & Date of last meeting: 8/12/2019		
		<ul style="list-style-type: none"> • Members of Academic Advisory Body 	Enclosed – Annexure - I		
		<ul style="list-style-type: none"> • Frequency of the Board Meeting and Academic Advisory Body & date of last meeting 	Academic advisory body conducts meetings twice in a year to discuss about academic activities Date of last meeting: 8/12/2019		

	<ul style="list-style-type: none"> Organizational chart and processes 	
	<ul style="list-style-type: none"> Nature and Extent of involvement of Faculty and students in academic affairs/improvements 	Enclosed Annexure - II
6	<ul style="list-style-type: none"> Mechanism/ Norms and Procedure for democratic/ good Governance 	Enclosed Annexure - II
	<ul style="list-style-type: none"> Student Feedback on Institutional Governance/ Faculty performance 	<p>The Feed Back form consist of specific parameters to evaluate the faculty performance. We collect the feed back from the student at the end of the semester / year. The collected feed back forms are analyzed and discussed with HOD'S by head of the institute for development of the institution.</p>
	<ul style="list-style-type: none"> Grievance Redressal mechanism for Faculty, staff and students 	<p>Grievances Redressal Committee constituted. The aggrieved member of teaching/non-teaching staff or student shall make a written representation to the Principal through proper channel or online grievance redressal mechanism. Principal shall examine the merits of the case and forward the same to the committee. The Committee shall examine the issue and make recommendations to the College Management for further necessary action.</p>
	<ul style="list-style-type: none"> Establishment of Anti Ragging Committee 	Enclosed – Annexure - III
	<ul style="list-style-type: none"> Establishment of Online Grievance Redressal Mechanism 	http://ancpap.edugrievance.com
	<ul style="list-style-type: none"> Establishment of Grievance Redressal Committee in the Institution and Appointment of OMBUDSMAN by the University 	Enclosed – Annexure - IV
	<ul style="list-style-type: none"> Establishment of Internal Complaint Committee (ICC) 	<p>ANCP established Internal Complaints Committee on “Sexual Harassment of Women at Work place” to look into the complaints pertaining to Sexual Harassment of Women at Work place matter and provide them an early solution.</p>
	<p>Programmes</p> <ul style="list-style-type: none"> Name of Programmes approved by AICTE 	<ul style="list-style-type: none"> * B.Pharmacy (UG) * Pharm.D * Pharm.D (PB) * M.Pharmacy Pharmaceutics Pharmaceutical Chemistry Pharmaceutical Analysis and Quality Assurance Pharmacology

	<ul style="list-style-type: none"> Name of Programmes Accredited by AICTE 	* B.Pharmacy (UG) – Accredited by NBA * Pharm.D * Pharm.D (PB) * M.Pharmacy Pharmaceutics Pharmaceutical Chemistry Pharmaceutical Analysis and Quality Assurance Pharmacology			
	<ul style="list-style-type: none"> Status of Accreditation of the Courses 	2019-22			
	<ul style="list-style-type: none"> Total number of Courses 	7 Courses			
	<ul style="list-style-type: none"> No. of Courses for which applied for Accreditation 	1 B.Pharmacy (UG)			
	<ul style="list-style-type: none"> Status of Accreditation – Preliminary/ Applied for SAR and results awaited/ Applied for SAR and visits completed/ Results of the visits awaited/ Rejected/ Approved for Courses 	Accredited by NBA – B.Pharmacy Accredited by NAAC “A” Grade B.Pharmacy (UG) Pharm.D Pharm.D (PB) M.Pharmacy <ul style="list-style-type: none"> ➤ Pharmaceutics ➤ Pharmaceutical Chemistry ➤ Pharmaceutical Analysis and Quality Assurance ➤ Pharmacology 			
	<ul style="list-style-type: none"> For each Programme the following details are to be given: 				
	<ul style="list-style-type: none"> Name Number of Seats Duration 	* B.Pharmacy (UG) - 100 - 4 Years * Pharm.D - 30 - 6 Years * Pharm.D (PB) - 10 - 3 Years * M.Pharmacy - 2 Years <ul style="list-style-type: none"> ➤ Pharmaceutics - 15 ➤ Pharmaceutical Chemistry - 15 ➤ Pharmaceutical Analysis and Quality Assurance -15 ➤ Pharmacology - 15 			
	<ul style="list-style-type: none"> Cut off marks / rank of admission during the last three years 	Branch	CAY 2017-18	CAY 2018-19	CAY 2019-20
		UG – B.Pharmacy	6891-62468	7346-56235	9599-46054
		PG – Pharm.D	7760-36584	6475-33887	8838-29842
		PG – Pharm.D (PB)	2195-3268	-	-
		PG – M.Pharmacy			
		Pharmaceutics	321-3980	417-2199	1518-3946
		Pharmaceutical Chemistry	40-2195	546-3871	218-4701
		Pharmaceutical Analysis & Quality Assurance	594-2195	296-296	1518-4260
		Pharmacology	711-3980	475-2916	556-3642
		Pharmaceutical Technology	-	-	NA
		Pharmaceutical Analysis	-	2445-4201	NA
		Pharmaceutics – Drug Regulatory Affairs	1633-3622	1243-1243	NA
			CAY 2017-18	CAY 2018-19	CAY 2019-20
		For B.Pharm. – Category ‘A’	46900	46900 46900	53100 53100

	<ul style="list-style-type: none"> Fee 	Category 'B' 46900 For Pharm.D – Category 'A' 125000 Category 'B' 125000 For Pharm.D (PB) – Category 'A' 125000 Category 'B' 125000 For M.Pharm.– Category 'A' 110000 Category 'B' 110000	125000 125000 125000 125000 110000 110000	125000 125000 125000 125000 110000 110000
	<ul style="list-style-type: none"> Placement Facilities 	<p>The Training and Placement Cell of ANCP not only acts as a facilitator for training and placement but also works towards overall development of the students and also supports the students in each and every stage of the placement processes. The Training and Placement Cell is also committed to integrating the career issues within an academic environment for realizing their best possible career path. Training and Placement Cell undertakes the following activities to achieve the desired results and set targets:</p> <ul style="list-style-type: none"> ➤ Placing the students in industries through ON campus recruitment, pooled campus and OFF campus recruitments ➤ Internship of the Students ➤ Corporate Grooming of the students ➤ Conducting Guest Lectures from Industry experts ➤ Continuous academia – industry interaction ➤ To conduct pre-placement talks and mock interviews. <p>The Training and Placement Cell will also works in association with skill development cell in training the students for the development of desired skills, which are essential for suitable job profile/ higher education/ self-employment by inviting the Corporate Industries / Research or Academic Institutes personnel.</p>		
	<ul style="list-style-type: none"> Campus placement in last three years with minimum salary, maximum salary and average salary 	YEAR	HIGHEST PACKAGE (lakhs per annum)	LOWEST PACKAGE (lakhs per annum)
		2016-2017	2.5	1.4
		2017-2018	2.5	1.4
		2018-2019	2.5	1.4
	<ul style="list-style-type: none"> Name and duration of programme(s) having Twinning and Collaboration with Foreign University(s) and being run in the same Campus along with status of their AICTE approval. If there is Foreign Collaboration, give the following details: Details of the Foreign University 	Not Applicable		
	<ul style="list-style-type: none"> Name of the University 			
	<ul style="list-style-type: none"> Address 			
	<ul style="list-style-type: none"> Website 			
	<ul style="list-style-type: none"> Accreditation status of the University in its Home Country 			
	<ul style="list-style-type: none"> Ranking of the University in the Home Country 			

	<ul style="list-style-type: none"> Whether the degree offered is equivalent to an Indian 	
	<ul style="list-style-type: none"> Degree? If yes, the name of the agency which has approved equivalence. If no, implications for students in terms of pursuit of higher studies in India and abroad and job both 	
	<ul style="list-style-type: none"> within and outside the country 	
	<ul style="list-style-type: none"> Nature of Collaboration 	
	<ul style="list-style-type: none"> Conditions of Collaboration Complete details of payment a student has to make to get the full benefit of Collaboration For each Programme Collaborated provide the following: <ul style="list-style-type: none"> Programme Focus Number of seats Admission Procedure Fee Placement Facility Placement Records for last three years with minimum salary, maximum salary and average salary Whether the Collaboration Programme is approved by AICTE? If not whether the Domestic/Foreign University has applied to AICTE for approval 	
7	Faculty <ul style="list-style-type: none"> Branch wise list Faculty members: Permanent Faculty Adjunct Faculty Permanent Faculty: Student Ratio 	Enclosed – Annexure – VI 53 - 1:15 (UG) & 1:10 (PG)
	<ul style="list-style-type: none"> Number of Faculty employed and left during the last three years 	Employed: 53 Left: 51
8	Profile of Vice Chancellor/ Director/ Principal/ Faculty For each Faculty give a page covering with Passport size photograph <ol style="list-style-type: none"> Name Date of Birth Unique id Education Qualifications Work Experience <ul style="list-style-type: none"> Teaching Research Industry others Area of Specialization Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level Research guidance <ul style="list-style-type: none"> No. of papers published in National/ International Journals/ Conferences Master Ph.D. Projects Carried out Patents 	Enclosed – Annexure - VII

	xi. Technology Transfer xii. Research Publications xiii.No. of Books published with details	
9	Fee <ul style="list-style-type: none"> • Details of fee, as approved by State Fee Committee, for the Institution • Time schedule for payment of fee for the entire programme • No. of Fee waivers granted with amount and name of students • Number of scholarship offered by the Institution, duration and amount • Criteria for fee waivers/scholarship 	For B.Pharm. – Category 'A' - 53100 Category 'B' - 53100 For Pharm.D. – Category 'A' - 125000 Category 'B' - 125000 For Pharm.D.(PB) - Category 'A' - 125000 Category 'B' - 125000 For M.Pharm. – Category 'A' - 110000 Category 'B' - 110000
	<ul style="list-style-type: none"> • Estimated cost of Boarding and Lodging in Hostels 	Rs.55,000/- per year
10	Admission <ul style="list-style-type: none"> • Number of seats sanctioned with the year of approval • Number of Students admitted under various categories each year in the last three years • Number of applications received during last two years for admission under Management Quota and number admitted 	Enclosed - Annexure - VIII
11	Admission Procedure <ul style="list-style-type: none"> • Mention the admission test being followed, name and address of the Test Agency and its URL (website) • Number of seats allotted to different Test Qualified candidate separately (AIEEE/ CET (State conducted test/ University tests/ CMAT/ GPAT)/ Association conducted test) • Calendar for admission against Management/vacant seats: • Last date of request for applications • Last date of submission of applications • Dates for announcing final results • Release of admission list (main list and waiting list shall be announced on the same day) • Date for acceptance by the candidate (time given shall in no case be less than 15 days) • Last date for closing of admission • Starting of the Academic session • The waiting list shall be activated only on the expiry of date of main list • The policy of refund of the fee, in case of withdrawal, shall be clearly notified 	<p>A candidate should possess the eligibility of 10+2 qualification from Board of Intermediate, Government of Andhra Pradesh with M.P.C/Bi.P.C as his/her optional subjects, or any other equivalent examination recognized as equivalent there to.</p> <p>A student to step in four-year degree course in Engineering except NRI quota must qualify in "Engineering, Agricultural and Medical Common Entrance Test" (EAMCET), a State-Level Entrance Test conducted by the Govt. Of Andhra Pradesh. Students who qualify in EAMCET entrance test will be admitted strictly on merit bases.</p> <ul style="list-style-type: none"> • The Convener of EAMCET admits on merit secured in Intermediate or an equivalent examination and the rank secured in EAMCET. • The Management admits candidates for the Management and NRI quota based on merit and should possess first class is optional. • * The Convener of ECET admits 10% of the candidates from the stream of Diploma Holders should pass in diploma from Andhra Pradesh State Government or an equivalent examination.
12	Criteria and Weight ages for Admission <ul style="list-style-type: none"> • Describe each criterion with its respective weight ages i.e. Admission Test, marks in qualifying examination etc. • Mention the minimum level of acceptance, if any • Mention the cut-off levels of percentage and percentile score of the candidates in the admission test for the last three 	Category 'A' seats : 70% Category 'B' seats : 30% For B.Pharmacy & Pharm.D Courses As per the norms prescribed by Andhra Pradesh State Government 70% of the seats designated as Category 'A' seats will be filled by the Convener, AP EAMCET, based on the rank secured in the AP EAMCET (Common entrance test conducted by Government of Andhra Pradesh State). 30% of the seats designated as category 'B' seats will be filled

	<p>years</p> <ul style="list-style-type: none"> • Display marks scored in Test etc. and in aggregate for all candidates who were admitted 	<p>by the College based on the guidelines issued by the Government of Andhra Pradesh State.</p> <p>For M.Pharmacy & Pharm.D (PB) Courses 70% of seats covered under category 'A' filled by the Convener, APPGECET, based on the rank secured in GATE/APPGECET. 30% of the seats covered under category 'B' shall be filled first by sponsored candidates and vacant seats, if any, with other eligible candidates based on the merit following the guidelines issued by Government of Andhra Pradesh State.</p>
13	<p>List of Applicants</p> <ul style="list-style-type: none"> • List of candidate whose applications have been received along with percentile/percentage score for each of the qualifying examination in separate categories for open seats. List of candidate who have applied along with percentage and percentile score for Management quota seats 	<p>Enclosed - Annexure - IX</p>
14	<p>Results of Admission Under Management seats/Vacant seats</p> <ul style="list-style-type: none"> • Composition of selection team for admission under Management Quota with the brief profile of members (This information be made available in the public domain after the admission process is over) • Score of the individual candidate admitted arranged in order of merit • List of candidate who have been offered admission • Waiting list of the candidate in order of merit to be operative from the last date of joining of the first list candidate • List of the candidate who joined within the date, vacancy position in each category before operation of waiting list 	<p>Enclosed – Annexure – IX</p>
15	<p>Information of Infrastructure and Other Resources Available</p> <ul style="list-style-type: none"> • Number of Class Rooms and size of each • Number of Tutorial rooms and size of each • Number of Laboratories and size of each • Number of Drawing Halls with capacity of each • Number of Computer Centers with capacity of each • Central Examination Facility, Number of rooms and capacity of each • Barrier Free Built Environment for disabled and elderly persons 	<p>Enclosed – Annexure - X</p>
	<ul style="list-style-type: none"> • Occupancy Certificate • Fire and Safety Certificate • Hostel Facilities 	<p>Enclosed – Annexure – XI</p>
	<p>Library</p> <ul style="list-style-type: none"> • Number of Library books/ Titles/ Journals available (program-wise) • List of online National/ International Journals subscribed • E-Library facilities 	<p>Enclosed – Annexure – XII</p>

Laboratory and Workshop <ul style="list-style-type: none"> • List of Major Equipment/Facilities in each Laboratory/ Workshop • List of Experimental Setup in each Laboratory/ Workshop 	Enclosed – Annexure - XIII
Computing Facilities <ul style="list-style-type: none"> • Internet Bandwidth • Number and configuration of System • Total number of system connected by LAN • Total number of system connected by WAN • Major software packages available • Special purpose facilities available 	40 MPBS 133 LENOVO: WINDOS – 8.1 PRO PROCESSOR –INTEL ® PENTIUM ® CPU – G322O@ 3.00GHZ RAM- 2.00GB. 133 133 7 software's
<ul style="list-style-type: none"> • Innovation Cell 	ANCP Innovation Cell is a platform aims towards promoting the entrepreneurial spirit of start-up enthusiasts by providing a healthy ecosystem to promote their ideas, startups and researches into successful entrepreneurial ventures. Roles & Responsibilities The role of our innovation team is to conceive, champion, and carefully develop a new approach that is yet to be tried elsewhere.
<ul style="list-style-type: none"> • Research & Development Cell 	Since its inception, Annamacharya College of Pharmacy (ANCP) Rajampet has been striving to develop itself into an institution of excellence in education and research in consonance with the contemporary and future needs of the society through meaningful education, research and leadership in pharmaceutical innovation for the industrial growth of the country. With the path-breaking innovations in both its curriculum and research, the institute is rapidly gaining a good reputation among the institutions in Rayalaseema region of Andhra Pradesh. The research philosophy has progressed from inter - department collaboration, to inter – institutional partnerships at national and international levels. The scope and scale of research has substantially evolved from the era of student project dissertations at UG and PG level, Ph.D. theses of research scholars and to funded projects.
List of facilities available <ul style="list-style-type: none"> • Games and Sports Facilities 	The institution has a huge sports ground are available for playing Basketball, volleyball, football, cricket, judo and Tennicoit. Facilities for indoor games, such as carroms, chess, Table Tennis are provided to the students. A full-time Physical Director takes care of the sports and games. Several students have represented Inter-Collegiate and Inter-University competitions and won prizes.
<ul style="list-style-type: none"> • Extra-Curricular Activities 	The talents available with the students in respect of non-academic activities are encouraged. For this purpose, a full-time Overall Coordinator, Student Affairs is appointed and he takes care of all the events relating to cultural activities. Cultural Programmes are organized on the eve of Independence Day and Republic Day. The students participate in large numbers and sufficient guidance is provided from the faculty members.

	Literary activities	Students are encouraged to participate in various literary events, such as essay writing competitions, elocution and quiz programmes.
	Magazine / Newsletter	The college publishes a Magazine titled “APOTHEC” once in a year. The college publishes a newsletter titled as ‘ANCP NEWS LETTER’. This Newsletter is issued twice a year. It contains information relating to various activities taken up by faculty and students.
	Soft Skill Development Facilities	ANCP Skill Development centre is aimed at developing the students on the following horizons: <ul style="list-style-type: none"> • Professional Communication skills (both Verbal and Written) • Interpersonal and intrapersonal soft skills • Preparation for Group discussions, mock interviews and presentations • Overall Grooming and Counselling Functions: <ul style="list-style-type: none"> • To look after the enhancement of the communication & interpersonal skills of the students • To provide Intensive training in communication and Interpersonal Skills through various Personality Development Programmes • To conduct the Personality development Programs by the experts of Industry and by the Faculty of Annamacharya Institute of Management • To conduct various activities like group discussions, debates, role plays, mock interviews, public speaking, mock conferences, quizzes etc.
	Industrial Visits / Tours	Every year Pharmacy students visits various pharmaceutical industries as per JNTUA regulation and acquire knowledge about various types of equipments, departments, documentation guidance and procedures followed in pharmaceutical industries. Students undergoes training in industry and submit industrial training report for the evaluation.
	Alumni activities	An Alumni Welfare Association has been formed in the college for the purpose of maintaining a link with the college even after studies. The Faculty Coordinator of Alumni activities continuously interact with alumni, organize sessions by alumni on technical, non- technical, soft skills, industry expectations etc., to guide their junior students at college. An annual get-together of alumni from all over the world takes place in December every year.
	Teaching Learning Process <ul style="list-style-type: none"> • Curricula and syllabus for each of the programmes as approved by the University • Academic Calendar of the University • Academic Time Table with the name of the Faculty members handling the Course • Teaching Load of each Faculty • Internal Continuous Evaluation System and place • Student's assessment of Faculty, System in place 	Enclosed – Annexure – XIV

	For each Post Graduate Courses give the following: <ul style="list-style-type: none"> • Title of the Course • Curricula and Syllabi • Laboratory facilities exclusive to the Post Graduate Course • Special Purpose • Software, all design tools in case • Academic Calendar and frame work 	Enclosed – Annexure – XV
16	Enrollment of students in the last 3 years	Enclosed – Annexure – XVI
17	List of Research Projects/ Consultancy Works <ul style="list-style-type: none"> • Number of Projects carried out, funding agency, Grant received • Publications (if any) out of research in last three years out of masters projects • Industry Linkage • MoUs with Industries (minimum 3) 	Enclosed – Annexure – XVII
18	LoA and subsequent EoA till the current Academic Year	Enclosed – Annexure - XVIII
19	Accounted audited statement for the last three years	Enclosed – Annexure – XIX
20	Best Practices adopted, if any	Enclosed – Annexure – XX

Dr.D.Swarnalatha
PRINCIPAL



ANCP
ANNAMACHARYA COLLEGE OF PHARMACY

Estd: 2003

Sponsored by ANNAMACHARYA EDUCATIONAL TRUST (Regd. 135/IV/97)

Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,

Accredited by NAAC with 'A' Grade, Bangalore, Accredited by NBA (UG Programme), New Delhi

Recognised u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognised Research Center, JNTUA, Anantapuramu,

Date: 08-12-2019

Constitution of Governing Body

1. Chairman : Sri. C. Gangi Reddy, Hon.Secretary, A.E.T.
2. Member, Nominated by the Trust : Dr. C. Ramachandra Reddy, M.B.B.S., D.CH.
Chairman, A.E.T.
3. Member, Nominated by the Trust : Smt. C. Sashikala, Secretary, A.E.T.
4. Member, Nominated by the Trust : Mr. C. Yella Reddy, Vice Chairman, A.E.T.
5. Member, Nominated by the Trust : Mr. C. Abhishek Reddy, Treasurer, A.E.T.
6. Member, J.N.T.U. Nominee : Dr. A. Saila Kumari,
Assistant Prof. in Mathematics Dept.,
JNTUA College of Engineering, Anantapur.
7. Ex.Officio Member, Technical Education, Govt. Of.A.P. : R.J.D. Tech. Education
S.V.U. Region, Tirupathi.
8. Member, Educationalist from the Region : Prof. K.V.S.R.G. Prasad,
Dean, School of Pharmacy,
Sri PadmavathiMahilaViswaVIdyalayam,
Tirupathi.
9. Member Industrialist : Mr. C. Pradeep Kumar Reddy,
Reddy's Laboratory, Hyderabad.
10. Member : Dr. S.M.V. Narayana
Principal, A.I.T.S. Rajampet.
11. Principal, Member Secretary : Dr. D. Swarnalatha
Principal, Annamacharya College of Pharmacy.


SECRETARY



ANCP Estd: 2003
ANNAMACHARYA COLLEGE OF PHARMACY

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The Constitution of Governing Body

Sri. C. Gangi Reddy Hon' Secretary, A.E.T. CHAIRMAN	Dr. C. Ramachandra Reddy Chairman, A.E.T. MEMBER	Sri. C. Yella Reddy Vice Chairman, A.E.T. MEMBER	Sri C. Abhishek Treasurer, A.E.T. MEMBER
R.J.D., Tech. Education, S.V.U. Region Tirupathi. MEMBER	Dr.A. Saila Kumari Assistant Prof. in Mathematics Dept., JNTUA College of Engineering, Anantapur MEMBER	Prof. KVSRRG Prasad Dean, School of Pharmacy, S.P.M.V.V., Tirupati MEMBER	Mr. C. Pradeep Kumar Reddy Reddy's Laboratory, Hyderabad. MEMBER
Dr. S.M.V. Narayana Principal, AITS, Rajampet MEMBER	Dr. D. Swarnalatha Principal, ANCP, Rajampet. MEMBER SECRETARY	----	----

The Minuets of the 18th Governing body meeting which held by 11:00 am on 08-12-2019 at Institute Premises, Rajampet are as follows:

Item No. I : Resolved to approve the budget for coming academic year and Resolved to approve the Annual Report for the previous financial year.

Item No. II: The Governing Body appreciated the following:

- Approval of all Pharmacy courses u/s 12 of the Pharmacy Act, 1948 up to 2023.
- International Day of Yoga conducted at College premises on 21-06-2019
- International Conference on Significance of Herbal Drugs and Nutraceuticals in Preventing Diseases, sponsored by AICTE, New Delhi held on 9-10, August 2019
- Personality Development Program – Master Your Mind by Sri. K.V. Pradeep, Personality Development Trainer.
- World Pharmacists Day Celebrations on 25-09-2019
- Soft Skills for Youth conducted in college by Sri. A. Ramanaiah, Chinmayi Mission, on 28-09-2019
- Entrepreneurship Awareness Camp (EAC) by Entrepreneurship Development Cell, ANCP held on 28th March 2019.
- Orientation and Induction Program for First Year B.Pharm Students by Dr. G.K. Naidu, HOD, Govt. Polytechnic, Tirupati.
- Blood Donation Drive by NSS on 21-10-2019
- Rally in Support of Police Service on Police Commemoration Day on 21-10-2019
- Off-Campus Drive by AGS Health Care on 08-11-2019
- National Pharmacy Week Celebrations from 18-11-2019 to 23-11-2019
- Personality Development Program by Sri. Yandamuri Veerendranath,
- Faculty & Student's participation in seminars & conferences.
- Submission of Proposal for AICTE Quality Improvement Schemes (AQIS)
- Submission of AQAR-2019 to NAAC, Bangalore

Thallapaka Panchayat, New Boyanapalli (Post), Rajampet - 516126, Y.S.R. Kadapa District. A.P., India
Tel: 08656-251865 (Principal), 251867 (Office), 251868 (Exam Cell) Mobile: +91 9848998651, +91 9912342118

E-mail: ancpaet@gmail.com Visit us: www.ancpap.in



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Recognised u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognised Research Center, JNTUA, Anantapuramu,

Item No. III: The Governing Body made a note on the following:

- Entrepreneurship Awareness Camp - release of Financial Assistance of Rs.20,000/- from DST (NIMAT Project)
- Procurement of apparatus and chemicals.

Item No. IV: The Governing Body suggested to initiate the following:

- Proposal for Ratification of faculty members by JNTUA, Anantapur.
- Proposals to conduct workshops, National & International conferences.
- Proposals to conduct Scientific & Poster sessions
- Initiating for Financial Assistances from AICTE.
- Pharmacy programmes and developments.

Members Attended for Governing Body Council on

- Sri C. Gangi Reddy, Chairman,
Hon'Secretary, A.E.T. :: C-Koody
- Dr.C. Ramachandra Reddy, Member
Chairman, A.E.T. :: [Signature]
- Sri C. Yella Reddy, Member
Vice Chairman, A.E.T. :: C Yella Reddy
- Sri C. Abhishek Reddy, Member
Treasurer, A.E.T. :: C. Abhishek
- Higher Education, Member
R.J.D., Tech. Education, Govt. of A.P. Tirupathi ::
- Dr. A. Saila Kumari, Member.
Assistant Prof. in Mathematics Dept,
JNTUA College of Engineering, Anantapur :: Sealekumari
- Prof. K.V.S.R.G.Prasad, Member,
Dean, School of Pharmacy, S.P.M.V.V., Tirupathi ::
- Mr. C. Pradeep Kumar Reddy, Member,
Reddy's Laboratories, Hyderabad. :: C. Pradeep
- Dr. S.M.V.Narayana, Member,
Principal, A.I.T.S., Rajampet :: S.M.V. Narayana
- Dr. D. Swarnalatha, Member Secretary
Principal, Annamacharya College of Pharmacy :: [Signature]

(Dr. D. Swarnalatha)
Member Secretary

ANNAMACHARYA COLLEGE OF PHARMACY

Approved by AICTE, PCI, New Delhi, Affiliated to JNTUA, Anantapuramu and
Accredited by NBA (UG Program), New Delhi, Recognised Research Centre, JNTIUA Anantapuramu,
Recognised u/s 2(f) & 12 (B) of the UGC Act, 1956

New Boyanapalli, Rajampet - 516126, Y.S.R. Kadapa District. A.P., India

Ph: 08565-251865 (Principal), 251867(Office), 251868 (Exam Cell) **Mobile:** +91 9848998651

E-mail: ancpaet@gmail.com **Website:** www.ancpap.in

SERVICE RULES



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ANNAMACHARYA EDUCATIONAL TRUST
(Regd. 135/IV/97)

About the Institute

Annamacharya College of Pharmacy, Rajampet started in 2003, is offering B.Pharmacy programme of four year duration. Seven M.Pharmacy programmes in Pharmaceutics, Pharmaceutical Chemistry, Pharmaceutical Analysis & Quality Assurance, Pharmaceutical Analysis, Pharmacology, Pharmaceutical Technology, Drug Regulatory Affairs of two years duration; Pharm.D (Doctor of Pharmacy) programme of 6 Years duration, Pharm.D (Post Baccalarate) programme of 3 Years duration and D.Pharmacy programme of two years duration. ANCP has established one Collaborative Center for Research through Jawaharlal Nehru Technological University Anantapur (JNTUA) to offer Research Programme, leading to Ph.D. In a short span, ANCP has reached among the finest institutions in Andhra Pradesh and is blending the best traditions with vibrant energy and diversity.

The Institute has 35 faculty members and the sanctioned intake of 315 students per year. Efficient leadership and support provided by the dedicated Management, contributions made by the faculty members, staff, stakeholders and proactive students nurtured the development of the core values of the Institution. ANCP has established the quality culture in teaching learning and administrative processes through the sustenance measures, NBA Accreditation, NAAC Accreditation and Internal Quality Assurance Cell.

Annamacharya College of Pharmacy has committed to provide quality and value based education for the urban and rural students in this region.

ANNAMACHARYA COLLEGE OF PHARMACY



INSTITUTE VISION

We impart futuristic technical education and instill high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

INSTITUTE MISSION

Our mission is to educate students from the local and rural areas and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

QUALITY POLICY

Annamacharya college of Pharmacy is committed to achieve excellence in Teaching, Research and Consultancy

- By imparting truly Global Focused Education
- By Creating World Class Professionals
- By Establishing Synergic Relationships with Research hub and Society
- By Developing State-of-art-Infrastructure and Well Endowed Faculty
- By Imparting Knowledge through Team Work and Incessant Effort

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PART I: GENERAL RULES

1.1 GENERAL

1.1.1 These rules shall be called “Annamacharya College of Pharmacy, Rajampet, Service and Conduct Rules” and shall come into force from the date April, 2017 as decided by the Annamacharya Educational Trust. These rules were framed from the rules which are already in force.

1.1.2 These rules shall apply to all categories of staff members (Teaching, Non-Teaching and Supporting Staff).

1.2 DEFINITION

1.2.1 ‘Institute’ means “Annamacharya College of Pharmacy, Rajampet”.

1.2.2 “Trust’ means “Annamacharya Educational Trust, Hyderabad”

1.2.3 “Teaching Post” means a post carrying a definite scale of pay / consolidated pay

1.2.4 “Supporting Staff” means a person appointed in a Non-Teaching post to which no other person holds a lien.

1.3 SERVICE RECORDS

1.3.1 Records of Service

1.3.1.1 A Service book for keeping the record of service of staff shall be maintained by Office in respect of each employee of the Institute.

1.3.1.2 All activities of a staff member in his/her official position shall be recorded in this service book, and each entry must be attested by the Administrative Officer (AO) or his/her superior.

1.3.1.3 The AO shall show the service book to each staff member in the month of April every year and the employee shall sign in the service book after verification.

1.3.2 Service conditions for the staff (Permanent/Ad-hoc)

1.3.2.1 Every staff member shall agree to abide by all the conditions herein stated and also such conditions as may be stipulated from time to time by the competent authority.

1.3.2.2 Every staff member shall employ himself/herself honestly, efficiently and diligently under the orders and instructions of the Principal/Director or other officers under whom he/she shall, from time to time, be placed. He/she shall discharge all duties pertaining to the office and perform in such a manner which may be required of him/her or which are necessary to be done in his/her capacity as aforesaid.

1.3.2.3 Every staff member shall devote his/her whole time to the duties of the said employment and shall not, either directly or indirectly, carry on or be concerned/involved in any trade, business or canvassing/private consulting work, private tuition or the like of a remunerative kind or of an honorary nature

without the specific written permission of the Chairman/Director/Principal.

1.3.2.4 Notwithstanding anything contained above, whenever any consultation work for any private firm or institution is undertaken by the Institute, such members of the staff as are required will be commissioned by the institute, with/without additional remuneration or honorarium as prescribed by the institute, from time to time.

1.3.2.5 Any staff member, on appointment, except on contract, shall be on probation for a period of two years.

1.3.2.6 All the teaching staff on permanent basis shall be paid AICTE scale of pay and other allowances as per Institute norms. In addition, contribution shall be made by the management towards the employees' provident fund, at a rate fixed by the Government of Andhra Pradesh.

1.3.2.7 Staff attendance should be signed every day in staff attendance register and swipe the attendance machine while he/she enters into institute and swipe while he/she leaves the institute.

1.3.2.8 Staff should be available in the Institute premises during the entire period of office hours, on all working days.

1.3.2.9 If a staff member on any kind of leave has to be out of station, he/she should intimate the Principal/Head of the Department

his/her exact out station address and phone numbers in his/her leave application.

1.3.2.10 No faculty member shall apply, during the period of his/her service in this institution, for an appointment outside or send an application for study or training, except with the prior permission of the management and such application should be routed through the Principal/Director. Any violation of this rule will be viewed seriously and suitable disciplinary action will be taken. The management may permit not more than two such supplications in an academic year, but reserves the right to refuse the forwarding of such applications in case there is any bond for the employee for a particular period of service in the institute.

1.3.2.11 The Principal/Director shall have the right to place any staff under suspension on charges of misconduct.

1.3.2.12 In a case wherein a member of the teaching or non-teaching staff commits any misconduct in discharge of his/her duties, the Secretary has got discretion to award punishment such as warning, censure, withholding or increment with or without cumulative effect after conducting an enquiry by a committee constituted by Principal.

- 1.3.2.13 For the development and progress of the institute/department, all members of the staff should work as a team and they should also maintain a cordial relationship with other departments.
- 1.3.2.14 In any meeting or assembly, decorum should be maintained and difference of opinion, if any, shall be expressed politely in diplomatic words without hurting the feelings of others.
- 1.3.2.15 Staff members should get prior permission from Management/Principal/Director to contact any outside agency or government departments for any matter related to the institute/hostels.
- 1.3.2.16 If a staff member draws advance from the institute to meet financial expenses for official tour or for arrangement of an institute event, he/she shall settle the account within 10 days from the date of withdrawal of advance, failing which the advance shall be adjusted from his/her salary.
- 1.3.2.17 Staff members, if and when relinquishing their job, shall hand over their jobs and responsibilities and get the NOC from all departments concerned.
- 1.3.2.18 All members of the staff shall be governed by general rules / norms also practiced by institute from time to time.
- 1.3.2.19 The appointing authority shall have the power to terminate the service of any member of the staff by 3 months' notice if on the

medical grounds, certified by a medical authority nominated by the Governing Body; his retention in service is considered undesirable by such authority.

1.3.2.20 The management shall have the power to terminate the service of any member of the staff on grounds of retrenchment or economy by giving to the person concerned 3 months' notice in writing.

1.3.3 Termination of Service/Resignation

1.3.3.1 If in the opinion of the appointing authority, the efficiency of an employee has been impaired due to any infirmity, due to which his retention in service is considered undesirable, by such appointing authority, his service may be terminated.

1.3.3.2 Faculty member, when resigns, has to give the following information.

- a. Nature of appointment at this institute (Consolidated or on scale)
- b. Notice period (2 Months / 3 Months)
- c. Reasons for resignation (Unless it is confidential)
- d. Date of relief, before the end of the notice period

1.3.3.3 The member will be relieved on any day before the end of the notice period as decided by the Principal of the Institute. However, the Principal of the Institute has the right to detain the

member beyond the notice period till the end of the semester or academic year.

1.3.3.4 The decision regarding the date of relief will depend on a number of factors like the appointment of a substitute, completion of the responsibilities like covering the syllabus, valuation of the answer scripts, completion of a particular assignment entrusted to the member, etc.

1.3.3.5 The other terms and condition of such employment shall be specified by the appointing authority in the letter of appointment.

PART – II – METHOD OF RECRUTIMENT

2.1 SCREENING

2.1.1 Recruitment is normally done twice in a year

2.1.2 Number of vacancies is notified by Principal/Director based on student strength/resignations or terminations of staff members, to the management for approval/information.

2.1.3. Vacancies are advertised in leading newspapers – both Telugu and English.

2.1.4 Screening of applications is done by the respective screening committee.

2.1.5 Short listed candidates are informed through call letters.

2.1.6 At times, Walk-in interviews are also conducted for immediate postings.

2.2 INTERVIEW

2.2.1. Interview Committee consists of Hon. Secretary, Principal, Director, faculty member; subject expert from outside the institute and respective Heads of the department.

2.2.2 In case of large number of applications, a written test is conducted for Lecturers post and short listed candidates shall be called for personal interview and selection be made on merit.

2.2.3 Direct interview is conducted for senior posts. Selection committee shall be constituted by the Secretary as per the guidelines approved by the Governing body.

2.3 PAY FIXATION

2.3.1 Pay for the selected candidates is fixed by the selection committee as per the pay scales approved by the Governing Body for the respective post based upon the qualification and experience of the candidate.

2.3.2 Higher Pay Packages for exceptional and experienced candidates are fixed by the selection committee subject to the approval of the Chairman of the Annamacharya Educational Trust.

2.4 PROMOTION POLICY

2.4.1 Person entering the teaching profession with PG Degree shall be designated as Assistant Professor and shall be placed in the Pay Band of Rs.15000-39100 with AGP of Rs.6000

2.4.2 Assistant Professors with Ph.D. having 5 years of experience or Assistant Professor with completed service of 10 years can be promoted as Associate Professor and shall be in the Pay Band of Rs.37400-67000 with AGP of Rs.9000

2.4.3. Associate Professors completing Ph.D. having 10 years of Experience shall be promoted as Professor and can be in Pay Band of 37400-67000 with AGP of Rs.10,000

2.5 RETIREMENT

2.5.1 The age of retirement of teaching faculty member shall be as per AICTE Norms.

2.5.2 The age of retirement of other non-teaching staff shall be as per State Government Rules or as may be decided by the Management.

PART-III CONDUCT & DISCIPLINE

3.1 CONDUCT

3.1.1 Every staff member shall, at all times, maintain absolute integrity and devotion to duty and do nothing which is unbecoming of an employee of an educational institution.

- 3.1.2 Every staff member shall abide by and comply with the rules and regulations of the institute and all orders and directions of his/her superior authorities, under whose control, he/she is placed.
- 3.1.3 Every staff member shall extend utmost courtesy and attention to all persons with whom he/she is to deal with in the course of his/her duties.
- 3.1.4 Every staff member shall Endeavour to promote the interest of the institute and shall not act in any manner prejudicial thereto.
- 3.1.5 No staff member shall be a member, or be otherwise associated with, any political party or any organization which takes part in politics, nor shall he/she part in, subscribe in aid of, or assist, in any other manner any political movement or activity.
- 3.1.6. No staff member shall join, or continue to be a member of an association the objectives or activities of which are prejudicial to the interests of the autonomy and integrity of India or public order or morality.
- 3.1.7 No staff member shall engage directly or indirectly in any trade or business or undertake any other employment. For undertaking honorary work of an social and charitable nature or work of a literary, artistic or scientific character the staff member shall obtain prior permission of the Principal/Director.

3.1.8 A staff member of this institute shall strictly abide by any law relating to alcoholic drink or drug in force in any area in which he may happen to be for the time being and not to be under the influence of any alcoholic drink or drug during the course of his duty and shall also take due care that the performance of his duties at any time is not affected in any way by the influence of such drink or drug.

3.1.9 Obligation to maintain secrecy: Every staff member shall maintain the strictest secrecy regarding the institute affairs and the affairs of its constituents and shall not divulge, directly or indirectly, any information of confidential nature either to a member or the public or of the institute staff, unless compelled to do so by a judicial or other authority or unless instructed to do so by a superior officer in the discharge of his duties.

3.1.10 No staff member of the institute shall enter into any partnership, accept any fees, endowment or commission whatsoever from any part other than the institute, except with the prior permission of the Hon. Secretary.

3.1.11 Acceptance of gifts: A staff member shall not solicit or accept any gift any subordinate employee, provided that such gifts, grants and donations shall be received by a staff member in the official discharge of his duties for the Institute.

3.2 DISCIPLINE

3.2.1 The Chairman / Secretary or any other competent authority may place a staff member under suspension when disciplinary proceedings against him / her are contemplated or are pending or a case against him / her in respect of any criminal offence is under investigation, inquiry or trial.

3.2.2 A staff member who is detained in police or judicial custody, whether on a criminal charge or otherwise for a period exceeding 48 hours or is sentenced to a term of imprisonment exceeding 48 hours by a court of law and is not forthwith dismissed or removed or compulsorily retired consequent to such conviction, shall be deemed to have been suspended with effect from the date of his detention/conviction by an order of the Chairman/Secretary and shall remain under suspension until further orders.

3.2.3 An order of suspension made or deemed to have been made under this bye-law shall continue to remain in force until it is modified or revoked by the authority competent to do so.

PART IV – LEAVE RULES

4.1 General

4.1.1 Leave accounts shall be maintained for each staff member in appropriate forms.

- 4.1.2 Leave is earned by “Duty” only. Duty for the purpose of leave includes, in addition to the days on duty;
- 4.1.3 Leave cannot be claimed as a matter of right. The sanctioning authority has full discretion to refuse or revoke leave of any description when the exigencies of service so demand or based on the reason for leave application.
- 4.1.4 A staff member who tenders resignation will not be eligible for any Leave excepting the casual leave for the proportionate period.
- 4.1.5 The sanctioning authority may recall a staff member to duty before the expiry of his leave or vacation.
- 4.1.6 Unauthorized absence from duty may be treated as misbehavior involving disciplinary action.
- 4.1.7 A Staff member on leave shall not take up any service or accept any employment without the prior sanction of the sanctioning authority.
- 4.1.8 The Principal shall be the authority competent to sanction leave to all staff member. In the case of the Principal, Chairman of the Governing Body will be the authority to sanction leave.
- 4.1.9 Casual leave will be admissible to a staff member of the Institute for a total period not exceeding 5 days in a calendar year. It may be granted for a period not exceeding 10 days at a time, including holidays. It may also be granted for half a day. Any balance period of C.L. shall lapse with the Calendar year.

4.1.10 Casual Leave should not be combined with any kind of regular leave or vacation or with Special Casual Leave.

4.1.11 *Academic Leave:* A faculty member is eligible for 15 days of academic leave in a calendar year, which can be sanctioned only for JNTUA examination work (Spot valuation, observer, etc.)

4.1.12 *Extra-ordinary Leave:* Extra-ordinary leave may be granted in the special circumstances mentioned below:

- 1) When no other leave is admissible, or
- 2) When other leave being admissible, the employee applied in writing for extraordinary leave. Such leave is not debited against leave account.

4.1.13 *Leave Salary:*

- 1) A staff member on Leave is entitled to Leave Salary equal to the pay drawn in his/her post before the day leave commences.
- 2) A staff member on Extra-ordinary leave is not entitled to any leave salary.

4.2 Staff members appointed on Regular Basis (on scale)

4.2.1 **Earned Leave:** The earned leave admissible to a staff member will be computed by using the following formulae.

A. For staff member on scale of pay

$$\text{Earned leave} = \left\{ \left[\frac{30}{N} * (N - n_1 - n_2) \right] - n_3 \right\}$$

Where

N = Number of calendar days i.e., 365/366

n_1 = No. of days of Extra Ordinary leave (i.e. leave on loss of pay)

+ No. of calendar days lost due to late joining in the year

n_2 = No. of days of earned leaves availed in the year

n_3 = No. of days of vacation availed in the year $\div 2$

Note: The earned leave calculated as above, on 31st December of the year, will be credited to the employee's Earned leave account on 1st January of next year.

4.2.2 Vacation Leave:

4.2.2.1 The Teaching staff and such other members of staff declared as vacation staff shall be eligible for 30 days of vacation in a calendar year. The Earned Leave calculated as in '4.2.1'

4.2.2.2 Vacation may be taken in combination with any kind of leave excepting the Casual Leave provided the total duration of vacation and leave shall not exceed 60 days.

4.2.3 Accumulation of earned leaves: An employee will, however, cease to earn such leave when the earned leave due amounts to 240 days. Further, the grant of earned leave at a time shall not exceed 60 days. This limit may, however, be relaxed by the competent authority who may grant earned leave in excess of 60 days for special reasons.

4.2.4 Maternity Leave: Maternity leave on full pay may be granted to a woman employee for a total period of 90 days to be availed in the entire career. This will be granted subject to the production of Medical Certificate from the Doctor specifying the period of leave recommended. Maternity leave may be combined with earned leave. Extraordinary leave may be granted if Medical certificate supports the request. Maternity leave may also be granted in case of miscarriage including abortion subject to the condition that the total leave granted in respect of this to a woman employee in her career is not more than 90 days and the application for leave is supported by Medical Certificate. Maternity leave will be sanctioned only in case of woman employee with a minimum of three years' service at this Institute, once during the service period.

4.2.5 Special C.L. not exceeding 6 days commencing from the date of operation shall be granted to male employee when he undergoes sterilization operation under the family planning scheme, once during the service period. This will be granted subject to the production of a Medical Certificate from the Doctor who performs the operation to the effect that the operation has been performed on him.

4.2.6 The minimum period of leave under these categories is 3 days and must be applied at least 3 days before proceeding on leave. The

employee can proceed on leave only after getting such leave sanctioned.

4.3 Staff members on Temporary and Ad-hoc Basis and on Consolidated Salary

4.3.1 Earned Leave

The earned leave admissible to an employee will be computed by using the following formulae.

A. For staff member on Ad-hoc scale of pay

$$\text{Earned leave} = \left\{ \left[\frac{15}{N} * (N - n_1 - n_2) \right] - \frac{n_3}{2} \right\}$$

Where

N = Number of calendar days i.e., 365/366

n_1 = No. of days of Extra Ordinary leave (i.e. leave on loss of pay)
+ No. of calendar days lost due to late joining in the year

n_2 = No. of days of earned leaves availed in the year

n_3 = No. of days of vacation availed in the year $\div 2$

Note: The earned leave calculated as above, on 31st December of the year, will be credited to the employee's Earned leave account on 1st January of next year.

4.3.2 Vacation Leave: The Teaching staff and such other members of staff declared as vacation staff shall be eligible for 30 days of vacation in a calendar year provided that the employee has been in service for

more than a year. The Earned Leave calculated as in '4.3.1' above will be reduced by $\frac{1}{4}$ of vacation days availed by the candidate.

4.3.3 An employee will however cease to earn such leave when the earned leave due amounts to 120 days. Further, the grant of earned leave at a time shall not exceed 30 days. This limit may, however, be relaxed by the competent authority who may grant earned leave in excess of 30 days for special reasons. In case an employee dies while in service, cash equivalent of leave salary that the deceased employee who had got, had he gone on earned leave but for death, due and admissible on the date immediately following the date of death subject to a maximum leave for 120 days shall be paid to the family.

4.3.4 The minimum period of leave under these categories is 3 days and must be applied at least 3 days before proceeding on leave. The employee can proceed on leave only after getting such leave sanctioned.

4.3.5 **Maternity Leave:** Maternity leave on full pay may be granted to a woman employee for a total period of 30 days to be availed in the entire career. This will be granted subject to the production of Medical Certificate from the Doctor specifying the period of leave recommended. Maternity leave may be combined with earned leave. Extraordinary leave may be granted if Medical certificate supports the request. Maternity leave may also be granted in case of

miscarriage including abortion subject to the condition that the total leave granted in respect of this to a woman employee in her career is not more than 30 days and the application for leave is supported by Medical Certificate. Maternity leave will be sanctioned only in case of woman employee with a minimum of one year service at this Institute, only once in the total service period.

4.4 ON DUTY

4.5.1 Teaching staff members shall be permitted to avail Special Casual Leave (SCL) for a maximum period of 15 days for University examination duty purpose. Staff member shall be permitted to avail on duty for attending FDP/Workshop/Conference/Symposiums/Seminars etc., in an academic year. ON DUTY shall be availed only with prior approval of the Head of the Institution (Principal).

4.5.2 Teaching staff who are deputed for specific purpose on “Other Duty” should submit a detailed report to the Principal about the purpose for which they are deputed, on the next day without fail.

4.5.3 The staff members who are proceeding on “Other Duty” with the approval of Principal should produce the “Attendance Certificate” immediately on the date of joining duty after availing “OD”.

PART V: GENERAL REGULATIONS FOR STAFF MEMBERS

5.1 The Faculty Member should come to the institute at least 15 minutes before the commencement of classes and should leave the Institute not earlier than 15 minutes after the end of the last hour.

5.2 All the Faculty Members are expected to follow the rules and regulations of the Institution as prevalent from time to time.

5.3 The work load of all the staff shall be fixed by the management. The work load of the teacher should not be less than 40 hours a week, of which teaching contact hours should be at least as follows:

(i) Principal 8 hours/week

(ii) Dean / Professor 12 hours / week

(iii) Associate Professor 16 hours / week

(iv) Assistant Professor / Senior Lecturer / Lecturer 22 hours / week

For the above stipulations, two tutorial hours/two-three laboratory/Drawing hours will be counted as one teaching hour.

The work plan of teachers shall ensure, in the most productive manner, the utilization of stipulated 40 working hours per week, with regard to the roles, jobs and targets assigned to them by the Department / Institution.

5.4 Faculty Members are expected to update their knowledge by attending seminars / workshops / conference, after obtaining necessary permission from the Principal / Management.

5.5 Faculty Members should attempt to publish text books, research papers in reputed International / Indian Journals / Conferences.

5.6 The Faculty Member must strive to prepare himself /herself academically to meet all the challenges and requirements in the methodology of teaching so that the input may be useful for the student community at large. Every Faculty Member is expected to extend his / her beneficial influence in building up the personality of students and he / she should associate himself/herself actively with such extra-curricular activities which he/she is interested in or assigned to him / her from time to time.

5.7 Groupism of any kind should be absolutely avoided. Faculty Members found indulging in such activities will be subject to discipline proceedings.

PART VI: DEPARTMENT RULES

6.1 The Faculty Member should take to the HOD and keep the HOD in confidence about the member's professional and personal activities.

6.2 The teaching load will be allotted by the HOD after taking into account of the Faculty member's interests.

6.3 In addition to the teaching, the Faculty Member should take additional responsibilities as assigned by Principal / HOD in academic, co-curricular or extra-curricular activities.

6.4 Every Faculty Member must give seminar at least once in each semester to other faculty.

- 6.5 Every Faculty Member has to post the student attendance online in ARP portal and simultaneously the absentees Hall Tickets should be noted every day in the Master attendance Register maintained in the Department as soon as the classes/laboratory hours are over.
- 6.6 Whenever a Faculty Member intends to take leave, the Faculty Member should get the leave sanctioned in advance and with proper alternate arrangements made for class/lab/invigilation duty. In case of emergency, the HOD or the next senior faculty must be informed with appropriate alternate arrangements suggested.
- 6.7 The Faculty Member should make him/her presentable. The Faculty Member should show no partiality to any segment / individual student.
- 6.8 The Faculty Advisor must update the student's personal file regularly and put up for inspection by HOD/Principal as the case may be.

PART VII: CLASS ROOM TEACHING RULES

- 7.1 Once subject is allotted the Faculty Member should prepare the lecture hour wise lesson plan.
- 7.2 The Faculty Member should get the lesson plan and course file approved by HOD and Principal. The course file consists of preface, previous year university question papers, notes, handouts, OHP sheets, test/exam question papers, two model answer scripts for each test/exam, Assignments.

- 7.3 The Faculty Member's Diary must be regularly updated and put up for inspection by HOD/Principal as the case may be.
- 7.4 The Faculty Member should refer to more reference manuals than text books and prepare his/her detailed lecture notes. The Faculty Member should not dictate the notes in the class.
- 7.5 The Faculty Member should go to the class at least 5 minutes before and enter the class without delay when the bell rings.
- 7.6 The Faculty Member should engage the full 55 minutes and should not leave the class early.
- 7.7 For the first 5 minutes the faculty member should recall the lessons of the previous lecture, and brief for 2 minutes about what they are going to learn in this session, then go on lecture up to 45 minutes and in the last 3 minutes conclude and say what we will see in the next class.
- 7.8 The Faculty Member should cultivate to include humor in the lecture, to break the monotony.
- 7.9 Should practice/rehearse the lecture well before going to the class.
- 7.10 The Faculty Member should make use of OHP/LCD, Models etc, as teaching learning aids.
- 7.11 The Faculty Member should encourage students asking doubts / questions.
- 7.12 The Faculty Member should get the feedback from students and act/adjust the teaching appropriately.

7.13 The Faculty Member should take care of academically backward students and pay special attention to their needs in special classes.

7.14 In problem oriented subject, regular tutorial have to be conducted. The Tutorial problems have to be handed over to the students at least one week in advance of actual class.

7.15 The Faculty Member should sign in the class log book every day after he / she complete the lecture.

7.16 The Faculty Member should interact with the class coordinator or counselor and inform him / her about the habitual absentees, academically backward student, objectionable behavior etc.

7.17 The Faculty Member should always aim for 100% pass results in his / her subjects and work accordingly.

7.18 The Faculty member should regularly visit library and read the latest journals / magazines in his / her specialty and keep oneself abreast of latest advancements.

7.19 The Faculty Member should be available for doubt clearance.

7.20 The Faculty Member should motivate the students and bring out the creativity/originality in the students.

PART-VIII LABORATORY

8.1 The Faculty Member going for laboratory class must perform the experiments personally and be satisfied with the results before asking the students to conduct the experiments.

8.2 Whenever possible, additional experiments to clarify or enlighten the students must be given.

8.3 The Lab observations must be corrected then and there and the records before the next class.

PART IX: TESTs / EXAMs

9.1 While setting question paper, the Faculty Member should also prepare the detailed answer and making scheme and submit to HOD for approval.

9.2 During invigilation, the Faculty Member should be continuously moving around. He / She should not sit in a place for a prolonged time. He / She should watch closely so that nobody resorts to any malpractice in the exam /test.

9.3 Whenever any malpractice is noticed, the Faculty Member should get a written statement from the student and inform the Chief Controller examinations / Controller of examinations.

9.4 The test papers must be corrected within three days from the date of examination and marks submitted to the HOD for forwarding to Academic Cell / Principal with remarks.

9.5 The faculty members should be very fair and impartial in awarding of internal marks to students or in selecting the outstanding students of the department and on similar occasions, it should be done strictly as per the prescribed norms. It should not have any bearing with region, language, religion, caste, status of parents, personal relations, etc.,

PART X: STUDENT – FACULTY REPORT

10.1 The Faculty Member should have a good control of students.

10.2 As soon as the Faculty Member enters the class, He / She should mark attendance. If anybody enters late beyond 5 minutes, the student may be permitted to attend the class but marked absent. In case of repeaters or habitual late comers the teacher should try to correct the student through personal counseling and if it does not bring any change the student must be directed to meet the student counselor / HOD.

10.3 The Faculty Member should act with tact the deal with students gently.

10.4 *The Faculty Member should be strict but not harsh. Never use harsh words, which would hurt the feeling of the students.*

Interpretation:

Notwithstanding anything contained in these Rules, the Governing Body shall have the power to decide on any matter when any difficulty arises, regarding the interpretation or implementation of any of the above Rules.

Financial Assistance for Paper Presentation / Publications for staff members:

Given below are the norms for getting the financial assistance regarding Paper Presentations / Publications by the faculty members at the National and International Conferences, International Journals with immediate effect.

1. A letter is to be put-up to the Principal, recommended by the concerned Head of the Department, enclosing a copy of communication received from the organizers accepting the presentation / publication of the paper. The letter must necessarily give an estimate of expenditure involved including T.A, D.A, Registration fee etc., if any, etc.,
2. The paper must be presented by the faculty in A.N.C.P., fixing-up a convenient date in consultation with the ANCP Seminar Organizer. This presentation can be either before or after receiving the acceptance letter from the conference organizers / publisher.
3. After the presentation of the paper in the conference, a claim is to be made by the faculty member giving the details of expenditure incurred showing the proof of such expenditure.
4. Faculty members are eligible for T.A & D.A. as per the Institute rules but must produce the tickets or Xerox copies of the tickets, receipt of

registration fee, as the proof of such expenditure. However, no proof is required for claiming the D.A.

5. The actual expenditure incurred in the above forms, subject to a maximum of Rs.3,000/- will be sanctioned to the faculty member for paper presentations in the Conferences.
6. Faculty members presenting papers in International conferences abroad will be eligible for a financial assistance of Rs.10,000/-
7. Faculty members publishing papers in international journals are eligible to claim the expenditure involved in getting the paper published, subject to a maximum amount of Rs.5,000/-
8. A faculty member can avail such financial assistance from the Institute, to an extent of two conferences in a calendar year out of which only one can be for presentation abroad. However, the claim for international journal paper printing expenditure can be made once in a year irrespective of the claim for the presentation in Conference. If the faculty member presents papers more than twice in any calendar year, the financial assistance cannot be extended for those additional presentations. However, the period of absence on all such paper presentations will be treated as on duty.

Annexure I

TA, DA & Incidentals for Staff Members

Grade s	Salary (per Month)	T.A. (actual subject to a maximu m of)	D.A.		Rent (actual subject to a maximum of)	
			State Capital s	Other places	State Capital s	Other places
I	Rs.40000/- & above	1 st class A/C	Rs.350	Rs.200	Rs.150 0	Rs.100 0
II	Rs.20,000/- & above but less than Rs.40,000/-	2 nd class A/C	Rs.300	Rs.170	Rs.120 0	Rs.700
III	Rs.10,000/- & above but less than Rs.20,000/-	3rd class A/C	Rs.300	Rs.170	Rs.100 0	Rs.500
IV	Less than Rs.10,000/-	2 nd class Sleeper	Rs.250	Rs.150	Rs.800	Rs.500

Incidentals at Actuals Full D.A. for the 8 hrs to 24 hrs of absence from headquarters; 50% D.A. for the 4 hrs to 8 hrs of absence from headquarters; Nil D.A. for the less than 4 hrs of absence from headquarters.

However, for journey undertaken by employees of any grade by Volvo bus to Hyderabad / Chennai etc., actual bus fare is to be taken as T.A. to be paid.





ANCP

Estd: 2003

ANNAMACHARYA COLLEGE OF PHARMACY

Sponsored by ANNAMACHARYA EDUCATIONAL TRUST (Regd. 135/IV/97)

Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,

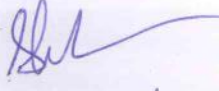
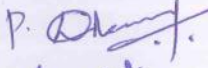





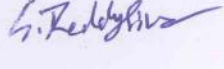
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Recognized u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognized Research Center, JNTUA, Ananthapuramu,

Date : 20.11.2019

Formation of Anti Ragging Committee – 2019-20

An anti ragging committee is constituted to take necessary steps and measures to ensure that no ragging will take place within the campus or outside ANCP.

Dr. D. Swarnalatha	- Chairman	
Dr. P. Dwarkanadha Reddy	- Member	
Dr. C. Surya Prakash Reddy	- Member	
Dr. M. Deepa	- Member	
Mr. S. Chand Basha	- Member	
Mrs. B. Nirmala Devi	- Member	
Ms. A. Susmitha	- Member	
Mr. G. Reddy Siva	- Member	


PRINCIPAL
PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI-516 126
RAJAMPET, Kadapa Dist. A. P.



ANNAMACHARYA COLLEGE OF PHARMACY

New Boyanapalli, Rajampet – 516 126, YSR Kadapa District A.P.

Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,
Accredited by NAAC with 'A' Grade, Bangalore, Accredited by NBA (UG Programme), New Delhi
Recognized u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognized Research Center, JNTUA, Ananthapuramu



Grievance Redressal Committee



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edugrievance
Online Grievance Redressal System

Benefits

- Students/parents/teachers/staff need not go directly to the grievance consultants to register complaints
- Encourages users to raise grievances without fear
- Provides a fair and speedy means of grievance handling
- Save time of aggrieved person and cell members
- Students, parents, teachers and other non-teaching staff can lodge complaints in a discreet manner
- Greater confidentiality and transparency in grievance dealing procedure
- Helps to build harmonious atmosphere in campus with openness and trust
- Automates entire complaint process right from registration to closure
- Advantage over paper-based systems as GRS can alert users immediately on the grievance, action taken etc.
- Round the clock availability of system
- Improved communication by way of SMS / Email alerts

Grievance Redressal Committee Members

Dr. D. Swarnalatha

Principal,

Chair-Person, ANCP Grievance Redressal Cell

Mobile No.: +91 - 98489 98651

E-mail ID : reddy_latha9@yahoo.co.in

Dr. P. Dwarakanadha Reddy

Professor, Dept. of Pharmaceutics
Member

Dr. K. Adinarayana

Professor, Dept. of Pharm. Biotechnology
Member

Dr. T.S. Mohamed Saleem

Professor, Dept. of Pharmacology
Member

Mr. V. Chinnikrishnaiah

Asso. Professor, Dept. of Pharmacology
Nodal Person, ANCP Grievance Redressal Cell
Mobile No.: +91 - 98663 56112
E-mail ID : chinnipharmacy@gmail.com

Mr. M. Praveen Kumar

Asso. Professor, Dept. of Pharmaceutics
Member

Mr. Y. Pradeep Kumar

Asso. Professor, Dept. of Pharm. Chemistry
Member

Mrs. B. Nirmala Devi

Asso. Professor, Dept. of Pharmacognosy
Member

OMBUDSMAN for JNTUA, for the purpose of
redressal grievances of the
students, parents and other.

Prof. K. Prahalada Rao
M.Tech., Ph.D.

Rector, JNTU Anantapur

Phone: 08554-272451 Fax: 08554-272451 Email: rector@jntua.ac.in

ESTABLISHMENT OF COMMITTEE FOR SC/ST

Annamacharya College of Pharmacy constituted SC/ST cell in the college campus to resolve the problems related to the SC/ST students. If any issues found shall be brought into the notice by email to SC/ST cell Officer, **Mr. V.Chinni Krishnaiah**, Asso.Professor, Dept. of Pharmacology, Annamacharya College of Pharmacy, **E-mail:ancpscstcell@gmail.com**

OBJECTIVES:

- 1) To bring the students belongs to SC/ST community at equality with the main stream student body.
- 2) To create a platform where students can point out their problems, regarding academic and non academic matters.
- 3) Committee often meets the students belong to SC/ST communities, to understand their problem and take necessary action and render them necessary advice/help to resolve the matter.
- 4) Creating awareness among the SC/ST students regarding the various Government and Non-Government scholarship schemes.
- 5) Counselling the students to help them overcome inferiority complex related to interaction with fellow students and personal grooming.

Issues related to Schedule Caste and Schedule Tribes students, *if found*, shall be brought into the notice by email to SC/ST cell Officer, **Mr.V.Chinni Krishnaiah**, Asso.Professor, Dept. of Pharmacology, Annamacharya College of Pharmacy.

CONTACT:

Mr.V.Chinni krishnaiah M.Pharm.,
SC/ST cell Officer
Asso.Professor, Dept. of Pharmacology.
Ph: 08565-251867
Mobile: +91 9866356112
Email: ancpscstcell@gmail.com
chinnipharmacy@gmail.com

COMMITTEE

- | | |
|---|--------------------------------------|
| 1. Mr. V. Chinnikrishnaiah
Asso. Professor, Dept. of Pharmacology | - Chair person
SC/ST cell officer |
| 2. Mr. Y.Pradeep Kumar
Asst. Professor, Dept. of Pharmaceutical chemistry | - Member |
| 3. Ms. A. Susmitha
Asst. Professor, Dept. of Pharm. Analysis | - Member |
| 4. Mr.M.Praveen kumar
Asso. Professor, Dept. of Pharmaceutics | - Member secretary |


Teaching Faculty Details

Department wise Teaching Staff Details Format

S.No.	Name of the Faculty	Designation
1	Dr.D.Swarna Latha	Professor Cum Principal
Department of Pharmaceutics		
2	Dr.P.Dwarakanadha Reddy	PROFESSOR
3	Dr C Suryaprakash Reddy	PROFESSOR
4	Dr N Kishore	PROFESSOR
5	Dr. N. Raghavendra Naveen	ASSO. PROFESSOR
6	Mr.M.Praveen kumar	ASSO. PROFESSOR
7	Mrs P Anitha	ASSO. PROFESSOR
8	Mr. V.Sarovar Reddy	ASSO. PROFESSOR
9	Mr. CA Nagabhuvaneswar Reddy	ASST. PROFESSOR
10	Ms. U. Katyayani	ASST. PROFESSOR
11	Mr. N.Ravi Naik	ASST. PROFESSOR
12	Mrs.B Gowthami	ASST. PROFESSOR
13	Mr. A. Surya Prakash	ASST. PROFESSOR
14	Mr N Jakeer Hussain	ASST. PROFESSOR
15	N Harika	ASST. PROFESSOR
Department of Pharmaceutical Chemistry		
16	Dr M Deepa	PROFESSOR
17	Y Pradeep Kumar	ASSO.PROFESSOR
18	S Chand Basha	ASSO. PROFESSOR
19	Shaik.Heena	ASST. PROFESSOR
20	T. Vamsi Gayatri	ASST. PROFESSOR
21	Ms A Chandana	ASST. PROFESSOR
Department of Pharmaceutical Analysis		
22	Madhu Medabalimi	ASSO. PROFESSOR
23	Eri Gireesh Kumar	ASSO. PROFESSOR
24	Prasanthi Chengalva	ASSO. PROFESSOR
25	Aggarapu Susmitha	ASSO. PROFESSOR

26	M.Chanti Naik	ASST. PROFESSOR
27	U Narasimhulu	ASST. PROFESSOR
28	Uma Devi G	ASST. PROFESSOR
29	Mrs S Sravana Jyothi	ASST. PROFESSOR
30	Mr. M. Mahendra	ASST. PROFESSOR
31	S Ashok	ASST. PROFESSOR
	Department of Pharmacology	
32	Dr. T. S M Saleem	PROFESSOR
33	Mr.V.Chinnikrishnaiah	ASSO. PROFESSOR
34	R Pradeep Kumar	ASSO. PROFESSOR
35	Dr D Girirajasekhar	ASSO. PROFESSOR
36	S Sudhakar	ASSO. PROFESSOR
37	S Mohan Raghupathy	ASSO. PROFESSOR
38	B Niveditha	ASST. PROFESSOR
39	M. Sireesha	ASST. PROFESSOR
40	Dr. S Sravana Kumari	ASST. PROFESSOR
41	Marripalli Nagendra	ASST. PROFESSOR
42	Avula Udaya	ASST. PROFESSOR
43	Jyotshna tallapaku	ASST. PROFESSOR
44	Dr. M. Pramod Kumar	ASST. PROFESSOR
45	Dr. T. Anusha Reddy	ASST. PROFESSOR
46	B Vinutha	ASST. PROFESSOR
47	Dr. A. N. Anusha Reddy	ASST. PROFESSOR
48	Dr. K. Haneefa	ASST. PROFESSOR
49	Mrs D S Priyanka	ASST. PROFESSOR
	Department of Pharmacognosy	
50	Mrs.B.Nirmala Devi	ASSO. PROFESSOR
	Department of Biotechnology	
51	Dr.K.Adinarayana	PROFESSOR
	H & S	
52	M Chakra Pani	ASST. PROFESSOR
53	S Raja Rajeswari	ASST. PROFESSOR

PROFILE OF PRINCIPAL

Name	:	Dr. D. Swarnalatha					
Designation	:	Principal					
Department	:	Pharmacognosy					
Date of Birth	:	20/05/1979					
Date of Joining	:	02/06/2006					
Unique id	:						
Department / Area of Specialization	:	Pharmacognsoy					
Education Qualifications	Under Graduate	:	B.Pharm				
	Post Graduate	:	M.Pharm				
	Doctoral	:	Ph.D.				
Work Experience	Teaching	:	15				
	Research	:	3				
	Industry	:	~				
Courses taught at	Under Graduate	:	Pharmacognsoy – I Pharmacognsoy – II Chemistry of Natural Drugs				
	Post Graduate	:	Chemistry of Natural Drugs				
Research Guidance	Master	:	10				
	Ph.D.	:	1 (Completed) 3 (Pursuing)				
Research Publications in Journals	:	National	:	20	International	:	5
Research Publications in Conferences	:	National	:	12	International	:	2
Projects Carried out	:	1					
Books published / IPRs / Patents	:	1					
Technology Transfer	:	~					
Professional Memberships	:	APTI, IPGA, ISPOR					
Awards	:	Vidyarathan Award Certificate of Achievement (Auropath Global Awards – 2019) for excellence in Research					
Grants fetched	:	1 under RPS - AICTE					

Admission Details last four years 2016-17 to 2019-20.

S. No	Name of the course*	Branch	Specialization** (if any)	Details of intake year wise								Year of starting the course
				2016-17		2017-18		2018-19		2019-20		
				Appro ved	Admi tted	Appro ved	Admi tted	Appro ved	Admi tted	Appro ved	Admi tted	
1.	B.Pharmacy	B.Pharmacy	Pharmacy	100	100	100	100	100	95	100	107	2003
2.	M.Pharmacy	Pharmaceutics	Pharmaceutics	15	05	15	11	15	06	15	4	2008
3.	M.Pharmacy	Pharmaceutical Chemistry	Pharm. Chemistry	15	10	15	07	15	03	15	4	2009
4.	M.Pharmacy	Pharmaceutical Analysis and Quality Assurance	Pharmaceutical Analysis and Quality Assurance	15	05	15	06	15	02	15	3	2010
5.	M.Pharmacy	Pharmacology	Pharmacology	15	09	15	15	15	07	15	3	2011
6.	M.Pharmacy	Pharmaceutical Technology	Pharmaceutical Technology	15	00	15	00	15	00	NA	NA	2011
7.	M.Pharmacy	Pharmaceutical Analysis	Pharmaceutical Analysis	15	01	15	01	15	02	NA	NA	2012
8.	M.Pharmacy	Pharmaceutics (Drug Regulatory Affairs)	Pharmaceutics (Drug Regulatory Affairs)	15	02	15	02	15	01	NA	NA	2012
9.	Pharm.D	Doctor of Pharmacy	Doctor of Pharmacy	30	29	30	30	30	25	30	24	2009
10	Pharm.D (PB)	Doctor of Pharmacy	Doctor of Pharmacy	10	00	10	02	10	01	10	0	2012

APEAMCET-B-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PDB-DOCTOR OF PHARMACY (BI.PC)

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	8838.00	9166210365	SADDA LAKSHMI PALLAVI	SADDA RAMIREDDY	F	OC	SVU	YES	ANCP_PDB_OC_GIRLS_SVU
2	9219.00	9160210062	KAIPA SUSHMA	KAIPA PURUSHOTHAMA RAO	F	OC	SVU	YES	ANCP_PDB_OC_GEN_SVU
3	10324.00	9159230045	CHINTHA LIKHITHA	CHINTHA NAGANNA	F	BC_B	SVU	YES	ANCP_PDB_OC_GEN_SVU
4	10763.00	9193210575	MAYALURI KALANJALI	MAYALURI RAMAMANO HAR REDDY	F	OC	SVU	YES	ANCP_PDB_OC_GIRLS_SVU
5	11529.00	9172210044	CHABALA AMARNATH REDDY	CHABALA RAJASEKHAR REDDY	M	OC	SVU	YES	ANCP_PDB_OC_GEN_SVU
6	12271.00	9176270108	GOPALAM VIJAYA DURGA	GOPALAM JANARDHAN RAO	F	BC_B	SVU	YES	ANCP_PDB_BC_B_PHH_GIRLS_SVU
7	12550.00	9176270052	C TEJASWAR	C NAGARAJA	M	OC	SVU	YES	ANCP_PDB_OC_GEN_SVU
8	15443.00	9361230018	DUMPALA VAMSI KRISHNA	DUMPALA KRISHNA MOHAN	M	BC_D	SVU	YES	ANCP_PDB_BC_D_GEN_UR
9	16261.00	9161230056	NOOLU SREELEKHA	NOOLU BALAKESAVA	F	SC	SVU	YES	ANCP_PDB_SC_GIRLS_UR
10	16397.00	9259220300	GURUGARI YESHWANTH	G VEERANNA	M	SC	SVU	YES	ANCP_PDB_SC_GEN_SVU
11	16898.00	9393220137	BINGI PURUSHOTHAM	BINGI SEKHARAI AH	M	BC_B	SVU	YES	ANCP_PDB_BC_B_GEN_SVU
12	17799.00	9376270069	CHAKALI MAHENDRA NATH	CHAKALI LINGAMAI AH	M	BC_A	SVU	YES	ANCP_PDB_BC_A_GEN_SVU
13	20779.00	9261220083	SUDHA NANDINI	SUDHA SURYA KAMALAKAR REDDY	F	OC	SVU	YES	ANCP_PDB_OC_GEN_SVU_EWS
14	21240.00	9363220200	SHAIK SALMA	SHAIK MASTHAN SAHEB	F	BC_E	SVU	YES	ANCP_PDB_BC_E_GEN_SVU
15	28025.00	9358220263	GODDINDLA PRASANTHI	GODDINDLA PRASAD	F	BC_A	SVU	YES	ANCP_PDB_BC_A_GIRLS_SVU
16	28756.00	9170230013	BALYAM NAGALAKSHMI	B SHARANAPPA	F	BC_A	SVU	YES	ANCP_PDB_BC_A_GEN_SVU
17	29842.00	9259220694	RAMAVATH PURUSHOTHAM NAIK	RAMAVATH DHANA SINGH NAIK	M	ST	SVU	YES	ANCP_PDB_ST_GEN_SVU

CONVENOR
APEAMCET-B - ADMISSIONS 2019



APEAMCET-B-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHB-B.PHARMACY (BI.PC)

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	9599.00	9176270023	BASAVARAJU VENKATA PRASASTH	BASAVARAJU VENKATA RAJESWARA RAO	M	OC	SVU	YES	ANCP_PHB_OC_GEN_UR
2	11561.00	9176230143	GUDISE MAHALAKSHMI	GUDISE LAKSHMIKANTH	F	BC_A	SVU	YES	ANCP_PHB_OC_GIRLS_UR
3	12012.00	9361210077	GODLAVEETI MAHENDRA	GODLAVEETI RAMANIAIAH	M	BC_A	SVU	YES	ANCP_PHB_OC_GEN_UR
4	14718.00	9173210165	NARLA SUPRAJA	NARLA NAGESWARA REDDY	F	OC	SVU	YES	ANCP_PHB_OC_GIRLS_SVU
5	15949.00	9270320079	GURRAM CHANDRIKA	GURRAM RAGHAHA	F	OC	SVU	YES	ANCP_PHB_OC_GIRLS_SVU
6	19089.00	9362220124	TANGUTURI SAI NIKITHA	TANGUTURI VENKATA RAMANA REDDY	F	OC	SVU	YES	ANCP_PHB_OC_GIRLS_SVU
7	19432.00	9359220459	LAKKIREDDY SOWMYA	LAKKIREDDY LAKSHMI KANTH REDDY	F	OC	SVU	NO	ANCP_PHB_OC_GIRLS_UR
8	20002.00	9263210081	SHAIK AFIYA	SHAIK MAHAMMED RAFI	F	BC_E	SVU	YES	ANCP_PHB_OC_GIRLS_SVU
9	20968.00	9361210133	MADDALA VENKATA CHANDU	MADDALA NAGA SRINIVASULU	M	OC	AU	YES	ANCP_PHB_OC_GEN_SVU
10	21237.00	9363220190	SETTAM KUSUMA	SETTAM SREENIVASA RAO BAHADUR	F	OC	SVU	NO	ANCP_PHB_OC_GIRLS_SVU
11	21437.00	9357210193	JANGITI VENKATA SIVA	JANGITI SUBBAIAH	M	BC_D	SVU	YES	ANCP_PHB_SC_GEN_UR
12	22679.00	9351210088	MADDINENI KALYANI	SREENIVASULU NAIDU	F	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU
13	22859.00	9163210087	SHAIK SHIFA TAJ	SHAIK YASEEN	F	BC_E	SVU	YES	ANCP_PHB_OC_GEN_SVU
14	23371.00	9160220010	BOBBALA MANISHA	BOBBALA MADDILETY REDDY	F	OC	SVU	YES	ANCP_PHB_OC_CAP_GEN_UR(0)
15	23795.00	9356210083	KOTALA YASASWINI	KOTALA CHANDRA MOHAN REDDY	F	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU
16	23823.00	9276220586	NAGIREDDYGARI KUMAR REDDY	NAGIREDDYGARI RAMANJULA REDDY	M	OC	SVU	YES	ANCP_PHB_BC_D_GEN_SVU
17	23958.00	9260210103	PAGADALA CHANDRA SEKHAR	PAGADALA SREENU	M	BC_A	SVU	YES	ANCP_PHB_BC_A_GEN_UR
18	24043.00	9294220523	MANDALA HARIKA	MANDALA JANARDHAN NAIDU	F	OC	SVU	YES	ANCP_PHB_OC_NCC_GEN_SVU(56)
19	24434.00	9293220499	KOTRA DEVI AISWARYA	KOTRA VENKATA RAMANA	F	OC	SVU	YES	ANCP_PHB_BC_D_GEN_SVU
20	24605.00	9162220121	UMMADIBOINA SUPRIYA	UMMADIBOINA SUBRAMANYAM	F	BC_D	SVU	YES	ANCP_PHB_OC_GEN_SVU
21	25140.00	9276230376	SHAIK MOHAMMAD MOULALI FAYAZ	S M D ZEELAN	M	BC_E	SVU	YES	ANCP_PHB_BC_E_GEN_SVU
22	25260.00	9162210166	POTHINENI GEETHA VANI	POTHINENI CHANDRA SEKHAR	F	BC_D	SVU	YES	ANCP_PHB_OC_GEN_SVU
23	25452.00	9295210836	SETTY HARSHA VARDHAN	SETTY SIVA SANKARAIAH	M	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU_EWS
24	25767.00	9359210104	KINDINTI HARIKA	KINDINTI MAHESWARAREDDY	F	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU
25	25842.00	9260220064	PAVITHRA.R	CHANDRA MOULI.R	F	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU
26	26249.00	9357210011	ADEPUDI CHANDU	A CHANGALRAYULU	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
27	26534.00	9295210243	DONTHIREDDY BHAVITHA	D CHANDRA SEKHAR REDDY	F	OC	SVU	YES	ANCP_PHB_ST_GEN_SVU
28	26914.00	9261210131	KOLA ABHINAY	KOLA HARINADHA	M	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU_EWS
29	27415.00	9356220038	DERANGULA MALLIKA	DERANGULA SREENIVASULU	F	BC_A	SVU	YES	ANCP_PHB_BC_A_GIRLS_SVU
30	27497.00	9393210750	POLU LAILA	POLU ESWAR REDDY	F	OC	SVU	YES	ANCP_PHB_OC_GIRLS_SVU_EWS
31	28049.00	9363220071	GUDIPATI MAMATHA	GUDIPATI SREENIVASULU	F	BC_D	SVU	YES	ANCP_PHB_BC_D_GIRLS_SVU
32	28537.00	9361250036	KASALA HRUTHIK	KASALA ANAND BABU	M	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_UR

33	29488.10	9355210088	GUNNA ANUSHA	G RAVI KUMAR	F	SC	SVU	YES	ANCP_PHB_SC_GIRLS_SVU
34	30192.00	9161210299	VEMPALLI MOHAMMAD RAFIQ	VEMPALLI BASHA	M	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_SVU
35	30273.00	9360210154	TALARI MANOJ KUMAR	TALARI RAMA CHANDRUDU	M	BC_A	SVU	YES	ANCP_PHB_BC_A_GEN_SVU
36	30721.00	9364230042	CHIRAMANA RAJASEKHAR	CHIRAMANA SESHIAIAH	M	BC_A	SVU	YES	ANCP_PHB_BC_A_GEN_SVU
37	30985.00	9394220533	MANGALI VENKATA RENU KUMAR	M SRINIVASULU	M	BC_A	SVU	YES	ANCP_PHB_BC_A_GEN_SVU
38	31421.00	9358230082	GUTTI SREEKANTH	GUTTI REDDAIAH	M	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU_EWS
39	31807.00	9262220102	SHAIK MOHAMMAD AZARUDDIN	SHAIK MOHAMMAD BASHA	M	BC_E	SVU	YES	ANCP_PHB_BC_E_GEN_SVU
40	31883.00	9360210127	SADHU PADMA SREE	SADHU KRISHNAIAH	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_UR
41	32196.00	9263210049	MITHIKAYALA SIREESHA	MITHIKAYALA RAMANAIAH	F	BC_D	SVU	YES	ANCP_PHB_BC_D_GIRLS_SVU
42	33140.00	9159230179	VADDE VISHALAKSHI	VADDE RAMESH	F	BC_A	SVU	YES	ANCP_PHB_BC_A_GEN_SVU
43	33448.00	9156210040	DASARI REKHA	DASARI MARUTHI PRASAD	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GIRLS_SVU
44	33806.00	9176230316	PAMISETTI SUMITHRA	PAMISETTI RAVIKUMAR	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GIRLS_SVU
45	33920.00	9360220046	KUMMARI BHUVANACHANDRA	KUMMARI VENKATA RAMUDU	M	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_SVU
46	34094.00	9361250045	KOTA LALITHASRI	KOTA VENUGOPAL SETTY	F	OC	SVU	YES	ANCP_PHB_OC_GIRLS_SVU_EWS
47	35232.00	9362220069	KURUVA GANGADHAR	KURUVA KAILASH	M	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_SVU
48	35295.00	9261250093	VANAPARTHI SAI BHAVANI	VANAPARTHI HANUMANTHU	F	BC_D	SVU	YES	ANCP_PHB_BC_D_GIRLS_SVU
49	37006.00	9361250100	POTHUGANTI PEERAM BI	POTHUGANTI PEERAIH	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GIRLS_SVU
50	37633.00	9257210292	MUDE MAHENDRA NAIK	M CHENNAIAH NAIK	M	ST	SVU	YES	ANCP_PHB_ST_GEN_UR
51	38168.00	9163220202	SUNKARA KUSUMA	SUNKARA KRISHNA	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GIRLS_SVU
52	38228.00	9259220086	BHUKYA PAVAN KALYAN	BHUKYA NARASIMHULU NAIK	M	ST	SVU	YES	ANCP_PHB_ST_GEN_SVU
53	38456.00	9258240061	GANDU VENKATA NARENDRA	GANDU VENKATA RAMANA	M	BC_D	SVU	YES	ANCP_PHB_BC_D_GEN_SVU
54	38775.00	9256220093	KUMAVATH NARESH NAIK	K VENKATRAMANA NAIK	M	ST	SVU	YES	ANCP_PHB_ST_GEN_SVU
55	39779.00	9256220105	MALLAPPAGARI DHARANI	M MOHAN BABU	F	BC_A	SVU	YES	ANCP_PHB_BC_A_PHO_GIRLS_SVU
56	39898.00	9257210163	JALA MANIKUMAR	JALA GURIAH	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
57	40273.00	9260210044	GUDDISANJANNAGARI LAKSHMI DEVI	GUDDISANJANNAGARI LAKSHMAIAH	F	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
58	40691.00	9162210165	POTHINENI DIVYA	POTHINENI PRABHAKAR	F	BC_D	SVU	YES	ANCP_PHB_BC_D_GEN_SVU
59	40782.00	9358220199	DHANYASI PRIYANKA	DHANYASI VENUGOPAL	F	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
60	40999.00	9263220158	POTHURAJU RAMUDU	POTHURAJU MANOHAR	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
61	41229.00	9163210009	BATHINI CHANDRALEKHA	BATHINI RAGHU RAMAIAH	F	BC_D	SVU	YES	ANCP_PHB_BC_C_GEN_SVU
62	41244.00	9352210076	MUMMALA ARTHY	M SRIRAMULU	F	SC	SVU	YES	ANCP_PHB_SC_GIRLS_SVU
63	41731.00	9263220197	SYED SANATASLEEM.	R S JAKIR HUSSAIN	F	OC	SVU	YES	ANCP_PHB_OC_GEN_SVU_EWS
64	42356.00	9276270209	MADURU PRANEETH BHARGAV	MADURU SUDHAKAR	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
65	42520.00	9259230039	DOUDALA LAVANYA	D VENKATESWARA GOUD	F	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_SVU
66	42635.00	9263220039	CHENCHUGONDA VIJAY KUMAR	CHENCHUGONDA RAMABHADHRUDU	M	BC_B	SVU	YES	ANCP_PHB_BC_B_GEN_SVU
67	43515.00	9360220010	DARA PRADEEP KUMAR	DARA SREENIVASULU	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
68	43601.00	9351220128	MALA JAYA PRAKASH	MALA RAMANJENEYULU	M	SC	SVU	YES	ANCP_PHB_SC_GEN_SVU
69	46054.00	9254210033	GOTLURU GEETHANJALI	GOTLURU GANGULAIAH	F	SC	SVU	YES	ANCP_PHB_SC_GIRLS_SVU

CONVENOR
APEAMCET-B - ADMISSIONS 2019



APEAMCET-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHM-B. PHARMACY (M.P.C. STREAM)

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	111194.00	5460210128	THULASIREDDYGARI SAI SUNITH KUMAR REDDY	THULASIREDDYGARI RAMA SUBBA REDDY	M	OC	SVU	YES	ANCP_PHM_OC_GEN_UR

CONVENOR
APEAMCET - ADMISSIONS 2019



APPGECET-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP1-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHCETS-PHARMACEUTICS

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	1518	3124320083	BANDI GIRI RAJ	BANDI VENKATARAMANAIAH	M	OC	SVU	YES	ANCP1_PHCETS_RGS_BC_A_GEN_UR
2	3946	3131320708	PATAN MAHAMMED ASADULLA KHAN	PATAN MAHAMMED FAIZ ALI KHAN	M	OC	SVU	YES	ANCP1_PHCETS_RGS_SC_GEN_SVU
3	12400	1691023565	BUKKEMANASNAIK	BTHYAGARAJU	M	ST	SVU	NO	ANCP1_PHCETS_RGS_OC_GEN_SVU

Competent Authority
APPGECET - ADMISSIONS 2019



APPGECET-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP1-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHCHEM-PHARMACEUTICAL CHEMISTRY

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	218	3121340101	CHAGALETI BHARATH KUMAR	C VENKATA RAMANA	M	BC_B	SVU	YES	ANCP1_PHCHEM_RGS_OC_GEN_SVU
2	414	3124321087	VADDI RADHA	VADDI RANGA SWAMY	F	BC_B	SVU	YES	ANCP1_PHCHEM_RGS_OC_GEN_UR
3	766	3124320862	SADDIKUTI GOWTHAMI	SADDIKUTI BHASKAR REDDY	F	OC	SVU	YES	ANCP1_PHCHEM_RGS_OC_GIRLS_SVU
4	4701	3131320716	PENDLURU GOWTHAMI	PENDLURU JAYABALUDU	F	SC	SVU	YES	ANCP1_PHCHEM_RGS_SC_PHV_GIRLS_SVU

Competent Authority
APPGECET - ADMISSIONS 2019



APPGECET-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP1-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHCOLG-PHARMACOLOGY

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	556	3126320044	AVULA MAHESH	AVULA MALLIKARJUNA	M	BC_D	SVU	YES	ANCP1_PHCOLG_RGS_BC_A_CAP_GEN_UR(0)
2	1952	3124320962	SHAIK SALMA	SHAIK SHAKEEL AHAMED	F	BC_E	SVU	YES	ANCP1_PHCOLG_RGS_OC_GIRLS_UR
3	3642	3124320342	GUJJULA MOUNIKA	GUJJULA NARAYANA	F	BC_D	SVU	YES	ANCP1_PHCOLG_RGS_OC_GIRLS_SVU

Competent Authority
APPGECET - ADMISSIONS 2019



APPGECET-2019 (Admissions)

FINAL LIST OF PROVISIONALLY ALLOTTED CANDIDATES BY THE CONVENOR

College : ANCP1-ANNAMACHARYA COLLEGE OF PHARMACY,RAJAMPETA,KDP

Branch :PHPAQA-PHARMA.QUAL.ASSURANCE/ANALYSIS & QUAL.ASSURANCE

SNO	RANK	HTNO	CANDIDATE NAME	FNAME	M/F	Cat.	Reg.	Fee Reimb.	ALLOTTED CATEGORY
1	1518	3124320570	MANDEM KIRAN KUMAR	MANDEM VENKATA RAMANA	M	SC	SVU	YES	ANCP1_PHPAQA_RGS_OC_GE N_SVU
2	3642	3124320725	PALEM GOPI	P RAJIAH	M	SC	SVU	YES	ANCP1_PHPAQA_RGS_SC_GE N_SVU
3	4260	3124321104	VEERASVA DANDUBOINA	DANDUBOINA VEERA OBULESU	M	BC_D	SVU	YES	ANCP1_PHPAQA_RGS_OC_GE N_UR

Competent Authority
APPGECET - ADMISSIONS 2019





ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION
(A Statutory Body of the Government of A.P)
I & II Floors, C-Block, Sri Mahendra Enclave, Tadepalli By-pass, TADEPALLI-5222501
Guntur District, Andhra Pradesh
Web: www.apsche.org. Email: specialofficerapsche@gmail.com



PROCEEDINGS OF THE CHAIRMAN, A.P STATE COUNCIL OF HIGHER EDUCATION, GUNTUR

Procs.No. APSCH/APEAMCET-SW1 -2019/CATB/Approval/ANCP/JNTUA Dt :05.12.2019

Sub : APSCH – APEAMCET- SW1 – 2019 -B.Pharmacy Course Admissions under 30% Management Quota (Category 'B') in Engineering/Pharmacy Colleges- Approval / Ratification of admissions - Orders issued - reg.

Ref : 1. G.O.Ms.No 74, HE(EC-2) Dated:28.07.2011 and subsequent amendments.
2. G.O.Ms.No 49, HE(EC/A2) Dept Dated:25.06.2013.
3. G.O.Ms.No 24, HE(EC) Dept Dated:10.03.2016.
4. Admission details uploaded as per guidelines by the institution in the web portal .

-oOo-

ORDER : -

Based on the uploaded information of candidates admitted in **ANNAMACHARYA COLLEGE OF PHARMACY [ANCP] ,RAJAMPETA** in Convener /Management/ Supernumerary quota in the portal <https://apcatbspot.nic.in> and on prima facie the scrutiny of the attested copies of the supporting documents submitted, the Competent Authority and Chairman, APSCH hereby accord provisional approval/ratification of the admissions made in the institution as per the rules in force for the year 2019-20. The provisional approval now granted is subject to (i) verification of the original certificates/documents of the students by the affiliating university concerned (ii) withdrawal of the said approval/ratification of all the students or part thereof, if any irregularities are noticed at a later date and (iii) the institution undertakes the responsibility for such irregularities.

Approved List

SNO	Cname	Fname	NRI	JEE Rank	EAMCET Rank	Aggr %	Group %	CGPA	Cat.	State
BRANCH :B. PHARMACY [PHM]										
1	KALE JAWAHAR PRANAY	KALE RAJA RAO	NO	NQ	NQ	87.00	85.80	-	BC_B	AP
2	LOMADA VENKATA DIVYA	L PRABHAKAR REDDY	NO	NQ	NQ	94.20	95.00	-	OC	AP
3	VULASALA VENKATA PAVANI	VULASALA VENKATA SIVA NARAYANA	NO	NQ	NQ	95.90	95.83	-	BC_B	AP
4	CHITTETI RAKESH	CHITTETI CHANDRASEKHAR	NO	NQ	NQ	77.70	82.50	-	OC	AP
5	BASIREDDYGARI NAGALAKSHMI	BASIREDDYGARI IVENKATARAMI REDDY	NO	NQ	43828.00	92.70	93.33	-	OC	AP
6	PERAKAM PAVAN KRISHNA	P MALLIKARJUN	NO	NQ	46759.00	81.40	81.66	-	OC	AP
7	SANISSETTY NANDINI	SANISSETTY MADHUSUDHAN RAO	NO	NQ	60486.00	64.70	66.66	-	OC	AP
8	MAILARU VENKATA SAI TEJA	MAILARU VENKATAIAH	NO	NQ	54574.00	72.00	72.50	-	OC	AP
9	TAMMIREDDY DIVYA	T RAJA SUBBA REDDY	NO	NQ	NQ	92.90	94.16	-	OC	AP
10	YANAMALA SRINIVASA REDDY	YANAMALA VENKATA REDDY	NO	NQ	NQ	76.70	78.33	-	OC	AP
11	PERUSOMULA MADHAN MOHAN	PERUSOMULA MANMADHUDU	NO	NQ	NQ	97.40	97.50	-	BC_A	AP
12	SIBYALA SAI DINESH	S RAJENDRA	NO	NQ	NQ	61.70	57.50	-	BC_B	AP
13	UPPALAPATI KARUNAKAR	UPPALAPATI PENCHALAIAH	NO	NQ	NQ	71.20	73.33	-	BC_A	AP
14	SAMA SUJANA	SAMA VENKATA SUBBAIAH	NO	NQ	NQ	77.90	80.83	-	BC_B	AP
15	CHINNA GOLLAREDDY PRAVALLIKA	CHINNAGOLLAREDDY VENKATA KRISHNA REDDY	NO	NQ	49320.00	83.20	84.16	-	OC	AP
16	SHAIK AVULA JAMAL BASHA	SHAIK AVULA JAMAL BASHA	NO	NQ	NQ	97.70	98.33	-	BC_E	AP
17	GORRELA JAHNAVI	G MALLIKARJUNA REDDY	NO	NQ	NQ	91.00	94.16	-	OC	AP
18	SAREDDY MADHUKISHOREKUMAR REDDY	SAREDDY GOPAL REDDY	NO	NQ	NQ	84.70	85.83	-	OC	AP
19	KASIREDDY ANUSHA	KASIREDDY SREENIVASULU REDDY	NO	NQ	NQ	75.50	74.16	-	OC	AP
20	KUNTUMALA RAKESH	KUNTUMALLA VENKATA NARAYANA	NO	NQ	NQ	67.70	68.33	-	BC_B	AP
21	PUROHITH PAVAN KUMAR	PUROHITH JABRARAM	NO	NQ	NQ	93.40	92.50	-	OC	AP
22	THUMMALA HARISH GOUD	THUMMALA OBAIAH	NO	NQ	NQ	85.70	84.16	-	BC_B	AP
23	PURUM BHAGYAVANI	PURUM RAVI SHANKAR	NO	NQ	NQ	79.00	68.33	-	BC_B	AP
24	BYREDDY NETHRANANDA REDDY	B RAGHUNATHA REDDY	NO	NQ	NQ	744.00	73.83	-	OC	AP
25	AVULA PRASAD BABU	AVULA SUBBARAYUDU	NO	NQ	NQ	75.00	83.30	-	BC_D	AP
26	PENIGALAPATI IASWARYA	PENIGALAPATI JAYARAMAIAH	NO	NQ	NQ	77.10	60.00	-	OC	AP
27	SHAIK YASMEEN	SHAIK CHAN BASHA	NO	NQ	49360.00	85.20	83.30	-	BC_E	AP
28	VEERAM REDDY PETA CHANDRAKALA	VEERAM REDDY PETA RAVI SANKAR REDDY	NO	NQ	36749.00	94.90	95.83	-	OC	AP

SNO	Cname	Fname	NRI	JEE Rank	EAMCET Rank	Aggr %	Group %	CGPA	Cat.	State
29	KOTHAPALLI INDIRA	KOTHAPALLI CHINNA VEERA REDDY	NO	NQ	NQ	93.40	93.30	-	OC	AP
30	BANDI MURALI MOHAN	BANDI VENKATESULU	NO	NQ	NQ	66.33	68.00	-	OC	AP

Rejected List

-----NIL-----



**CHAIRMAN
APSCHE**

To :

The Secretary/Correspondent/Principal of the college concerned



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION
(A Statutory Body of the Government of A.P)
I & II Floors, C-Block, Sri Mahendra Enclave, Tadepalli By-pass, TADEPALLI-5222501
Guntur District, Andhra Pradesh
Web: www.apsche.org. Email: specialofficerapsche@gmail.com



PROCEEDINGS OF THE CHAIRMAN, A.P STATE COUNCIL OF HIGHER EDUCATION, GUNTUR

Procgs.No. APSCHE/APPGECET-SW1 -2019/CATB/Approval/ANCP1/JNTUA Dt :07.11.2019

Sub : APSCHE – APPGECET – 2019 -M.Pharm. Course Admissions under 30% Management Quota (Category 'B') in MTECH/MPHARMACY Colleges- Approval / Ratification of admissions - Orders issued - reg.

Ref : 1. G.O.Ms.No 64, Higher Education(UE-2)Department dt:26.05.2006 and subsequent amendments.
2. G.O.Ms.No 116, Higher Education(UE-2)Department dt:07.08.2007 and subsequent amendments.
3. Admission details uploaded as per guidelines by the institution in the web portal .

-oOo-

ORDER :-

Based on the uploaded information of candidates admitted in **ANNAMACHARYA COLLEGE OF PHARMACY [ANCP1], RAJAMPETA** in Convener /Management/ Supernumerary quota in the portal <https://apcatbspot.nic.in> and on prima facie the scrutiny of the attested copies of the supporting documents submitted, the Competent Authority and Chairman, APSCHE hereby accord provisional approval/ratification of the admissions made in the institution as per the rules in force for the year 2019-20. The provisional approval now granted is subject to (i) verification of the original certificates/documents of the students by the affiliating university concerned (ii) withdrawal of the said approval/ratification of all the students or part thereof, if any irregularities are noticed at a later date and (iii) the institution undertakes the responsibility for such irregularities.

Approved List

SNO	Cname	Fname	Region	CET Rank	Aggr %	CGPA	Cat.	Branch	Course Type	State
BRANCH :PHARMACEUTICS [PHCETS]										
1	KANDALA AKHILA	KANDALA VENKATRAMI REDDY	SVU	NQ	77.87	-	OC	PHCETS	RGS	AP

Rejected List

-----NIL-----


**CHAIRMAN
APSCHE**

To :

The Secretary/Correspondent/Principal of the college concerned



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION
(A Statutory Body of the Government of A.P)
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Guntur District, Andhra Pradesh
Web: www.apsche.org. Email: specialofficerapsche@gmail.com



PROCEEDINGS OF THE CHAIRMAN, A.P STATE COUNCIL OF HIGHER EDUCATION, GUNTUR

Procgs.No. APSCHE/APEAMCET-SW1 -2019/CATB/Approval/ANCP/JNTUA Dt :05.12.2019

Sub : APSCHE – APEAMCET- SW1 – 2019 -Pharma-D Course Admissions under 30% Management Quota (Category 'B') in Engineering/Pharmacy Colleges- Approval / Ratification of admissions - Orders issued - reg.

Ref : 1. G.O.Ms.No 74, HE(EC-2) Dated:28.07.2011 and subsequent amendments.
2. G.O.Ms.No 49, HE(EC/A2) Dept Dated:25.06.2013.
3. G.O.Ms.No 24, HE(EC) Dept Dated:10.03.2016.
4. Admission details uploaded as per guidelines by the institution in the web portal .

-oOo-

ORDER :-

Based on the uploaded information of candidates admitted in **ANNAMACHARYA COLLEGE OF PHARMACY [ANCP] ,RAJAMPETA** in Convener /Management/ Supernumerary quota in the portal <https://apcatbspot.nic.in> and on prima facie the scrutiny of the attested copies of the supporting documents submitted, the Competent Authority and Chairman, APSCHE hereby accord provisional approval/ratification of the admissions made in the institution as per the rules in force for the year 2019-20. The provisional approval now granted is subject to (i) verification of the original certificates/documents of the students by the affiliating university concerned (ii) withdrawal of the said approval/ratification of all the students or part thereof, if any irregularities are noticed at a later date and (iii) the institution undertakes the responsibility for such irregularities.

Approved List

SNO	Cname	Fname	NRI	JEE Rank	EAMCET Rank	Aggr %	Group %	CGPA	Cat.	State
BRANCH :PHARM.D [PHD]										
1	LODI NIKHITHA	LODI CHANDRA	NO	NQ	NQ	90.40	88.33	-	SC	AP
2	GANJI MEGHANA	G VENKATESWARLU	NO	NQ	38600.00	78.50	82.16	-	BC_B	AP
3	GANUGA PENTA NEELESH KUMAR REDDY	G RAMANA REDDY	NO	NQ	15875.00	92.60	92.50	-	OC	AP
4	SANEPALLI DHEERAJ KUMAR REDDY	SANEPALLI VENKATA RAMI REDDY	NO	NQ	34966.00	86.40	88.66	-	OC	AP
5	KRANTHI KUMAR D	JAGADEESH D	NO	NQ	NQ	58.36	61.40	-	OC	TN
6	SHAIK AYESHA	SHAIK MAHABOOB BASHA	NO	NQ	NQ	82.90	84.10	-	BC_E	AR
7	CHEPPALLI POOJITHA REDDY	CHEPPALLI RAGHU NADHA REDDY	NO	NQ	43128.00	87.90	87.33	-	OC	AP

Rejected List

-----NIL-----

**CHAIRMAN
APSCHE**

To :
The Secretary/Correspondent/Principal of the college concerned



APEAMCET-B-2019 [ADMISSIONS]
FINAL RATIFIED/REJECTED LIST OF CANDIDATES ADMITTED AT INST.SPOT ADMN.
CollegeName : ANCP(ANNAMACHARYA COLLEGE OF PHARMACY), RAJAMPETA-[KDP]



DETAILS OF VACANCIES GIVEN TO COLLEGE

SNO	BRANCH NAME	CONVENOR SEATS	FILLED IN COUNSELLING	FILLED IN SPOT	VACANCY BEFORE SPOT	VACANCY AFTER SPOT
1	DOCTOR OF PHARMACY (BI.PC)(PDB)	23	17	0	6	6
2	B.PHARMACY (BI.PC)(PHB)	76	69	7	7	0

DETAILS OF DROPOUTS/NOT REPORTED/CANCELLATIONS MADE AT COLLEGE

SNO	HT.NO.	RANK	CANDIDATE NAME	M/F	CAT.	REG.	ALLOTTED BRANCH
1	9156210090	6551	KURLI CHETHAN SAI REDDY	M	OC	SVU	PDB
2	9276220635	11908	PAGIDALA VENKATA DINESH KUMAR REDDY	M	OC	SVU	PDB
3	9276220117	16838	BOJJA AKHILA	F	SC	SVU	PDB
4	9261230043	22324	MALLI SANDHYA RANI	F	SC	SVU	PDB
5	9258220498	23002	MADITHATI MANASA	F	OC	SVU	PDB
6	9358210162	33455	P SIRISHA	F	BC_D	SVU	PDB
7	9258220767	25874	RAMPA YOGAVIDYA	F	OC	SVU	PHB
8	9251210129	30731	NETHIBOTTU FARHANA	F	BC_E	SVU	PHB
9	9261250075	39492	RAMAYANAPU LAKSHMI CHAITANYA	F	OC	SVU	PHB
10	9262210180	40050	SEEKIRI DEEPAK KUMAR	M	SC	SVU	PHB
11	9251260035	43864	HARIJANA SWETHA	F	SC	SVU	PHB
12	9363220034	45088	CHAPALA SUSMITHA	F	SC	SVU	PHB

DETAILS OF INTERNAL SLIDING AFFECTED

NIL

FINAL LIST OF CANDIDATES ADMITTED AT INSTITUTIONAL SPOT ADMISSIONS

DETAILS OF SPOT ADMISSION ACCEPTED

SNO	HT.NO.	RANK	CANDIDATE NAME	M/F	CAT.	REG.	% OF MARKS	ALLOTED BRANCH
1	9260210154	59459	SIVAPURAM SUBRAMANYAM	M	OC	SVU	55.00	PHB
2	9351230037	55782	INDLA SRUTHI	F	OC	SVU	70.00	PHB
3	9163220175	51799	SHAIK AIDA	F	BC_E	SVU	77.00	PHB
4	9258220187	41374	CHINTHAM REDDY RAJINI	F	OC	SVU	80.00	PHB
5	9263220181	41347	SHAIK HABEEBA	F	BC_E	SVU	80.00	PHB
6	9163220117	38730	MATURI KUSUMA	F	OC	SVU	89.00	PHB
7	9263220192	37506	SHAIK SHAIMA	F	BC_E	SVU	66.00	PHB

LIST OF INSTITUTIONAL SPOT ADMITTED CANDIDATES AS PER DIRECTIONS OF HON'BLE HIGH COURT

NIL

DETAILS OF SPOT ADMISSION REJECTED

NIL

**Competent Authority
APEAMCET-B - ADMISSIONS 2019**





APPGECET-2019 [ADMISSIONS]
FINAL RATIFIED/REJECTED LIST OF CANDIDATES ADMITTED AT INST.SPOT ADMN.
CollegeName : ANCP1(ANNAMACHARYA COLLEGE OF PHARMACY), RAJAMPETA-[KDP]



DETAILS OF VACANCIES GIVEN TO COLLEGE

SNO	BRANCH NAME	CONVENOR SEATS	FILLED IN COUNSELLING	FILLED IN SPOT	VACANCY BEFORE SPOT	VACANCY AFTER SPOT
1	PHARMACEUTICS(PHCETS-RGS)	11	3	0	8	8
2	PHARMACEUTICAL CHEMISTRY(PHCHEM-RGS)	11	4	0	7	7
3	PHARMACOLOGY(PHCOLG-RGS)	11	3	0	8	8
4	PHARMA.QUAL.ASSURANCE/ANALYSIS & QUAL.ASSURANCE(PHPAQA-RGS)	11	3	0	8	8
5	PHARM.D.(PB)(PHPHMD-RGS)	8	0	0	8	8

DETAILS OF DROPOUTS/NOT REPORTED/CANCELLATIONS MADE AT COLLEGE

NIL

DETAILS OF INTERNAL SLIDING AFFECTED

NIL

FINAL LIST OF CANDIDATES ADMITTED AT INSTITUTIONAL SPOT ADMISSIONS

DETAILS OF SPOT ADMISSION ACCEPTED

NIL

LIST OF INSTITUTIONAL SPOT ADMITTED CANDIDATES AS PER DIRECTIONS OF HON'BLE HIGH COURT

NIL

DETAILS OF SPOT ADMISSION REJECTED

NIL

Competent Authority
APPGECEt - ADMISSIONS 2019



ANNAMACHARYA COLLEGE OF PHARMACY :: RAJAMPET

INFORMATION OF INFRASTRUCTURE

S. No.	Room Type	No.	Total Carpet Area (in Sq.mts)
1	Class Rooms	8	621.89
2	Class Rooms for Post Graduate	10	509.65
3	Tutorial Room	1	33.07
4	Laboratory (For First Year)	4	403.31
5	Laboratory (other than First Year)	3	327.65
6	Laboratory for Post Graduate	14	1214.65
7	Instrument Room (Second Year)	1	75.65
8	Machine Room	1	120.1
9	Library	1	233.76
10	Seminar Hall	1	167.33
11	Animal House (For Post graduate Course only)	1	76.38
12	Computer Center inclusive of Language Laboratory	1	84.72
13	Exam Control Office	1	30
14	Placement Office	1	33

OFFICE OF THE GRAM PANCHAYATH, THALLAPAKA,
RAJAMPET MANDAL, KADAPA DISTRICT, ANDHRA PRADESH

No:

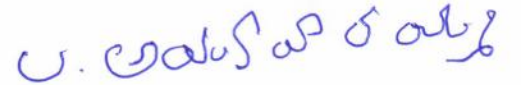
Date: 11.06.2008

OCCUPANCY CERTIFICATE

This is to certify that the Annamacharya College of Pharmacy is situated and running in a piece of land admeasuring 4.5 acres bearing Survey No.s 1085, 1084/1 & 1084/2 of Thallapaka Panchayath, New Boyanapally Post, Rajampet Mandal, Kadapa District, Andhra Pradesh.

The Annamacharya College of Pharmacy is established in the year of 2003 under the aegis of Annamacharya Educational Trust. The Building was constructed with the architectural plan given by Mr. V. Radhakrishna, a licensed architect with license No.23-Arch.TP10/Mch/2000,COA No.CA/84/3511. The building occupy a plinth area 79995.22 square feet (converted to 7431.80 square meters) constructed and completed in the year 2008 step by step containing Ground Floor plus 2 Floors with sufficient corridors and is fit in all respects to run the college.

I am hereby certifying that the college has completed the construction work, hence the certificate is issued.



SARPANCH
THALLAPAKA GRAMA PANCHAYATH

To

- 1) The Secretary,
Annamacharya Educational Trust,
2-2-25/p/7/1,DD Colony,
Bagh Amberpet, Hyderabad.
- 2) The Principal,
Annamacharya College of Pharmacy,
Thallapaka Panchayath,
New Boyanapally Post, Rajampet Mandal,
Kadapa District, Andhra Pradesh.

సర్పంచ్
గ్రామ పంచాయతి
తాళ్ళపాక గ్రామం, రాజంపేట మం.

Government of Andhra Pradesh**A.P. State Disaster Response and Fire Services Department****Annual Periodical Renewal Fire Certificate**

From:
Regional Fire Officer
Andhra Pradesh, Vijayawada

To:
The Registrar,
JNTUA, ANATAPURAM.

File No: 11535/KDP/RFO/2020, Date:31/01/2020

Occupancy NoC RC Number: 142/RFO/SR/2019

Sub: Andhra Pradesh State Disaster Response and Fire Services Department - Annual Periodical Fire Certificate to the constructed Non Multi Storeyed Building of Annamacharya College of Pharmacy,, represented by N. Subba Reddy,, in Survey No. 1084/1&2, 1085 at Tallapaka Village & Panchayat, Rajampet Mandal, Y.S.R. District - Regarding.

- Ref:
1. G.O.Ms.NO.71 Home (Prisons-A) Department, Dated.01-04-2010 & G.O.Ms.NO.140 Home(Prison & Fire Services) Department, Dt.04-09-2015.
 2. This Office Delegation of Powers Rc.No.3350/Audit/NOC/2012, Dated.09-03-2017.
 3. This Office NOC for Occupancy Rc No. 142/RFO/SR/2019, Dt.04/02/2019
 4. Renewal NOC For Occupancy 142/RFO/SR/2019, Dt.04/02/2019
 5. Online Application for Renewal NOC of N. Subba Reddy,, in Survey No. 1084/1&2, 1085 at Tallapaka Village & Panchayat, Rajampet Mandal, Y.S.R. District - Inspection report called for Regarding.
 6. Online Inspection Report submitted by Officers of this Department on 30-01-2020.

<< 0 >>

The Management of Annamacharya College of Pharmacy,, represented by N. Subba Reddy,, in Survey No. 1084/1&2, 1085 at Tallapaka Village & Panchayat, Rajampet Mandal, Y.S.R. District has requested to issue Annual Periodical Fire Certificate for period 2017-2018 duly remitting the Fire Precautionary fee for Rs.145060/- vide challan No. 31318364842019, Dated 29/01/2020 at DTO, Kadapa.

Annamacharya College of Pharmacy

1. This certificate is being issued as per G.O.Ms.No 140 Home (prisons & Fire Services) Department, Dt: 04.09.2015.
2. The No Objection Certificate for Occupancy was issued vide reference cited (3) and the Management has also obtained Annual Periodical Renewal Fire Certificate for vide reference 4th cited to the constructed Non Multi Storeyed Building.
3. The Officers of the department have recommended to issue The Annual Periodical Renewal Fire Certificate N. Subba Reddy, in Survey No. 1084/1&2, 1085 at Tallapaka Village & Panchayat, Rajampet Mandal, Y.S.R. District, subject to the following conditions.

Sl	As Builder	As Occupant	As Security Personnel
1	All the fire protection arrangements shall be maintained in good condition as seen during inspection.	All the escape/exit routes shall not be kept locked/blocked or encroached	All the occupants must know the correct method of operation of the fire fighting system installed.
2	Any loss of life or property due to non-functioning of fire safety measures and other installations shall be the responsibilities of the management.	All occupants shall be trained to operate the fire safety equipments during emergency.	Mock drills should be conducted once in 3 months for initial two years. Thereafter, once in every 6 months.
3	Addition / alteration, if any in the building may be verified by building authority.	Mock drills should be conducted once in 3 months for initial two years. Thereafter, once in every 6 months.	All security personnel shall be trained to operate the fire safety equipments during emergency.
4	This is Only for Fire Safety Point of View.	Raise the alarm if the fire cannot be controlled; Evacuate the area completely at once with nearest safe exit.	Attack the fire using available fire equipment only if you feel capable of controlling. If not, take all steps to isolate the area by closing doors and windows.

1/31/2020

A.P. State Disaster Response and Fire Services Department

4. This Annual Periodical Renewal Fire Certificate is valid from 04/02/2020 to 03/02/2025.

5. The Responsibility/liability of the owner/occupier or both to maintain Fire safety measures in good condition in all times, in accordance with AP Fire safety Act 1999 and Rules, 2006.

The following deficiencies are identified by the officers of the department and needs to be attended to by the management.

☐ This Renewal NOC is issued form Fire Safety Point of view only basing on recommendation of the inspection Committee and this Renewal NOC is not for claiming proprietary or ownership rights. Further, in case of any deviation noticed with respect to this Renewal NOC after issuance of this Renewal NOC, the same Renewal NOC shall be liable for cancellation at any time.

☐ The Management has to maintain Fire Safety Measures and other installations in good working condition at all times and the Responsibility of Fire Fighting equipment maintenance lies with the management as seen & tested by the committee at the time of inspection

☐ This Renewal NOC is valid for one year only and It is the responsibility of the Builder/Owner to apply for renewal of No Objection certificate, duly remitting the user charges as per G.O.Ms.No.169, Home (Prisons & Fire Service) Department.Dt.19-12-2019. two months before expire of this No Objection Certificate



11535/KDP/RFO/2020

Your Sincerely,

[Signature]
Regional Fire Officer

Andhra Pradesh, Vijayawada

Copy to N. Subba Reddy,, Annamacharya College of Pharmacy in Survey No. 1084/1&2, 1085 at Tallapaka Village & Panchayat,

Rajampet Mandal, Y.S.R. District

Copy to Chief Office for Record Purpose

Copy to District Fire Officer Concerned

Copy to Assistant District Fire Officer Concerned

Copy to Station Fire Officer Concerned

ANNAMACHARYA COLLEGE OF PHARMACY :: RAJAMPET

GIRLS HOSTEL DETAILS

Girls Hostel Name : BAHUDA GIRLS HOSTEL
No. of Blocks : 2 (Main Block & Extension Block)
Total area of the Hostel : 333 Sq.m
No of Rooms in Girls Hostel : 25
Dimension of Room : 65

STRENGTH OF PHARMACY STUDENTS COURSE WISE

S.NO	COURSE	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR
1.	B PHARMACY	16	15	14	08	-
2.	PHARMA D	07	08	07	02	03
3.	M PHARMACY	04	-	-	-	-
	TOTAL STRENGTH	75				



ANNAMACHARYA COLLEGE OF PHARMACY, RAJAMPET

Prof. M.L. SCHROFF'S WING

LEARN

TRANSFORM

ELEVATE

CENTRAL LIBRARY INFORMATION

Carpet Area of Library	: 158.5 Sq. m
Reading Space	: 120 Sq. m
Seating Capacity in reading space	: 100 Members
No. of Titles	: 2212
No. of Volumes	: 7974
No. of Journals	: 28
No. of Periodicals	: 07 Magazines
No. of Theses	: 497
No. of News Papers	: 06
Average No. of Users	: 150 per day
Average No. of transactions / day	: 70 per day

TIMINGS:

Working days	: 8.00 AM to 6.00 PM
Public Holidays	: 10.00 AM to 4.00 PM

DIGITAL LIBRARY INFORMATION

No. of computers	: 09
Internet speed	: 40 MBPS
e-Journal Subscription	: DELNET
No. of e- journals	: 200
No. of e-books	: 1140
No. of CDs	: 248
Book accessing	: OPAC
Software	: TLSS

REPROGRAPHY FACILITIES

Name of the Xerox Machine	: Kyocera Taskalfa 1801
Name of Printer	: HP Laser Jet 1020

SUBJECT WISE CLASSIFICATION OF BOOKS

	TITLES	VOLUMES	E-BOOKS
PHARMACOGNOSY	: 140	562	118
PHARMACEUTICAL CHEMISTRY	: 341	1689	152
PHARMACEUTICAL ANALYSIS	: 162	933	135
PHARMACEUTICAL BIOTECHNOLOGY	: 217	839	125
PHARMACOLOGY	: 358	1232	168
PHARMACEUTICS	: 399	1473	185
PHARMACY PRACTICE	: 376	920	115
GENERAL	: 219	326	142
TOTAL	: 2212	7974	1140
Total Books Cost	: Rs: 33,33,905.91/-		
Total No. of Titles	: 2212		
Total No. of Volumes	: 7974		



DELNET

Developing Library Network

New Delhi

www.delnet.in

Certificate of Membership

This certifies that

***Annamacharya College of Pharmacy
Rajampet, District Kadapa***

is an Institutional Member of

DELNET – Developing Library Network

and is entitled to all benefits and privileges pertaining thereto.

Membership Number ***IM – 5901*** has been renewed and it
expires on August 23, 2021

Dr. Sangeeta Kaul
Director

DELNET, New Delhi

Date of Issue: October 1, 2020

S.No.	Name of the journal
1.	Acta Pharmaceutica
2.	Acta Pharmaceutica Sinica B
3.	Adolescent Health, Medicine and Therapeutics
4.	Advanced Health Care Technologies
5.	Advances in Pharmacoepidemiology
6.	Advances in Pharmacoepidemiology and Drug Safety
7.	Advances in Pharmacological Sciences
8.	African Journal of Emergency Medicine
9.	African Journal of Pharmacy and Pharmacology
10.	African Journal of Traditional Complementary and Alternative Medicine
11.	Alcoholism and Drug Addiction
12.	Alexandria Journal of Medicine
13.	Alimentary Pharmacology & Therapeutics
14.	Alternative & Integrative Medicine
15.	American Journal of Pharmaceutical Education
16.	Annals of Medicine & Surgery
17.	Archives of Medicine
18.	Archives of Pharmacy Practice
19.	Asian Journal of Pharmaceutical and Clinical Research
20.	Asian Journal of Pharmaceutical and Health Sciences
21.	Asian Journal of Pharmaceutical Sciences
22.	Asian Journal of Pharmaceutics
23.	Asian Pacific Journal of Tropical Medicine
24.	Austin Journal of Pharmacology and Therapeutics
25.	B.M.C infectious Diseases
26.	Biochemistry & Pharmacology Open Access
27.	Blood and Lymphatic Cancer: Targets and Therapy
28.	Brazilian Journal of Pharmaceutical Sciences
29.	Breast Cancer: Targets and Therapy
30.	British Journal of Pharmacology and Toxicology
31.	Bulletin of Faculty of Pharmacy, Cairo University

32.	Cardiovascular Pharmacology
33.	Chronic Diseases and Translational Medicine
34.	Chronic Obstructive Pulmonary Disease: Journal of the COPD Foundation
35.	Chronicles of Pharmaceutical Science
36.	ChronoPhysiology and Therapy
37.	Clinical Pharmacology: Advances and Applications
38.	ClinicoEconomics
39.	Current issues on Pharmacy and Medical Scinces
40.	DARU : Journal of Pharmaceutical Sciences
41.	Der Pharma Chemica
42.	Der Pharmacia Lettre
43.	Der Pharmacia Sinica
44.	Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy
45.	Diagnostic and Therapeutics Endoscopy
46.	Drug:Real world outcomes
47.	Drug Design, Development and Therapy
48.	Drug Designing
49.	Drug Development and Therapeutics
50.	Drug, Healthcare and Patient Safety
51.	EBiomedicine
52.	Egyptian Pharmaceutical Journal
53.	Emergency Medicine
54.	European Journal of Biomedical and Pharmaceutical Sciences
55.	European Journal of Case reports in internal medicine
56.	European Pharmaceutical Journal
57.	European Respiratory Journal
58.	Future Journal of Pharmaceutical Sciences
59.	Gastrointestinal Cancer: Targets and Therapy
60.	General Medicine
61.	Global Journal of Pharmacy & Pharmaceutical Science
62.	Hepatic Medicine : Evidence and Research
63.	Herbal Medicine

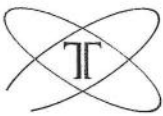
64.	<u>HIV/AIDS-Research and Palliative Care</u>
65.	<u>Immunity, Inflammation and Disease</u>
66.	<u>Immunome Research</u>
67.	<u>ImmunoTargets and Therapy</u>
68.	<u>Indian Journal of Neonatal Medicine and Research</u>
69.	<u>Indian Journal of Pharmaceutical Sciences</u>
70.	<u>Indian Journal of Pharmacology</u>
71.	<u>Indian Journal of Pharmacy Practice</u>
72.	<u>Indian Journal of Research in Homeopathy</u>
73.	<u>Indo Global Journal of Pharmaceutical Sciences</u>
74.	<u>Infection and Drug Resistance</u>
75.	<u>Innovations in Pharmacy</u>
76.	<u>Infectious Diseases and Therapy</u>
77.	<u>Integrated Pharmacy Research and Practice</u>
78.	<u>Integrative Medicine Research</u>
79.	<u>Internal Journal of Clinical Pharmacy</u>
80.	<u>Internal Medicine</u>
81.	<u>International Journal of Pharmaceutical and Phytopharmacological Research</u>
82.	<u>International Journal of Applied Research in Natural Products</u>
83.	<u>International Journal of Basic & Clinical Pharmacology</u>
84.	<u>International Journal of Chemical and Pharmaceutical Sciences</u>
85.	<u>International Journal of Drug Development & Research</u>
86.	<u>International Journal of Drug Discovery</u>
87.	<u>International Journal of Green Pharmacy</u>
88.	<u>International Journal of Pharma Sciences and Research</u>
89.	<u>International Journal of Pharmacological Research</u>
90.	<u>International Journal of Pharmaceutical Investigation</u>
91.	<u>International Journal of Pharmaceutical Sciences & Research</u>
92.	<u>International Journal of Pharmaceutical Sciences : Review and Research</u>
93.	<u>International Journal of Pharmacology and Clinical Sciences</u>
94.	<u>International Journal of Pharmacy and Biological Sciences</u>

95.	<u>International Journal of Pharmacy and Integrated Life Sciences</u>
96.	<u>International Journal of Pharmacy and Pharmaceutical Sciences</u>
97.	<u>International Journal of Pharmacy and Technology</u>
98.	<u>International Journal of Physical Medicine & Rehabilitation</u>
99.	<u>International Journal of Research in Ayurveda and Pharmacy</u>
100.	<u>International Journal on General Medicine</u>
101.	<u>International Research Journal of Pharmacy</u>
102.	<u>Iranian Journal of Pharmaceutical Research</u>
103.	<u>Journal of Advanced Pharmaceutical Research</u>
104.	<u>Journal of AIDS and HIV Infections</u>
105.	<u>Journal of Anaesthesiology Clinical Pharmacology</u>
106.	<u>Journal of Anesthesia and Patient Care</u>
107.	<u>Journal of Applied Pharmaceutical Science</u>
108.	<u>Journal of Advanced Pharmaceutical Research</u>
109.	<u>Journal of Asthma and Allergy</u>
110.	<u>Journal of Basic & Clinical Pharmacy</u>
111.	<u>Journal of Blood Disorders & Transfusion</u>
112.	<u>Journal of Blood Medicine</u>
113.	<u>Journal of Cancer Research in Therapeutics</u>
114.	<u>Journal of Cancer Science & Therapy</u>
115.	<u>Journal of Cancer Science and Clinical Oncology</u>
116.	<u>Journal of Cancer Therapeutics & Research</u>
117.	<u>Journal of Carcinogenesis & Mutagenesis</u>
118.	<u>Journal of Dentistry and Oral Care Medicine</u>
119.	<u>Journal of Developing Drugs</u>
120.	<u>Journal of Drug Delivery</u>
121.	<u>Journal of Drug Metabolism & Toxicology</u>
122.	<u>Journal of Ethnopharmacology</u>
123.	<u>Journal of Experimental Pharmacology</u>
124.	<u>Journal of Food and Drug Analysis</u>
125.	<u>Journal of Forensic Medicine</u>
126.	<u>Journal of Healthcare Leadership</u>
127.	<u>Journal of Immunology & Infectious Disease</u>

128.	<u>Journal of Korean Society for Clinical Pharmacology and Therapeutics</u>
129.	<u>Journal of Neurodegenerative Diseases</u>
130.	<u>Journal of Nuclear Medicine & Radiation Therapy</u>
131.	<u>Journal of Nutrition and Health Sciences</u>
132.	<u>Journal of Obesity and Overweight</u>
133.	<u>Journal of Oncology Medicine & Practice</u>
134.	<u>Journal of Ophthalmology</u>
135.	<u>Journal of Pain Management & Medicine</u>
136.	<u>Journal of Pharma Research</u>
137.	<u>Journal of Pharmaceutical Analysis</u>
138.	<u>Journal of Pharmaceutical Care</u>
139.	<u>Journal of Pharmaceutical Care & Health Systems</u>
140.	<u>Journal of Pharmaceutical Negative Results</u>
141.	<u>Journal of Pharmaceutical Science and Bio scientific Research</u>
142.	<u>Journal of Pharmaceutics and Drug Development</u>
143.	<u>Journal of Pharmacognosy & Natural Products</u>
144.	<u>Journal of Pharmacological Sciences</u>
145.	<u>Journal of Pharmacology & Clinical Toxicology</u>
146.	<u>Journal of Pharmacology & Pharmacotherapeutics</u>
147.	<u>Journal of Pharmacovigilance</u>
148.	<u>Journal of Pharmacy and Bioallied Sciences</u>
149.	<u>Journal of Pharmacy and Pharmaceutical Sciences</u>
150.	<u>Journal of Pharmacy Practice and Community Medicine</u>
151.	<u>Journal of Pharmacy Teaching</u>
152.	<u>Journal of Preventive Medicine</u>
153.	<u>Journal of Pulmonary & Respiratory Medicine</u>
154.	<u>Journal of Research in Pharmacy Practice</u>
155.	<u>Journal of Sports Medicine & Doping Studies</u>
156.	<u>Journal of Surgery and Operative Care</u>
157.	<u>Journal of Tropical Diseases & Public Health</u>
158.	<u>Journal of Vascular Medicine & Surgery</u>
159.	<u>Journal of Vector Borne Diseases</u>

160.	Journal of Young Pharmacists
161.	Marine Drugs
162.	Metal-Based Drugs
163.	National Journal of Physiology, Pharmacy and Pharmacology
164.	Occupational Medicine & Health Affairs
165.	Drug Delivery Journal
166.	Orphan Drugs: Research and Reviews
167.	Pediatric Health, Medicine and Therapeutics
168.	Pharmaceuticals
169.	Pharmaceutics
170.	Pharmacie Globale : International Journal of Comprehensive Pharmacy
171.	Pharmacogenomics and Personalized Medicine
172.	Pharmacology & Therapeutics
173.	Pharmacology and Pharmacy
174.	Pharmacy Practice
175.	Pharmacy-MDPI
176.	Research & Reviews: Journal of Hospital and Clinical Pharmacy
177.	Research Journal of Pharmacognosy
178.	Robotic Surgery: Research and Reviews
179.	SOJ Microbiology & Infectious Diseases
180.	Southern Med Review
181.	Stamford Journal of Pharmaceutical Sciences
182.	The Open Biomarkers Journal (Bentham)
183.	The Open Biotechnology Journal (Bentham)
184.	The Open Infectious Diseases Journal
185.	The Open Medicinal Chemistry Journal (Bentham)
186.	The Open Nanoscience Journal (Bentham)
187.	The Open Natural Products Journal (Bentham)
188.	The Open Nitric Oxide Journal (Bentham)
189.	The Open Nutraceuticals Journal (Bentham)
190.	The Open Pain Journal (Bentham)
191.	The Open Pharmacoeconomics & Health Economics Journal (Bentham)

192.	<u>The Open proteomics journal (Bentham)</u>
193.	<u>Toxicology Journal</u>
194.	<u>Therapeutics and Clinical Risk Management</u>
195.	<u>Toxicology</u>
196.	<u>Translational Biomedicine</u>
197.	<u>Tropical Journal of Pharmaceutical Research</u>
198.	<u>Universal Journal of Pharmacy</u>
199.	<u>Veterinary Medicine: Research and Reviews</u>
200.	<u>World Journal of Gastrointestinal Pharmacology and Therapeutics</u>



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Tax Invoice																
Total I.T. Software Solutions Pvt. Ltd. WZ - 248, Plot No. 7 Inder Puri, New Delhi - 110012 Tel: 011-25833323 PAN No: AADCT4815G GSTIN: 07AADCT4815E22I																
Client PO No.: ANCP/RJPT/LIB/PO/2017										Invoice No. TISS/008						
Date: 10-08-2017										Date of Invoice: 30-08-2017						
										State: Delhi						
<div style="display: flex; justify-content: space-between;"> <div> Bill to Party Name: Annamacharya College of Pharmacy The Principal Annamacharya College of Pharmacy New Boyanapalli - 516126 </div> <div> Ship to Party Name: Annamacharya College of Pharmacy The Principal Annamacharya College of Pharmacy New Boyanapalli - 516126 </div> </div>																
GSTIN: State: Andhra Pradesh										GSTIN: State: Andhra Pradesh						
S.No.	Details	HSN Code	UOM	Qty	Rate	Amount	Discount	Taxable Value	CGST Rate	CGST Amount	SGST Rate	SGST Amount	IGST Rate	IGST Amount	Total	
1	TLSS - Total Library Software System		-	-	-	50,000		50,000	-	-	-	-	18	9,000	59,000	
2	Barcode Pniter (Zebra)		-	-	-	22,500		22,500	-	-	-	-	18	4,050	26,550	
3	Barcode Reader (Symbol)		-	-	-	12,500		12,500	-	-	-	-	18	2,250	14,750	
4	Barcode Labels		-	-	-	2,500		2,500	-	-	-	-	18	450	2,950	
5	Barcode Ribbon for Thermal Printer		-	-	-	2,250		2,250	-	-	-	-	18	405	2,655	
						-		-	-	-	-	-	-	-	-	
						-		-	-	-	-	-	-	-	-	
						-		-	-	-	-	-	-	-	-	
TOTAL						89,750		89750	-	-	-	-	16,155	105,905		
Total Amount in Words: One Lacs Five Thousand Nine Hundred and Five Only										Total Amount before Tax					89,750	
										Add: CGST					-	
										Add: SGST					-	
										Add: IGST					16,155	
										Total Tax Amount					16,155	
										Total Amount After Tax					105,905	
Bank Details Account Name: Total IT Software Solutions Pvt Ltd Bank: Axis Bank Ltd. Address: G12A, Vikaspuri, New Delhi - 110018 Account No. 914020049292422 IFSC Code: UTIB0000079																
For Total I.T. Software Solutions Pvt. Ltd. Authorised Signatory <i>[Signature]</i>																

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PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI-516 126
RAJAMPET, Kadapa Dist. A. P.

LIST OF EQUIPMENTS

Department of Pharmaceutics:

1. All Purpose Equipment
2. Ampoule washing machine
3. Autoclave
4. Ball Mill
5. Bottle Sealing Machine
6. Brookfield Viscometer
7. Bulk Density Apparatus
8. Centrifuge
9. Clarity Test Apparatus
10. Dhona Balance
11. Digital Balance
12. Digital pH Meter
13. Disintegration Test Apparatus
14. Dissolution Test Apparatus
15. Environmental Test Chamber
16. Freeze Dryer
17. Friability Tester
18. Hand Grinding Mill
19. Heating Mantle
20. High Speed Homogenizers
21. High Vacuum Pump
22. Homogenizer
23. Hot air oven
24. Hot Plate
25. Hot Plate
26. IR Moisture Balance
27. Magnetic Stirrer
28. Magnetic Stirrer
29. Ointment Filling Machine
30. Probe Sonicator
31. Refrigerator
32. Remi Motor
33. Rotary Evaporator
34. Rotary tablet punching machine
35. Sieve Shaker
36. Single Rotary tablet punching machine
37. Tablet Disintegration Test Apparatus
38. Tablet Polishing Machine
39. Tablet Hardness Tester
40. Tincture Press
41. Tray Dryer
42. Tube crimping & sealing
43. USP Dissolution Apparatus
44. UV Visible Spectrophotometer
45. Weighing Balance

LIST OF EQUIPMENTS

Department of Pharmacology:

1. Analgesiometer
2. Animal balances
3. Bones set
4. CAR Apparatus
5. Centrifuge
6. Clinical thermometers
7. Dessicator
8. Digital Actimeter with whole board
9. Digital actophotometer
10. Digital Balance
11. Digital Plethysmometer
12. Digital Sherrington recording drum
13. Digital Single unit organ bath
14. Digital tele thermometer
15. Dissection Boards/Trays
16. Double unit organ bath
17. Eddy's Hot Plate
18. Electro convulsimeter
19. ESR Tubes and stands
20. Haemocytometer
21. Haemometer
22. Heart perfusion system
23. Heating mantle
24. Histamine chamber
25. human skeleton
26. Kymograph
27. Microplate spectrophotometer
28. Microscopes
29. Mini gel electrophoresis
30. Nerve Muscle assembly
31. Operating Table
32. Plethysmograph
33. Plus maze apparatus
34. Pole climbing apparatus
35. Rabbit cages
36. Rabbit holder
37. Rotarod apparatus
38. semi auto analyzer
39. single distillation unit
40. Single unit organ bath
41. Smoking burner with stand
42. Sphygmomanometer
43. Stethoscope
44. Student Stimulator
45. Swimming test apparatus
46. Thermometers
47. Tissue homogenizer

LIST OF EQUIPMENTS

Department of Pharmaceutical Chemistry:

1. Evaporator Rotary vacuum evaporator
2. Heating mantles 250ml/500ml/1000ml
3. Hot Air Oven
4. Magnetic stirrer with Hot plate
5. Melting /Boiling point apparatus
6. pH meter
7. Vacuum pump

Department of Pharmacognosy:

1. Binocular microscope
2. Compound Microscopes
3. Digital Balance
4. Flash chromatography
5. Hot air oven
6. Hot Plate rectangular
7. Hot Plate round
8. Mantles
9. Microtone
10. Muffle furnace
11. Projection microscope
12. Rotary evaporator
13. Rotary evaporator-Vacuum
14. Simple microscopes
15. UV Cabinet
16. Vacuum pump
17. Water bath 6 holes

Department of Pharmaceutical Biotechnology:

1. Antibiotic zone reader
2. Aseptic cabinet
3. Autoclave
4. BOD Incubator
5. Centrifuge
6. Colony counter
7. Colorimeter
8. Digital Balance
9. Digital pH meter
10. Electric water bath
11. Gel electrophoresis
12. Heating Mantle
13. Hot air oven
14. Incubator
15. Laminar air flow
16. Micro centrifuge
17. Micro pipettes
18. Microscopes
19. Projection microscope
20. Rotatory shaker
21. UV Trans illuminator
22. Vortex mixture

LIST OF EQUIPMENTS

Department of Pharmaceutical Analysis:

1. Abbe's Refractometer
2. Agilent 1120 Compact LC HPLC
3. Auto Titrator (AT-97)
4. Dhona Analytical Balance 200/D (200mg Capacity 0.1mg Sensitivity)
5. Digital Conductivity meter
6. Digital Flame Photometer
7. Digital Nepheloturbidity meter
8. Digital pH meter (ELICO)
9. Digital Photo Flurometer
10. Digital Photoelectric Colorimeter
11. Digital Universal AutoTitrator
12. Heating Mantle 250ml/500ml
13. Homogenizer
14. Hot Plate
15. Infra red Balance
16. Keroy Analytical Balance with Weight Box
17. Magnetic Stirrer with Hot Plate
18. Polarimeter with Sodium lamp Assembly & Transformer, 20cm Tube
19. Polarograph
20. Quartz Distillation Unit 2Lts Capacity
21. SemiAuto Biochemistry Analyzer
22. Shimadzu Digital Balance 0.1mg Sensitivity
23. Shimadzu Digital Balance 10mg Sensitivity
24. Shimadzu IR Spectrophotometer (IR Affinity-1)
25. Shimadzu UV-Vis Spectrophotometer (UV-1800)
26. Smart2Pure 3Lts/HR UV Pretreatment Set FPR TKA Smart2Pure
27. Sonicator
28. TLC Kit (Chamber + Plates)
29. UV-Vis Spectrophotometer
30. Vacuum Pump
31. Water Bath Rectangular
32. Water Distillation Set Single



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., Act. No. 30 of 2008)
ANANTHAPURAMU-515 002 (A.P) INDIA

**Academic Regulations (R19) for
B.Pharm (Regular-Full time)**
(Effective for the students admitted into 1 year from the Academic Year 2019-2020 onwards)

Pharmacy Council of India
New Delhi

Rules & Syllabus for the Bachelor of Pharmacy (B. Pharm) Course

[Framed under Regulation 6, 7 & 8 of the Bachelor of
Pharmacy (B. Pharm) course regulations 2014]

1. *[Signature]* 2. N. Krishnamani 3. *[Signature]* 4. *[Signature]*
5. *[Signature]* 6. *[Signature]*

CHAPTER- I: REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the B. Pharm. Degree Program (CBCS) of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by Pharmacy Council of India.

2. Minimum qualification for admission

First year B. Pharm:

Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

2.2. B. Pharm lateral entry (to third semester):

A pass in D. Pharm. course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

3. Duration of the program

The course of study for B.Pharm shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curricula and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semester shall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

6. Attendance and progress

A candidate is required to put in at least 80% attendance in aggregate of all courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic

1. 
2. N. Krishnamoorti
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work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

7.1 Credit assignment

7.1.1 Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2) for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

7.2 Minimum credit requirements

The minimum credit points required for award of a B. Pharm. degree is 208. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Project over the duration of eight semesters. The credits are distributed semester-wise as shown in Table IX. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.






The lateral entry students shall get 52 credit points transferred from their D. Pharm program. Such students shall take up additional remedial courses of 'Communication Skills' (Theory and Practical) and 'Computer Applications in Pharmacy' (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.

8. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

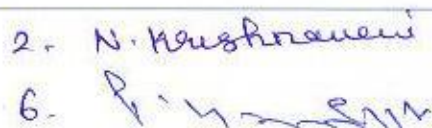
8.1 Induction Program (zero semester)

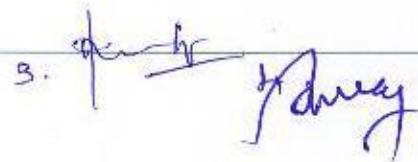
Induction program for students to be offered at zero semester to bring the conducive atmosphere among the students community right at the start of the first year for duration of three weeks.

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- a) Physical activity – Sports, Yoga, Heartfulness relaxation and meditation
- b) Creative Arts
- c) Universal Human Values
- d) Literary
- e) Proficiency Modules
- f) Lectures by Eminent People
- g) Visits to local Areas
- h) Familiarization to Dept. & Innovations

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9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

Table-I: Course of study for semester I

Course code	Name of the course	No. of Hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I – Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
BP113CV	Comprehensive Viva-Voce [†] – I	-	-	-
Total		32/34[§]/36	4	27/29[§]/30

*Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

[§]Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

* Non University Examination (NUE)

[†]Non University Examination (NUE) with grading

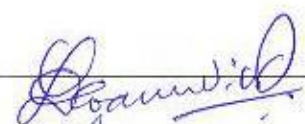

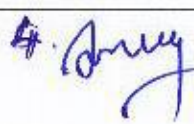


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Table-II: Course of study for semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
BP211CV	Comprehensive Viva-Voce [‡] – II	-	-	-
Total		32	4	29

* Non University Examination (NUE)

[‡] Non University Examination (NUE) with grading

Table-III: Course of study for semester III

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2
BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering –Practical	4	-	2
BP309CV	Comprehensive Viva-Voce [‡] – III	-	-	-
Total		28	4	24

[‡] Non University Examination (NUE) with grading


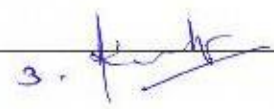
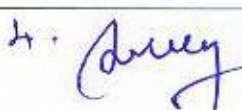

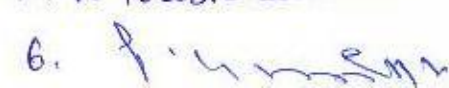
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Table-IV: Course of study for semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III- Theory	3	1	4
BP402T	Medicinal Chemistry I - Theory	3	1	4
BP403T	Physical Pharmaceutics II - Theory	3	1	4
BP404T	Pharmacology I - Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I- Theory	3	1	4
BP406P	Medicinal Chemistry I - Practical	4	-	2
BP407P	Physical Pharmaceutics II - Practical	4	-	2
BP408P	Pharmacology I - Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I - Practical	4	-	2
BP410CV	Comprehensive Viva-Voce ^e - IV	-	-	-
Total		31	5	28

^e Non University Examination (NUE) with grading

Table-V: Course of study for semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II - Theory	3	1	4
BP502T	Industrial PharmacyI- Theory	3	1	4
BP503T	Pharmacology II - Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II- Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence - Theory	3	1	4
BP506P	Industrial PharmacyI - Practical	4	-	2
BP507P	Pharmacology II - Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II - Practical	4	-	2
BP509CV	Comprehensive Viva-Voce ^e - V	-	-	-
Total		27	5	26

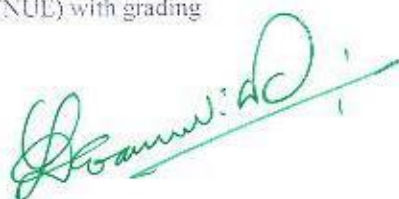
^e Non University Examination (NUE) with grading



Table-VI: Course of study for semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP601T	Medicinal Chemistry III – Theory	3	1	4
BP602T	Pharmacology III – Theory	3	1	4
BP603T	Herbal Drug Technology – Theory	3	1	4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	4
BP605T	Pharmaceutical Biotechnology – Theory	3	1	4
BP606T	Quality Assurance – Theory	3	1	4
BP607P	Medicinal chemistry III – Practical	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
BP610CV	Comprehensive Viva-Voce ^e – VI	-	-	-
Total		30	6	30

^e Non University Examination (NUE) with grading

Table-VII: Course of study for semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP701T	Instrumental Methods of Analysis – Theory	3	1	4
BP702T	Industrial PharmacyII – Theory	3	1	4
BP703T	Pharmacy Practice – Theory	3	1	4
BP704T	Novel Drug Delivery System – Theory	3	1	4
BP705P	Instrumental Methods of Analysis – Practical	4	-	2
BP706PS	Practice School*	12	-	6
BP707MC	Constitution of India ^e	-	-	-
BP708CV	Comprehensive Viva-Voce ^e – VII	-	-	-
Total		28	5	24

* Non University Examination (NUE)

^e Non University Examination (NUE) with grading

Table-VIII: Course of study for semester VIII

Course code	Name of the course	No. of Hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	Pharma Marketing Management	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardization of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology	12	-	6
BP811ET	Advanced Instrumentation Techniques			
BP812ET	Dietary Supplements and Nutraceuticals			
BP813PW	Project Work			
BP814MC	Essence of India Traditional Knowledge [†]	-	-	-
BP815CV	Comprehensive Viva-Voce [‡] – VIII	-	-	-
Total		24	4	22

[†] Non University Examination (NUE) with grading

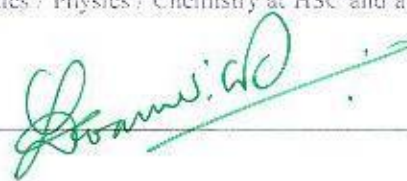

Table-IX: Semester wise credits distribution

Semester	Credit Points
I	27/29 ^b /30 ^a
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01 [*]
Total credit points for the program	209/211 ^b /212 ^a

* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

^aApplicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

^bApplicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

9.1 Mandatory Courses (Non credit courses)

Mandatory courses shall be conducted at

Semester VII – Constitution of India

Semester VIII – Essence of India Traditional Knowledge

Comprehensive viva-voce should be introduced with internal evaluation.

Comprehensive viva-voce shall be conducted at the end of every semester

10. Program Committee

1. The B. Pharm. program shall have a Program Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Program Committee shall be as follows:

A senior teacher shall be the Chairperson; One Teacher from each department handling B.Pharm courses; and four student representatives of the program (one from each academic year), nominated by the Head of the institution.

3. Duties of the Program Committee:

- i. Periodically reviewing the progress of the classes.
- ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
- iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
- iv. Communicating its recommendation to the Head of the institution on academic matters.
- v. The Program Committee shall meet at least thrice in a semester preferably at the end of each Sessional exam (Internal Assessment) and before the end semester exam.

11. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – X.

11.1 End semester examinations

The End Semester Examinations for each theory and practical course through semesters I to VIII shall be conducted by the university except for the subjects with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

Dr. Anand K. D.

S. H. Srinivas

Tables-X: Schemes for internal assessments and end semester examinations semester wise

Semester I


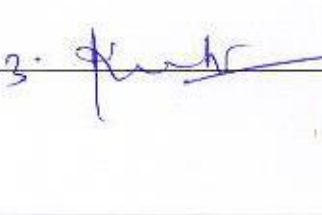
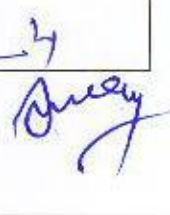
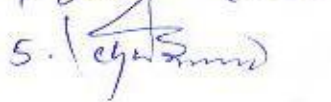

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP113CV	Comprehensive Viva-voce ⁵ - I	-	-	-	-	-	-	-
Total		70/75/80 ⁶	115/125/130 ⁶	23/24/26 ⁶ Hrs	185/200/210 ⁶	490/525/540 ⁶	31.5/33/35 ⁶ Hrs	675/725/750 ⁶

⁵ Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course.

⁶ Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

* Non University Examination(NUE)

⁴ Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)

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Semester II

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks	Duration	Total	Marks	Duration	
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP206T	Environmental sciences – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP207P	Human Anatomy and Physiology II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP208P	Pharmaceutical Organic Chemistry I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP209P	Biochemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP211CV	Comprehensive Viva-Voce [†] - II	-	-	-	-	-	-	-
Total		80	125	20 Hrs	205	520	30 Hrs	725





* The subject experts at college level shall conduct examinations

[†] Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)

Semester III

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP301T	Pharmaceutical Organic Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP302T	PhysicalPharmaceutical –Theory	10	15	1 Hr	25	75	3 Hrs	100
BP303T	Pharmaceutical Microbiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP304T	Pharmaceutical Engineering – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP306P	Physical Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP307P	Pharmaceutical Microbiology – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP308P	Pharmaceutical Engineering – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP309CV	Comprehensive Viva-Voce ⁶ - III	-	-	-	-	-	-	-
Total		60	100	20	160	440	28Hrs	600

⁶ Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)

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Semester IV

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP401T	Pharmaceutical Organic Chemistry III - Theory	10	15	1 Hr	25	75	3 Hrs	100
BP402T	Medicinal Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP403T	Physical Pharmaceutics II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP404T	Pharmacology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP405T	Pharmacognosy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP406P	Medicinal Chemistry I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP407P	Physical Pharmaceutics II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP408P	Pharmacology I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP409P	Pharmacognosy I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP410CV	Comprehensive Viva-voce ⁵ - IV	-	-	-	-	-	-	-
Total		70	115	21 Hrs	185	515	31 Hrs	700

⁵ Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)



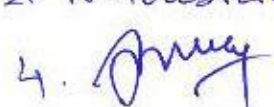
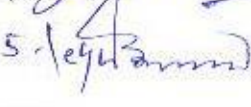

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Semester V

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks	Duration	Total	Marks	Duration	
BP501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP502T	Industrial Pharmacy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP503T	Pharmacology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP504T	Pharmacognosy II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP506P	Industrial Pharmacy I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP507P	Pharmacology II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP508P	Pharmacognosy II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP509CV	Comprehensive Viva-voce ^e - V	-	-	-	-	-	-	-
Total		65	105	17 Hr	170	480	27 Hrs	650

^e Non University Examination (NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)

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Semester VI

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks	Duration	Total	Marks	Duration	
BP601T	Medicinal Chemistry III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP602T	Pharmacology III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP603T	Herbal Drug Technology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP605T	Pharmaceutical Biotechnology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP606T	Quality Assurance – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP607P	Medicinal chemistry III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP608P	Pharmacology III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP609P	Herbal Drug Technology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP610CV	Comprehensive Viva-voce ⁶ - VI	-	-	-	-	-	-	-
Total		75	120	18 Hrs	195	555	30 Hrs	750

⁶ Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)




Semester VII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks	Exams Duration	Total	Marks	Duration	
BP701T	Instrumental Methods of Analysis – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP702T	Industrial Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP703T	Pharmacy Practice – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP704T	Novel Drug Delivery System – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP705 P	Instrumental Methods of Analysis – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP706 PS	Practice School*	25	-	-	25	125	5 Hrs	150
BP707MC	Constitution of India ⁵	-	-	-	-	-	-	-
BP708CV	Comprehensive Viva-voce ⁵ - VII	-	-	-	-	-	-	-
Total		70	70	8Hrs	140	460	21 Hrs	600

* The subject experts at college level shall conduct examinations

⁵ Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)



Semester VIII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks	Exams Duration	Total	Marks	Duration	
BP801T	Biostatistics and Research Methodology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP802T	Social and Preventive Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP803ET	Pharmaceutical Marketing – Theory							
BP804ET	Pharmaceutical Regulatory Science – Theory							
BP805ET	Pharmacovigilance – Theory							
BP806ET	Quality Control and Standardization of Herbs – Theory	10 + 10 = 20	15 + 15 = 30	1 + 1 = 2 Hrs	25 + 25 = 50	75 + 75 = 150	3 + 3 = 6 Hrs	100 + 100 = 200
BP807ET	Computer Aided Drug Design – Theory							
BP808ET	Cell and Molecular Biology – Theory							
BP809ET	Cosmetic Science – Theory							
BP810ET	Experimental Pharmacology – Theory							
BP811ET	Advanced Instrumentation Techniques – Theory							
BP812ET	Dietary Supplements and Nutraceuticals – Theory							
BP813PW	Project Work	-	-	-	-	150	4 Hrs	150
BP814MC	Essence of India Traditional Knowledge ^e	-	-	-	-	-	-	-
BP815CV	Comprehensive Viva-voce ^e - VII	-	-	-	-	-	-	-
Total		40	60	4 Hrs	100	450	16 Hrs	550

^e Non University Examination(NUE) and shall be graded as satisfactory (50% and above) / unsatisfactory (less than 50%)

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Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table-XI: Scheme for awarding internal assessment: Continuous mode

Theory		
Criteria	Maximum Marks	
Attendance (Refer Table – XII)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	10	5
Practical		
Attendance (Refer Table – XII)	2	
Based on Practical Records, Regular viva voce, etc.	3	
Total	5	

Table- XII: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

11.2.1 Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – X.

Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

Question paper pattern for theory Sessional examinations**For subjects having University examination**

I. Multiple Choice Questions (MCQs)	=	10 x 1 = 10
OR		OR
Objective Type Questions (5 x 2)	=	05 x 2 = 10
(Answer all the questions)		
I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 2 out of 3)	=	2 x 5 = 10

Total	=	30 marks

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For subjects having Non University Examination

I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 4 out of 6)	=	4 x 5 = 20

Total = 30 marks

Question paper pattern for practical sessional examinations

I. Synopsis	=	10
II. Experiments	=	25
III. Viva voce	=	05

Total = 40 marks

12. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of B.Pharm. program if he/she secures at least 50% marks in that particular course including internal assessment. For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

13. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

Clarification for Improvement of internal assessment

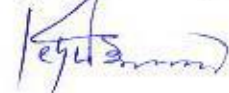
Whomever is opting for Improvement of internal assessment he/she must appear for end semester examination. In case of improvement of internal assessment the better marks should be considered. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

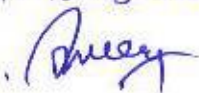
15. Re-examination of end semester examinations


Reexamination of end semester examinations shall be conducted as per the schedule given in table XIII. The exact dates of examinations shall be notified from time to time.

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Table-XIII: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I, III, V and VII	November / December	May / June
II, IV, VI and VIII	May / June	November / December

Question paper pattern for end semester theory examinations

For 75 marks paper

I. Multiple Choice Questions(MCQs) OR
Objective Type Questions (10 x 2)

= 20 x 1 = 20
OR
= 10 x 2 = 20

(Answer all the questions)

II. Long Answers (Answer 2 out of 3) = 2 x 10 = 20

**Note: Not more than one question from any one unit
(II. For Long Answers)**

III. Short Answers (Answer 7 out of 9) = 7 x 5 = 35

Total = 75 marks

Note: One question from each unit and not more than two questions from any one unit (III. For Short Answers)

For 50 marks paper

I. Long Answers (Answer 2 out of 3) = 2 x 10 = 20

II. Short Answers (Answer 6 out of 8) = 6 x 5 = 30

Total = 50 marks

For 35 marks paper

I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10

II. Short Answers (Answer 5 out of 7) = 5 x 5 = 25

Total = 35 marks

Question paper pattern for end semester practical examinations

I. Synopsis = 5

II. Experiments = 25

III. Viva voce = 5

Total = 35 marks

B. H. Srinivasan

16. Academic Progression:

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. Academic progression rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.

A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.

A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of I, II, III, IV, V and VI semesters are successfully completed.


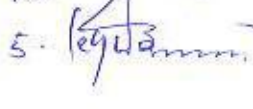
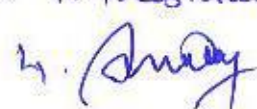
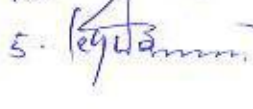
A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to VIII semesters within the stipulated time period as per the norms specified in 26.



A lateral entry student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of III and IV semesters are successfully completed.

A lateral entry student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of III, IV, V and VI semesters are successfully completed.

A lateral entry student shall be eligible to get his/her CGPA upon successful completion of the courses of III to VIII semesters within the stipulated time period as per the norms specified in 26.

Any student who has given more than 4 chances for successful completion of I / III semester courses and more than 3 chances for successful completion of II / IV semester courses shall be permitted to attend V / VII semester classes ONLY during the subsequent academic year as the case may be. In simpler terms there shall NOT be any ODD BATCH for any semester.

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Note: Grade AB should be considered as failed and treated as one head for deciding academic progression. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table – XII.

Table – XII: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

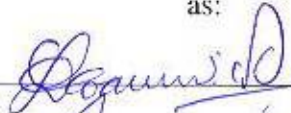


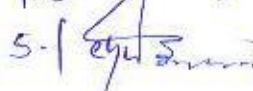
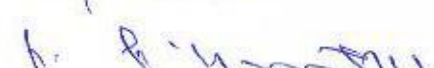
For mandatory courses, “Satisfactory” or “Unsatisfactory” shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called ‘Semester Grade Point Average’ (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C₁, C₂, C₃, C₄ and C₅ and the student’s grade points in these courses are G₁, G₂, G₃, G₄ and G₅, respectively, and then students’ SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and AB grade awarded in that semester. For example if a learner has a F or AB grade in course 4, the SGPA shall then be computed as:

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$$C_1G_1 + C_2G_2 + C_3G_3 + C_4 \text{ ZERO} + C_5G_5$$

$$\text{SGPA} = \frac{\text{C}_1\text{G}_1 + \text{C}_2\text{G}_2 + \text{C}_3\text{G}_3 + \text{C}_4 \text{ ZERO} + \text{C}_5\text{G}_5}{\text{C}_1 + \text{C}_2 + \text{C}_3 + \text{C}_4 + \text{C}_5}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{\text{C}_1\text{S}_1 + \text{C}_2\text{S}_2 + \text{C}_3\text{S}_3 + \text{C}_4\text{S}_4 + \text{C}_5\text{S}_5 + \text{C}_6\text{S}_6 + \text{C}_7\text{S}_7 + \text{C}_8\text{S}_8}{\text{C}_1 + \text{C}_2 + \text{C}_3 + \text{C}_4 + \text{C}_5 + \text{C}_6 + \text{C}_7 + \text{C}_8}$$

where C_1, C_2, C_3, \dots is the total number of credits for semester I, II, III, ..., and S_1, S_2, S_3, \dots is the SGPA of semester I, II, III, ...

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a project under the supervision of a teacher and submit a report. The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). The projects shall be evaluated as per the criteria given below.

1. *[Signature]* 2. N. Krishnan 3. *[Signature]*
 4. *[Signature]* 5. *[Signature]* 6. *[Signature]*

Evaluation of Dissertation Book:

Objective(s) of the work done	15 Marks
Methodology adopted	20 Marks
Results and Discussions	20 Marks
Conclusions and Outcomes	20 Marks

Total	75 Marks
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Evaluation of Presentation:

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks

Total	75 Marks
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Explanation: The 75 marks assigned to the dissertation book shall be same for all the students in a group. However, the 75 marks assigned for presentation shall be awarded based on the performance of individual students in the given criteria.

22. Industrial training (Desirable)

Every candidate shall be required to work for at least 150 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

23. Practice School

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time.

At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

Details for conduct of Practice School

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice

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 4. *[Signature]* 5. *[Signature]* 6. *[Signature]*

school as declared by the program committee from time to time.

The program committee shall discuss with various departments in the college and shall provide the Practice School module which the students can opt to enhance their specific skill as desired by them and perform in the college premises only.

For example:

Quality control & Quality assurance of Pharmaceuticals, Manufacturing of dosage forms and their evaluation, Extraction of phytoconstituents etc.,

24. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

25. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

26. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

27. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the program by paying the required fees.

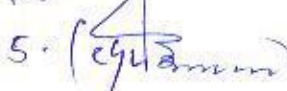
28. A Socially/ Community Health relevant Projects/ Extracurricular/Co curricular activities

The student has to spend 15 Hrs./semester on any socially/ community health relevant projects (Health awareness – communicable, non-communicable disorders and diseases, nutritional deficiency disorders, Health as per WHO guidelines, prevention of disorder and diseases, Immunization significance and life style modification) and submit a report for evaluation. This shall be evaluated by a committee consisting of Principal, Head of the department, Project mentor and one senior faculty member of the department.

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ACADEMIC REGULATIONS FOR B.PHARM (R19)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2019-2020 and onwards)

1. Award of B.Pharm Degree

A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B. Pharm degree if the student fulfills the following academic regulations:

- a) Pursues a course of study for not less than three academic years and not more than six academic years.
- b) A student shall register and put up minimum 157/159^{\$}/160[#] credits and the minimum credit points required for award of a B. Pharm. degree is 156.

* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

^{\$}Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.



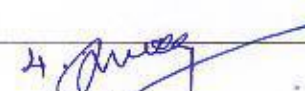


[#]Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

- c) Students who fail to earn 208 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Pharm course and their admission shall stand cancelled

Students, who fail to fulfill the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

2. The regulations are to be adopted as that of B. Pharm (Regular).

All other regulations as applicable for B. Pharmacy Four-year degree course (Regular) will hold good for B. Pharm (Lateral Entry Scheme).

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CHAPTER - II: SYLLABUS

Semester I

BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

Course Content:

Unit I

10 hours

- **Introduction to human body**

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

- **Cellular level of organization**

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

- **Tissue level of organization**

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II

10 hours

- **Integumentary system**

Structure and functions of skin

- **Skeletal system**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**

Structural and functional classification, types of joints movements and its articulation

Unit III

10 hours

- **Body fluids and blood**

- Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

- **Lymphatic system**

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV

08 hours

Peripheral nervous system:

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

- **Special senses**

Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V

07 hours

- **Cardiovascular system**

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

BP102T. PHARMACEUTICAL ANALYSIS (Theory)

45 Hours

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Objectives: Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

Course Content:

UNIT-I

10 Hours

(a) **Pharmaceutical analysis**- Definition and scope

- i) Different techniques of analysis
- ii) Methods of expressing concentration
- iii) Primary and secondary standards.
- iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b)**Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

(c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

UNIT-II

10 Hours

- **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III

10 Hours

- **Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.
- Basic Principles,methods and application of diazotisation titration.

UNIT-IV

08 Hours

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V

07 Hours

- **Electrochemical methods of analysis**
 - **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications.
 - **Potentiometry** - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.
 - **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

I Limit Test of the following

- (1) Chloride
- (2) Sulphate
- (3) Iron
- (4) Arsenic

II Preparation and standardization of

- (1) Sodium hydroxide
- (2) Sulphuric acid
- (3) Sodium thiosulfate
- (4) Potassium permanganate
- (5) Ceric ammonium sulphate

III Assay of the following compounds along with Standardization of Titrant

- (1) Ammonium chloride by acid base titration
- (2) Ferrous sulphate by Cerimetry
- (3) Copper sulphate by Iodometry
- (4) Calcium gluconate by complexometry
- (5) Hydrogen peroxide by Permanganometry
- (6) Sodium benzoate by non-aqueous titration
- (7) Sodium Chloride by precipitation titration

IV Determination of Normality by electro-analytical methods

- (1) Conductometric titration of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base

Recommended Books: (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

BP103T. PHARMACEUTICS- I (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Content:

UNIT – I

10 Hours

- **Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II

10 Hours

- **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
- **Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT – III

08 Hours

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
- **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.
- **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

UNIT – IV

08 Hours

- **Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIT – V

07 Hours

- **Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosage forms

1 . Syrups

- a) Syrup IP'66
- b) Compound syrup of Ferrous Phosphate BPC'68

2. Elixirs

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

3.Linctus

- a) Terpin Hydrate Linctus IP'66
- b) Iodine Throat Paint (Mandles Paint)

4. Solutions

- a) Strong solution of ammonium acetate
- b) Cresol with soap solution
- c) Lugol's solution

5. Suspensions

- a) Calamine lotion
- b) Magnesium Hydroxide mixture
- c) Aluminium Hydroxide gel

6. Emulsions

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

7. Powders and Granules

- a) ORS powder (WHO)
- b) Effervescent granules
- c) Dusting powder
- d) Divided powders

8. Suppositories

- a) Glycero gelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

8. Semisolids

- a) Sulphur ointment
- b) Non staining-iodine ointment with methyl salicylate
- c) Carbopal gel

9. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash

Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Objectives: Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

UNIT I

10 Hours

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

General methods of preparation, assay for the compounds superscripted with **asterisk (*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II

10 Hours

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III

10 Hours

- **Gastrointestinal agents**

Acidifiers: Ammonium chloride* and Dil. HCl

Antacid: Ideal properties of antacids, combinations of antacids, Sodium

Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

UNIT IV

08 Hours

- **Miscellaneous compounds**

Expectorants: Potassium iodide, Ammonium chloride*.

Emetics: Copper sulphate*, Sodium potassium tartarate

Haematinics: Ferrous sulphate*, Ferrous gluconate

Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite

Astringents: Zinc Sulphate, Potash Alum

UNIT V

07 Hours

- **Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131} , Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

4 Hours / Week

I Limit tests for following ions

Limit test for Chlorides and Sulphates
Modified limit test for Chlorides and Sulphates
Limit test for Iron
Limit test for Heavy metals
Limit test for Lead
Limit test for Arsenic

II Identification test

Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate

III Test for purity

Swelling power of Bentonite
Neutralizing capacity of aluminum hydroxide gel
Determination of potassium iodate and iodine in potassium Iodide

IV Preparation of inorganic pharmaceuticals

Boric acid
Potash alum
Ferrous sulphate

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian

Pharmacopoeia

BP105T.COMMUNICATION SKILLS (Theory)

30 Hours

Scope: This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Objectives:

Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

Course content:

UNIT – I

07 Hours

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT – II

07 Hours

- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

UNIT – III

07 Hours

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT – IV

05 Hours

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT – V

04 Hours

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

BP111P.COMMUNICATION SKILLS (Practical)

2 Hours / week

The following learning modules are to be conducted using wordsworth[®] English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

Recommended Books: (Latest Edition)

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1st Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1st Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5th Edition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2nd Edition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1st Edition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1st Edition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4th Edition, Pan Mac Millan, 2009
12. Bringing out the best in people, Aubrey Daniels, 2nd Edition, Mc Graw Hill, 1999

BP 106RBT.REMEDIAL BIOLOGY (Theory)

30 Hours

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Objectives: Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

UNIT I

07 Hours

Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,

Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones.

UNIT II

07 Hours

Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes

UNIT III

07 Hours

Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

UNIT IV

05 Hours

Plants and mineral nutrition:

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

UNIT V

04 Hours

Plant respiration:Respiration, glycolysis, fermentation (anaerobic).

Plant growth and development

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

Cell - The unit of life

- Structure and functions of cell and cell organelles.Cell division

Tissues

- Definition, types of tissues, location and functions.

Text Books

- a. Text book of Biology by S. B. Gokhale
- b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books

- a. A Text book of Biology by B.V. Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d.Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

BP112RBP.REMEDIAL BIOLOGY (Practical)

30 Hours

1. Introduction to experiments in biology
 - a) Study of Microscope
 - b) Section cutting techniques
 - c) Mounting and staining
 - d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root
Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

BP 106RMT.REMEDIAL MATHEMATICS (Theory)

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Course Content:

UNIT – I

06 Hours

- **Partial fraction**

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

- **Logarithms**

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

- **Function:**

Real Valued function, Classification of real valued functions,

- **Limits and continuity :**

Introduction, Limit of a function, Definition of limit of a function ($\epsilon - \delta$

definition), $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$, $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$,

UNIT –II

06 Hours

- **Matrices and Determinant:**

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley-Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

UNIT – III

06 Hours

- **Calculus**

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of x^n w.r.t x , where n is any rational number, Derivative of e^x , Derivative of $\log_e x$, Derivative of a^x , Derivative of trigonometric functions from first principles (**without Proof**), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT – IV

06 Hours

- **Analytical Geometry**

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V

06 Hours

- **Differential Equations** : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
- **Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended Books (Latest Edition)

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal

Semester II

BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Content:

Unit I

10 hours

- **Nervous system**

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

Unit II

06 hours

- **Digestive system**

Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine

and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

- **Energetics**

Formation and role of ATP, Creatinine Phosphate and BMR.

Unit III

- **Respiratory system**

10 hours

Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

- **Urinary system**

Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Unit IV

10 hours

- **Endocrine system**

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

Unit V

09 hours

- **Reproductive system**

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

- **Introduction to genetics**

Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA

4. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)

45 Hours

Scope: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT-I

07 Hours

- **Classification, nomenclature and isomerism**

Classification of Organic Compounds

Common and IUPAC systems of nomenclature of organic compounds

(up to 10 Carbons open chain and carbocyclic compounds)

Structural isomerisms in organic compounds

UNIT-II 10 Hours

- **Alkanes*, Alkenes* and Conjugated dienes***

SP³ hybridization in alkanes, Halogenation of alkanes, uses of paraffins.

Stabilities of alkenes, SP² hybridization in alkenes

E₁ and E₂ reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E₁ versus E₂ reactions, Factors affecting E₁ and E₂ reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III 10 Hours

- **Alkyl halides***

SN₁ and SN₂ reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

SN₁ versus SN₂ reactions, Factors affecting SN₁ and SN₂ reactions

Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

- **Alcohols***- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV 10 Hours

- **Carbonyl compounds* (Aldehydes and ketones)**

Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V

08 Hours

- **Carboxylic acids***

Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester

Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

- **Aliphatic amines*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)

4 Hours / week

1. Systematic qualitative analysis of unknown organic compounds like
 1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
 2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
 3. Solubility test
 4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
 5. Melting point/Boiling point of organic compounds
 6. Identification of the unknown compound from the literature using melting point/ boiling point.
 7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
 8. Minimum 5 unknown organic compounds to be analysed systematically.
2. Preparation of suitable solid derivatives from organic compounds
3. Construction of molecular models

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

BP203 T. BIOCHEMISTRY (Theory)

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: Upon completion of course student shall be able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

UNIT I

08 Hours

- **Biomolecules**

Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

- **Bioenergetics**

Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP and cyclic AMP

UNIT II

10 Hours

- **Carbohydrate metabolism**

Glycolysis – Pathway, energetics and significance

Citric acid cycle- Pathway, energetics and significance

HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

Glycogen metabolism Pathways and glycogen storage diseases (GSD)

Gluconeogenesis- Pathway and its significance

Hormonal regulation of blood glucose level and Diabetes mellitus

- **Biological oxidation**

Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate level phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

UNIT III

10 Hours

- **Lipid metabolism**

- Oxidation of saturated fatty acid (Palmitic acid)

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

- **Amino acid metabolism**

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

Catabolism of heme; hyperbilirubinemia and jaundice

UNIT IV

10 Hours

- **Nucleic acid metabolism and genetic information transfer**

Biosynthesis of purine and pyrimidine nucleotides

Catabolism of purine nucleotides and Hyperuricemia and Gout disease

Organization of mammalian genome

Structure of DNA and RNA and their functions

DNA replication (semi conservative model)

Transcription or RNA synthesis

Genetic code, Translation or Protein synthesis and inhibitors

UNIT V

07 Hours

- **Enzymes**

Introduction, properties, nomenclature and IUB classification of enzymes

Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

Enzyme inhibitors with examples

Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation

Therapeutic and diagnostic applications of enzymes and isoenzymes

Coenzymes –Structure and biochemical functions

BP 209 P. BIOCHEMISTRY (Practical)

4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

BP 204T.PATHOPHYSIOLOGY (THEORY)

45Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states;
2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

Course content:

Unit I

10Hours

- **Basic principles of Cell injury and Adaptation:**
Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance

- **Basic mechanism involved in the process of inflammation and repair:**

Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

Unit II

10Hours

- **Cardiovascular System:**

Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)

- **Respiratory system:** Asthma, Chronic obstructive airways diseases.
- **Renal system:** Acute and chronic renal failure .

Unit II

10Hours

- **Haematological Diseases:**

Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia

- **Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones
- **Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
- **Gastrointestinal system:** Peptic Ulcer
-

Unit IV

8 Hours

- Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
- **Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout
- **Principles of cancer:** classification, etiology and pathogenesis of cancer
- **Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout
- **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer

Unit V

7 Hours

- **Infectious diseases:** Meningitis, Typhoid, Leprosy, Tuberculosis

Urinary tract infections

- **Sexually transmitted diseases:** AIDS, Syphilis, Gonorrhea

Recommended Books (Latest Editions)

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore; 1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

Recommended Journals

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)

30 Hrs (2 Hrs/Week)

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Objectives: Upon completion of the course the student shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course content:

UNIT – I

06 hours

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT –II

06 hours

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT – III

06 hours

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring

Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT – IV

06 hours

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V

06 hours

Computers as data analysis in Preclinical development:
Chromatographic data analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMs)

BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard , generating label in MS WORD
5. Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Wiley and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

Scope:Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Objectives: Upon completion of the course the student shall be able to:

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Course content:

Unit-I

10hours

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-II

10hours

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III

10hours

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment

SEMESTER III

BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)

45 Hours

Scope: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Objectives: Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. prepare organic compounds

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT I

10 Hours

- **Benzene and its derivatives**

- A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
- B. Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation.
- C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
- D. Structure and uses of DDT, Saccharin, BHC and Chloramine

UNIT II

10 Hours

- **Phenols*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols
- **Aromatic Amines*** - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts
- **Aromatic Acids*** –Acidity, effect of substituents on acidity and important reactions of benzoic acid.

UNIT III

10 Hours

- **Fats and Oils**

- a. Fatty acids – reactions.

- b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.
- c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

UNIT IV

08 Hours

- **Polynuclear hydrocarbons:**

- a. Synthesis, reactions
- b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

UNIT V

07 Hours

- **Cyclo alkanes***

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)

4 Hrs/week

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III Preparation of compounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction
- Cinnamic acid from Benzaldehyde by Perkin reaction
- *P*-Iodo benzoic acid from *P*-amino benzoic acid

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.

8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

BP302T. PHYSICAL PHARMACEUTICS-I (Theory)

45Hours

Scope: The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I

10 Hours

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

UNIT-II

10Hours

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism.

Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

UNIT-III

08 Hours

Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions,

surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

UNIT-IV**08Hours**

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

UNIT-V**07 Hours**

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

BP306P. PHYSICAL PHARMACEUTICS – I (Practical)

4 Hrs/week

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl₄ and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)

45Hours

Scope:

- Study of all categories of microorganisms especially for the production of alcohol antibiotics, vaccines, vitamins enzymes etc..

Objectives: Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Course content:

Unit I

10 Hours

Introduction, history of microbiology, its branches, scope and its importance.

Introduction to Prokaryotes and Eukaryotes

Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count).

Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

Unit II

10 Hours

Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC).

Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous, radiation and mechanical method of sterilization.

Evaluation of the efficiency of sterilization methods.

Equipments employed in large scale sterilization.

Sterility indicators.

Unit III

10 Hours

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses.

Classification and mode of action of disinfectants

Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions

Evaluation of bactericidal & Bacteriostatic.

Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Unit IV

08 Hours

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification.

Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids.

Assessment of a new antibiotic.

Unit V

07Hours

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage.

Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.

Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.

Application of cell cultures in pharmaceutical industry and research.

BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)

4 Hrs/week

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Recommended Books (Latest edition)

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Pepler: Microbial Technology.
9. I.P., B.P., U.S.P.- latest editions.
10. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
11. Edward: Fundamentals of Microbiology.
12. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
13. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

Objectives: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course content:

UNIT-I

10 Hours

- **Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.
- **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.
- **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

UNIT-II

10 Hours

- **Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

- **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator.
- **Distillation:** Basic Principles and methodology of simple distillation,flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

UNIT- III

08 Hours

- **Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.
- **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

UNIT-IV

08 Hours

- **Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.
- **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

UNIT- V

07 Hours

- **Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceuticals- C.V.S Subrahmanyam et al., Latest edition.
8. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

BP308P - PHARMACEUTICAL ENGINEERING (Practical)

4 Hours/week

- I. Determination of radiation constant of brass, iron, unpainted and painted glass.
- II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient by heat exchanger.
- IV. Construction of drying curves (for calcium carbonate and starch).
- V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
- VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots.
- IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
- X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
- XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
- XII. To study the effect of time on the Rate of Crystallization.
- XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

SEMESTER IV

BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)

45 Hours

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Objectives: At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds

Course Content:

Note: To emphasize on definition, types, mechanisms, examples, uses/applications

UNIT-I

10 Hours

Stereo isomerism

Optical isomerism –

Optical activity, enantiomerism, diastereoisomerism, meso compounds

Elements of symmetry, chiral and achiral molecules

DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers

Reactions of chiral molecules

Racemic modification and resolution of racemic mixture.

Asymmetric synthesis: partial and absolute

UNIT-II

10 Hours

Geometrical isomerism

Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)

Methods of determination of configuration of geometrical isomers.

Conformational isomerism in Ethane, n-Butane and Cyclohexane.

Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.

Stereospecific and stereoselective reactions

UNIT-III

10 Hours

Heterocyclic compounds:

Nomenclature and classification

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrrole, Furan, and Thiophene

Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene

UNIT-IV**8 Hours**

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrazole, Imidazole, Oxazole and Thiazole.

Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine

Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

UNIT-V**07 Hours****Reactions of synthetic importance**

Metal hydride reduction (NaBH_4 and LiAlH_4), Clemmensen reduction, Birch reduction, Wolff Kishner reduction.

Oppenauer-oxidation and Dakin reaction.

Beckmanns rearrangement and Schmidt rearrangement.

Claisen-Schmidt condensation

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal
4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchrist

BP402T. MEDICINAL CHEMISTRY – I (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I

10 Hours

Introduction to Medicinal Chemistry

History and development of medicinal chemistry

Physicochemical properties in relation to biological action

Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.

Drug metabolism

Drug metabolism principles- Phase I and Phase II.

Factors affecting drug metabolism including stereo chemical aspects.

UNIT- II

10 Hours

Drugs acting on Autonomic Nervous System

Adrenergic Neurotransmitters:

Biosynthesis and catabolism of catecholamine.

Adrenergic receptors (Alpha & Beta) and their distribution.

Sympathomimetic agents: SAR of Sympathomimetic agents

Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine,

Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
- Agents with mixed mechanism: Ephedrine, Metaraminol.

Adrenergic Antagonists:

Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.

Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

UNIT-III

10 Hours

Cholinergic neurotransmitters:

Biosynthesis and catabolism of acetylcholine.

Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.

Parasympathomimetic agents: SAR of Parasympathomimetic agents

Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.

Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorophate, Echothiophate iodide, Parathione, Malathion.

Cholinesterase reactivator: Pralidoxime chloride.

Cholinergic Blocking agents: SAR of cholinolytic agents

Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.

Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

UNIT- IV

08 Hours

Drugs acting on Central Nervous System

A. Sedatives and Hypnotics:

Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem

Barbiturates: SAR of barbiturates, Barbitol*, Phenobarbital, Mephobarbital, Amobarbital, Butobarbital, Pentobarbital, Secobarbital

Miscellaneous:

Amides & imides: Glutethimide.

Alcohol & their carbamate derivatives: Meprobamate, Ethchlorvynol.

Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.

B. Antipsychotics

Phenothiazines: SAR of Phenothiazines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.

Ring Analogues of Phenothiazines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.

Fluorobutyrophenones: Haloperidol, Droperidol, Risperidone.

Beta amino ketones: Molindone hydrochloride.

Benzamides: Sulpieride.

C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action

Barbiturates: Phenobarbitone, Methobarbital. **Hydantoins:**

Phenytoin*, Mephentyoin, Ethotoin **Oxazolidine diones:**

Trimethadione, Paramethadione **Succinimides:**

Phensuximide, Methsuximide, Ethosuximide* **Urea and**

monoacylureas: Phenacemide, Carbamazepine*

Benzodiazepines: Clonazepam

Miscellaneous: Primidone, Valproic acid, Gabapentin, Felbamate

UNIT – V

07 Hours

Drugs acting on Central Nervous System

General anesthetics:

Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.

Ultra short acting barbiturates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.

Dissociative anesthetics: Ketamine hydrochloride.*

Narcotic and non-narcotic analgesics

Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anileridine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.

Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.

BP406P. MEDICINAL CHEMISTRY – I (Practical)

4 Hours/Week

I Preparation of drugs/ intermediates

- 1 1,3-pyrazole
- 2 1,3-oxazole
- 3 Benzimidazole
- 4 Benztriazole
- 5 2,3- diphenyl quinoxaline
- 6 Benzocaine
- 7 Phenytoin
- 8 Phenothiazine
- 9 Barbiturate

II Assay of drugs

- 1 Chlorpromazine
- 2 Phenobarbitone
- 3 Atropine
- 4 Ibuprofen
- 5 Aspirin
- 6 Furosemide

III Determination of Partition coefficient for any two drugs

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)

45Hours

Scope: The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Content:

UNIT-I

07 Hours

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.

UNIT-II

10 Hours

Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

UNIT-III

10 Hours

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

UNIT-IV

10Hours

Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

UNIT-V

10 Hours

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

BP 407P. PHYSICAL PHARMACEUTICS- II (Practical)

3 Hrs/week

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

BP 404 T. PHARMACOLOGY-I (Theory)

45 Hrs

Scope: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Objectives: Upon completion of this course the student should be able to

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

Course Content:

UNIT-I

08 hours

1. General Pharmacology

- a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.
- b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

UNIT-II

12 Hours

General Pharmacology

- a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action.
- b. Adverse drug reactions.
- c. Drug interactions (pharmacokinetic and pharmacodynamic)
- d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

UNIT-III**10 Hours****2. Pharmacology of drugs acting on peripheral nervous system**

- a. Organization and function of ANS.
- b. Neurohumoral transmission, co-transmission and classification of neurotransmitters.
- c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics.
- d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).
- e. Local anesthetic agents.
- f. Drugs used in myasthenia gravis and glaucoma

UNIT-IV**08 Hours****3. Pharmacology of drugs acting on central nervous system**

- a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.
- b. General anesthetics and pre-anesthetics.
- c. Sedatives, hypnotics and centrally acting muscle relaxants.
- d. Anti-epileptics
- e. Alcohols and disulfiram

UNIT-V**07 Hours****3. Pharmacology of drugs acting on central nervous system**

- a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.
- b. Drugs used in Parkinson's disease and Alzheimer's disease.
- c. CNS stimulants and nootropics.
- d. Opioid analgesics and antagonists
- e. Drug addiction, drug abuse, tolerance and dependence.

BP 408 P.PHARMACOLOGY-I (Practical)

4Hrs/Week

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology

6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,

BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

45 Hours

Scope: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

Objectives: Upon completion of the course, the student shall be able

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

Course Content:

UNIT-I

10 Hours

Introduction to Pharmacognosy:

- (a) Definition, history, scope and development of Pharmacognosy
- (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture
- (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

UNIT-II

10 Hours

Cultivation, Collection, Processing and storage of drugs of natural origin:

Cultivation and Collection of drugs of natural origin
Factors influencing cultivation of medicinal plants.
Plant hormones and their applications.
Polyploidy, mutation and hybridization with reference to medicinal plants

Conservation of medicinal plants

UNIT-III

07 Hours

Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.

Applications of plant tissue culture in pharmacognosy.

Edible vaccines

UNIT IV

10 Hours

Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

Introduction to secondary metabolites:

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

UNIT V

08 Hours

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

Fibers - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

Marine Drugs:

Novel medicinal agents from marine sources

BP408 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)

4 Hours/Week

1. Analysis of crude drugs by chemical tests: (i) Tragacanth (ii) Acacia (iii) Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and palisade ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Recommended Books: (Latest Editions)

1. W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhale (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr. S.H. Ansari, 1st edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhale
9. Anatomy of Crude Drugs by M.A. Iyengar

SEMESTER V

BP501T. MEDICINAL CHEMISTRY – II (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Objectives: Upon completion of the course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I

10 Hours

Antihistaminic agents: Histamine, receptors and their distribution in the humanbody

H₁-antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium

H₂-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole

Anti-neoplastic agents:

Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan,

Chlorambucil, Busulfan, Thiotepa

Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine

Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT – II

10 Hours

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.

Diuretics:

Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide.

Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide,

Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid.

Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.

Osmotic Diuretics: Mannitol

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT- III

10 Hours

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcanide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

UNIT- IV

08 Hours

Drugs acting on Endocrine system

Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.

Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol

Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

UNIT – V

07 Hours

Antidiabetic agents:

Insulin and its preparations

Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin.

Thiazolidinediones: Pioglitazone, Rosiglitazone.

Meglitinides: Repaglinide, Nateglinide.

Glucosidase inhibitors: Acarbose, Voglibose.

Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Mepylcaine, Cyclomethycaine, Piperocaine.

Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.

Miscellaneous: Phenacaine, Dipreron, Dibucaine.*

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP 502 T. Industrial PharmacyI (Theory)

45 Hours

Scope: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Objectives: Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:

3 hours/ week

UNIT-I

07 Hours

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization

BCS classification of drugs & its significant

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

UNIT-II

10 Hours

Tablets:

- a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.
- b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.
- c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

UNIT-III

08 Hours

Capsules:

- a. **Hard gelatin capsules:** Introduction, Production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.
- b. **Soft gelatin capsules:** Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

UNIT-IV

10 Hours

Parenteral Products:

- a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity
- b. Production procedure, production facilities and controls, aseptic processing
- c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.
- d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

UNIT-V

10 Hours

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

BP 506 P. Industrial PharmacyI (Practical)

4 Hours/week

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman &J.B.Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

BP503.T. PHARMACOLOGY-II (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Course Content:

UNIT-I

10hours

1. Pharmacology of drugs acting on cardio vascular system

- a. Introduction to hemodynamic and electrophysiology of heart.
- b. Drugs used in congestive heart failure
- c. Anti-hypertensive drugs.
- d. Anti-anginal drugs.
- e. Anti-arrhythmic drugs.
- f. Anti-hyperlipidemic drugs.

UNIT-II

10hours

1. Pharmacology of drugs acting on cardio vascular system

- a. Drug used in the therapy of shock.
- b. Hematinics, coagulants and anticoagulants.
- c. Fibrinolytics and anti-platelet drugs
- d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

- a. Diuretics
- b. Anti-diuretics.

UNIT-III

10hours

3. Autocoids and related drugs

- a. Introduction to autocoids and classification
- b. Histamine, 5-HT and their antagonists.
- c. Prostaglandins, Thromboxanes and Leukotrienes.
- d. Angiotensin, Bradykinin and Substance P.
- e. Non-steroidal anti-inflammatory agents
- f. Anti-gout drugs
- g. Antirheumatic drugs

UNIT-IV**08hours****5. Pharmacology of drugs acting on endocrine system**

- a. Basic concepts in endocrine pharmacology.
- b. Anterior Pituitary hormones- analogues and their inhibitors.
- c. Thyroid hormones- analogues and their inhibitors.
- d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
- d. Insulin, Oral Hypoglycemic agents and glucagon.
- e. ACTH and corticosteroids.

UNIT-V**07hours****5. Pharmacology of drugs acting on endocrine system**

- a. Androgens and Anabolic steroids.
- b. Estrogens, progesterone and oral contraceptives.
- c. Drugs acting on the uterus.

6. Bioassay

- a. Principles and applications of bioassay.
- b. Types of bioassay
- c. Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5-HT

BP 507 P. PHARMACOLOGY-II (Practical)

4Hrs/Week

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA_2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD_2 value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert.
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)

45Hours

Scope: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Objectives: Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content:

UNIT-I

7 Hours

Metabolic pathways in higher plants and their determination

- a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
- b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II

14 Hours

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,

Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta

Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis

Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,

Tannins: Catechu, Pterocarpus

Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

Glycosides: Senna, Aloes, Bitter Almond

Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III

06 Hours

Isolation, Identification and Analysis of Phytoconstituents

- a) Terpenoids: Menthol, Citral, Artemisin
- b) Glycosides: Glycyrrhetic acid & Rutin
- c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine
- d) Resins: Podophyllotoxin, Curcumin

UNIT-IV

10 Hours

Industrial production, estimation and utilization of the following phytoconstituents:

Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT V

8 Hours

Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)

4 Hours/Week

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
 - a. Caffeine - from tea dust.
 - b. Diosgenin from Dioscorea
 - c. Atropine from Belladonna
 - d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstituents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhale (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, 2nd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

Scope: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Objectives: Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Content:

UNIT-I

10 Hours

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT-II

10 Hours

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III

10 Hours

- **Pharmacy Act –1948:** Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and

Penalties

- **Medicinal and Toilet Preparation Act –1955:** Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.
- **Narcotic Drugs and Psychotropic substances Act-1985 and Rules:** Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV

08 Hours

- **Study of Salient Features of Drugs and Magic Remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
- **Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
- **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

UNIT-V

07 Hours

- **Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
- **Code of Pharmaceutical ethics** Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
- **Medical Termination of Pregnancy Act**
- **Right to Information Act**
- **Introduction to Intellectual Property Rights (IPR)**

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh

2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)

SEMESTER VI

BP601T. MEDICINAL CHEMISTRY – III (Theory)

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

Objectives: Upon completion of the course student shall be able to

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

UNIT – I

10 Hours

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

-Lactam antibiotics: Penicillin, Cephalosporins, - Lactamase inhibitors, Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II

10 Hours

Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria.

Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.

Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunate, Artemether, Atovaquone.

UNIT – III

10 Hours

Anti-tubercular Agents

Synthetic anti tubercular agents: Isoniazid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*

Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycin, Capreomycin sulphate.

Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents:

Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirdine, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT – IV

08 Hours

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole, Tioconazole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.

Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantel, Ivermectin.

Sulphonamides and Sulfones

Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxazole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.

Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.

Sulfones: Dapsone*.

UNIT – V

07 Hours

Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammett's electronic parameter, Taft's steric parameter and Hansch analysis.

Pharmacophore modeling and docking techniques.

Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

BP607P. MEDICINAL CHEMISTRY- III (Practical)

4 Hours / week

I Preparation of drugs and intermediates

- 1 Sulphanilamide
- 2 7-Hydroxy, 4-methyl coumarin
- 3 Chlorobutanol
- 4 Triphenyl imidazole
- 5 Tolbutamide
- 6 Hexamine

II Assay of drugs

- 1 Isonicotinic acid hydrazide
- 2 Chloroquine
- 3 Metronidazole
- 4 Dapsone
- 5 Chlorpheniramine maleate
- 6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

BP602 T. PHARMACOLOGY-III (Theory)

45 Hours

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.

Objectives: Upon completion of this course the student should be able to:

1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
2. comprehend the principles of toxicology and treatment of various poisonings and
3. appreciate correlation of pharmacology with related medical sciences.

Course Content:

UNIT-I

10hours

1. Pharmacology of drugs acting on Respiratory system

- a. Anti -asthmatic drugs
- b. Drugs used in the management of COPD
- c. Expectorants and antitussives
- d. Nasal decongestants
- e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

- a. Antiulcer agents.
- b. Drugs for constipation and diarrhoea.
- c. Appetite stimulants and suppressants.
- d. Digestants and carminatives.
- e. Emetics and anti-emetics.

UNIT-II

10hours

3. Chemotherapy

- a. General principles of chemotherapy.
- b. Sulfonamides and cotrimoxazole.
- c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolones, tetracycline and aminoglycosides

UNIT-III

10hours

3. Chemotherapy

- a. Antitubercular agents
- b. Antileprotic agents

- c. Antifungal agents
- d. Antiviral drugs
- e. Anthelmintics
- f. Antimalarial drugs
- g. Antiamoebic agents

UNIT-IV

08hours

3. Chemotherapy

- l. Urinary tract infections and sexually transmitted diseases.
- m. Chemotherapy of malignancy.

4. Immunopharmacology

- a. Immunostimulants
- b. Immunosuppressant

Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V

07hours

5. Principles of toxicology

- a. Definition and basic knowledge of acute, subacute and chronic toxicity.
- b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity
- c. General principles of treatment of poisoning
- d. Clinical symptoms and management of barbiturates, morphine, organophosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

- a. Definition of rhythm and cycles.
- b. Biological clock and their significance leading to chronotherapy.

BP 608 P. PHARMACOLOGY-III (Practical)

4Hrs/Week

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
10. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)

45 hours

Scope: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Objectives: Upon completion of this course the student should be able to:

1. understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP .

Course content:

UNIT-I

11 Hours

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation

Source of Herbs

Selection, identification and authentication of herbal materials

Processing of herbal raw material

Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming.

Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy

b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.

UNIT-II

7 Hours

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.

Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-III

10 Hours

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

UNIT- IV

10 Hours

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs
Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

- a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
- b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V

07 Hours

General Introduction to Herbal Industry

Herbal drugs industry: Present scope and future prospects.

A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine

Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

BP 609 P. HERBAL DRUG TECHNOLOGY (Practical)

4 hours/ week

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

45 Hours

Scope: This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arising therein.

Objectives: Upon completion of the course student shall be able to:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
4. Understand various pharmacokinetic parameters, their significance & applications.

Course Content:

UNIT-I 10 Hours

Introduction to Biopharmaceutics

Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption through GIT, absorption of drug from Non per oral extra-vascular routes, **Distribution** Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT- II 10 Hours

Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs

Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, *in-vitro* drug dissolution models, *in-vitro-in-vivo* correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

UNIT- III 10 Hours

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - K_E , $t_{1/2}$, V_d , AUC , K_a , Cl_t and CL_R - definitions methods of eliminations, understanding of their significance and application

UNIT- IV**08 Hours**

Multicompartment models: Two compartment open model. IV bolus

Kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical settings.

UNIT- V**07 Hours**

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity.
c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA
4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmanekar and Sunil B. Jaiswal, Vallabh Prakashan Pitampura, Delhi
5. Pharmacokinetics: By Milo Gibaldi Donald, R. Marcel Dekker Inc.
6. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Robert F Notari Marcel Dekker Inc, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)

45 Hours

Scope:

- Biotechnology has a long promise to revolutionize the biological sciences and technology.
- Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
- Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.
- Biotechnology has already produced transgenic crops and animals and the future promises lot more.
- It is basically a research-based subject.

Objectives: Upon completion of the subject student shall be able to;

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

Unit I

10 Hours

- a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.
- b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.
- c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.
- d) Brief introduction to Protein Engineering.
- e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.
- f) Basic principles of genetic engineering.

Unit II

10 Hours

- a) Study of cloning vectors, restriction endonucleases and DNA ligase.
- b) Recombinant DNA technology. Application of genetic engineering in medicine.
- c) Application of r DNA technology and genetic engineering in the production of:
 - i) Interferon
 - ii) Vaccines- hepatitis- B
 - iii) Hormones-Insulin.
- d) Brief introduction to PCR

Unit III

10 Hours

Types of immunity- humoral immunity, cellular immunity

- a) Structure of Immunoglobulins
- b) Structure and Function of MHC
- c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.
- d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.
- e) Storage conditions and stability of official vaccines
- f) Hybridoma technology- Production, Purification and Applications
- g) Blood products and Plasma Substitutes.

Unit IV

08Hours

- a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.
- b) Genetic organization of Eukaryotes and Prokaryotes
- c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.
- d) Introduction to Microbial biotransformation and applications.
- e) Mutation: Types of mutation/mutants.

Unit V

07 Hours

- a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.
- b) Large scale production fermenter design and its various controls.
- c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,
- d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal

Society of Chemistry.

5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

BP606TPHARMACEUTICAL QUALITY ASSURANCE (Theory)

45 Hours

Scope: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Objectives: Upon completion of the course student shall be able to:

- understand the cGMP aspects in a pharmaceutical industry
- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries
- understand the responsibilities of QA & QC departments

Course content:

UNIT – I

10 Hours

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

Total Quality Management (TQM): Definition, elements, philosophies

ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines

Quality by design (QbD): Definition, overview, elements of QbD program, tools

ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration

NABL accreditation : Principles and procedures

UNIT - II

10 Hours

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – III

10 Hours

Quality Control: Quality control test for containers, rubber closures and secondary packing

materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT – IV

08 Hours

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT – V

07 Hours

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

Warehousing: Good warehousing practice, materials management

Recommended Books: (Latest Edition)

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma.
6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
8. Good laboratory Practices – Marcel Deckker Series
9. ICH guidelines, ISO 9000 and 14000 guidelines

SEMESTER VII

BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:

UNIT –I

10 Hours

UV Visible spectroscopy

Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations.

Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.

Applications - Spectrophotometric titrations, Single component and multi component analysis

Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II

10 Hours

IR spectroscopy

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations

Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications

UNIT –III

10 Hours

Introduction to chromatography

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, R_f values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications

Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

UNIT –IV

08 Hours

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

UNIT –V

07 Hours

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction, theory, instrumentation and applications

BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)

4 Hours/Week

- 1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
- 2 Estimation of dextrose by colorimetry
- 3 Estimation of sulfanilamide by colorimetry
- 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
- 5 Assay of paracetamol by UV- Spectrophotometry
- 6 Estimation of quinine sulfate by fluorimetry
- 7 Study of quenching of fluorescence
- 8 Determination of sodium by flame photometry
- 9 Determination of potassium by flame photometry
- 10 Determination of chlorides and sulphates by nephelo turbidometry
- 11 Separation of amino acids by paper chromatography
- 12 Separation of sugars by thin layer chromatography
- 13 Separation of plant pigments by column chromatography
- 14 Demonstration experiment on HPLC
- 15 Demonstration experiment on Gas Chromatography

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 702 T. INDUSTRIAL PHARMACYII (Theory)

45 Hours

Scope: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Objectives: Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

Course Content:

UNIT-I

10 Hours

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

UNIT-II

10 Hours

Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

UNIT-III

10 Hours

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT-IV**08 Hours**

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT-V**07 Hours**

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http://en.wikipedia.org/wiki/Regulatory_Affairs.
2. International Regulatory Affairs Updates, 2005. available at <http://www.iraup.com/about.php>
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at <http://www.cgmp.com/ra.htm>.

BP 703T. PHARMACY PRACTICE (Theory)

45 Hours

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Objectives: Upon completion of the course, the student shall be able to

1. know various drug distribution methods in a hospital
2. appreciate the pharmacy stores management and inventory control
3. monitor drug therapy of patient through medication chart review and clinical review
4. obtain medication history interview and counsel the patients
5. identify drug related problems
6. detect and assess adverse drug reactions
7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
8. know pharmaceutical care services
9. do patient counseling in community pharmacy;
10. appreciate the concept of Rational drug therapy.

Unit I:

10 Hours

a) Hospital and its organization

Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization

Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction

Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting

drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy

Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Unit II:

10 Hours

a) Drug distribution system in a hospital

Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary

Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring

Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence

Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview

Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management

Financial, materials, staff, and infrastructure requirements.

Unit III:

10 Hours

a) Pharmacy and therapeutic committee

Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) information services

Drug

Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling

Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist

d) Education and training program in the hospital

Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills

Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Unit IV 8 Hours

a) Budget preparation and implementation

Budget preparation and implementation

b) Clinical Pharmacy

Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.

Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales

Introduction and sale of over the counter, and Rational use of common over the counter medications.

Unit V 7 Hours

a) Drug store management and inventory control

Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs

Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests

Blood chemistry, hematology, and urinalysis

Recommended Books (Latest Edition):

1. Merchant S.H. and Dr. J.S.Quadry. *A textbook of hospital pharmacy*, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice- essential concepts and skills*, 1st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. *Hospital pharmacy*, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. *Hospital Pharmacy*, 1st ed. Maharashtra: Career Publications; 2008.
5. Scott LT. *Basic skills in interpreting laboratory data*, 4th ed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. *Health Education and Community Pharmacy*, 18th ed. India: CBS Publishers & Distributers; 2008.

Journals:

1. Therapeutic drug monitoring. ISSN: 0163-4356
2. Journal of pharmacy practice. ISSN : 0974-8326
3. American journal of health system pharmacy. ISSN: 1535-2900 (online)
4. Pharmacy times (Monthly magazine)

BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)

45 Hours

Scope: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Objectives: Upon completion of the course student shall be able

1. To understand various approaches for development of novel drug delivery systems.
2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

Course content:

Unit-I

10 Hours

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Unit-II

10 Hours

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump

Unit-III

10 Hours

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Unit-IV

08 Hours

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Unit-V

07 Hours

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Recommended Books: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)

SEMESTER VIII

BP801T. BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB[®], DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:

Unit-I

10 Hours

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II

10 Hours

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression- Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference

Unit-III

10 Hours

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV

8 Hours

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V

7Hours

Design and Analysis of experiments:

Factorial Design: Definition, 2^2 , 2^3 design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

BP 802T SOCIAL AND PREVENTIVE PHARMACY

Hours: 45

Scope:

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:

After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course content:

Unit I:

10 Hours

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Unit II:

10 Hours

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Unit III:

10 Hours

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National

programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

Unit IV:

08 Hours

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Unit V:

07 Hours

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Recommended Books (Latest edition):

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended Journals:

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

BP803ET. PHARMA MARKETING MANAGEMENT (Theory)

45 Hours

Scope:

The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.

Course Objective: The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Unit I

10 Hours

Marketing:

Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:

Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation & targeting. Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.

Unit II

10 Hours

Product decision:

Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III

10 Hours

Promotion:

Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Unit IV

10 Hours

Pharmaceutical marketing channels:

Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):

Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Unit V

10 Hours

Pricing:

Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:

Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)

45Hours

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Objectives: Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development
2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
3. Know the regulatory approval process and their registration in Indian and international markets

Course content:

Unit I

10Hours

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Unit II

10Hours

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

Regulatory authorities and agencies

Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Unit III

10Hours

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical

Document (eCTD), ASEAN Common Technical Document (ACTD) research.

Unit IV

08Hours

Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V

07Hours

Regulatory Concepts

Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

BP 805T: PHARMACOVIGILANCE (Theory)

45 hours

Scope: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives:

At completion of this paper it is expected that students will be able to (know, do, and appreciate):

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Course Content

Unit I

10 Hours

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II

10 hours

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III

10 Hours

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV

8 Hours

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V

7 hours

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones & Bartlett Publishers.
7. Textbook of Pharmacoepidemiology edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills: G. Parthasarathi, Karin Nyfort Hansen, Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal

11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

12. <http://www.who.unc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297>
13. <http://www.ich.org/>
14. <http://www.cioms.ch/>
15. <http://cdsco.nic.in/>
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html

BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS (Theory)

Scope: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Objectives: Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

Unit I

10 hours

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms

WHO guidelines for quality control of herbal drugs.

Evaluation of commercial crude drugs intended for use

Unit II

10 hours

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines

WHO Guidelines on GACP for Medicinal Plants.

Unit III

10 hours

EU and ICH guidelines for quality control of herbal drugs.

Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Unit IV

08 hours

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products.

Preparation of documents for new drug application and export registration

GMP requirements and Drugs & Cosmetics Act provisions.

Unit V

07 hours

Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems

Comparison of various Herbal Pharmacopoeias.

Role of chemical and biological markers in standardization of herbal products

Recommended Books: (Latest Editions)

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)

45 Hours

Scope: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Objectives: Upon completion of the course, the student shall be able to understand

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

Course Content:

UNIT-I

10 Hours

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT-II

10 Hours

Quantitative Structure Activity Relationship (QSAR)

SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammett's substituent constant and Taft's steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT-III

10 Hours

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

UNIT-IV**08 Hours****Informatics & Methods in drug design**

Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V**07 Hours**

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Park Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry" Lea & Febiger.
5. Koro Ikovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)

45 Hours

Scope:

- Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function.
- This is done both on a microscopic and molecular level.
- Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organisms such as humans, plants, and sponges.

Objectives: Upon completion of the subject student shall be able to;

- Summarize cell and molecular biology history.
- Summarize cellular functioning and composition.
- Describe the chemical foundations of cell biology.
- Summarize the DNA properties of cell biology.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle

Course content:

Unit I

10Hours

- a) Cell and Molecular Biology: Definitions theory and basics and Applications.
- b) Cell and Molecular Biology: History and Summation.
- c) Properties of cells and cell membrane.
- d) Prokaryotic versus Eukaryotic
- e) Cellular Reproduction
- f) Chemical Foundations – an Introduction and Reactions (Types)

Unit II

10 Hours

- a) DNA and the Flow of Molecular Information
- b) DNA Functioning
- c) DNA and RNA
- d) Types of RNA
- e) Transcription and Translation

Unit III

10 Hours

- a) Proteins: Defined **and** Amino Acids
- b) Protein Structure

- c) Regularities in Protein Pathways
- d) Cellular Processes
- e) Positive Control and significance of Protein Synthesis

Unit IV

08 Hours

- a) Science of Genetics
- b) Transgenics and Genomic Analysis
- c) Cell Cycle analysis
- d) Mitosis and Meiosis
- e) Cellular Activities and Checkpoints

Unit V

07 Hours

- a) Cell Signals: Introduction
- b) Receptors for Cell Signals
- c) Signaling Pathways: Overview
- d) Misregulation of Signaling Pathways
- e) Protein-Kinases: Functioning

Recommended Books (latest edition):

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Peppler: Microbial Technology.
9. Edward: Fundamentals of Microbiology.
10. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
11. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
12. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
13. RA Goldshy et. al., : Kuby Immunology.

BP809ET. COSMETIC SCIENCE(Theory)

45Hours

UNIT I

10Hours

Classification of cosmetic and cosmeceutical products

Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

UNIT II

10 Hours

Principles of formulation and building blocks of skin care products:

Face wash,

Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmeceuticals.

Antiperspirants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products:

Conditioning shampoo, Hair conditioner, anti-dandruff shampoo.

Hair oils.

Chemistry and formulation of Para-phenylene diamine based hair dye.

Principles of formulation and building blocks of oral care products:

Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT III

10 Hours

Sun protection, Classification of Sunscreens and SPF.

Role of herbs in cosmetics:

Skin Care: Aloe and turmeric

Hair care: Henna and amla.

Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skin-cream and toothpaste.

UNIT IV

08 Hours.

Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties

Soaps, and syndet bars. Evolution and skin benefits.

UNIT V

07 Hours

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis.

Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes

Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor.

Antiperspirants and Deodorants- Actives and mechanism of action

References

- 1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
- 3) Text book of cosmeticology by Sanju Nanda & Roop K. Khar, Tata Publishers.

BP810 ET. PHARMACOLOGICAL SCREENING METHODS

45 Hours

Scope: This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Objectives

Upon completion of the course the student shall be able to,

- Appreciate the applications of various commonly used laboratory animals.
- Appreciate and demonstrate the various screening methods used in preclinical research
- Appreciate and demonstrate the importance of biostatistics and research methodology
- Design and execute a research hypothesis independently

Unit –I	08 Hours
Laboratory Animals: Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.	
Unit –II	10 Hours
Preclinical screening models a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study. b. Study of screening animal models for Diuretics, nootropics, anti-Parkinson's, antiasthmatics, Preclinical screening models: for CNS activity- analgesic, antipyretic, anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease	

Unit –III Preclinical screening models: for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anaesthetics	
Unit –IV Preclinical screening models: for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslipidemic, anti aggregatory, coagulants, and anticoagulants Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.	
Research methodology and Bio-statistics Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students ‘t’ test and One-way ANOVA. Graphical representation of data	05 Hours

Recommended Books (latest edition):

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. CPCSEA guidelines for laboratory animal facility.
4. Drug discovery and Evaluation by Vogel H.G.
5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: Upon completion of the course the student shall be able to

- understand the advanced instruments used and its applications in drug analysis
- understand the chromatographic separation and analysis of drugs.
- understand the calibration of various analytical instruments
- know analysis of drugs using various analytical instruments.

Course Content:

UNIT-I

10 Hours

Nuclear Magnetic Resonance spectroscopy

Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications

UNIT-II

10 Hours

Thermal Methods of Analysis: Principles, instrumentation and applications of Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, X-ray

Crystallography, rotating crystal technique, single crystal diffraction, powder diffraction, structural elucidation and applications.

UNIT-III

10 Hours

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments

Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer,

Fluorimeter, Flame Photometer, HPLC and GC

UNIT-IV

08 Hours

Radio immune assay:Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction techniques:General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT-V

07 Hours

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

BP 812 ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS

No. of hours :3

Tutorial:1

Credit point:4

Scope :

This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

Objective:

This module aims to provide an understanding of the concepts behind the theoretical applications of dietary supplements. By the end of the course, students should be able to :

1. Understand the need of supplements by the different group of people to maintain healthy life.
2. Understand the outcome of deficiencies in dietary supplements.
3. Appreciate the components in dietary supplements and the application.
4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

UNIT I

07 hours

- a. Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc.
- b. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community.
- c. Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

UNIT II

15 hours

Phytochemicals as nutraceuticals: Occurrence and characteristic features(chemical nature medicinal benefits) of following

- a) Carotenoids- and -Carotene, Lycopene, Xanthophylls, leutin
- b) Sulfides: Diallyl sulfides, Allyl trisulfide.
- c) Polyphenolics: Resveratrol
- d) Flavonoids- Rutin , Naringin, Quercetin, Anthocyanidins, catechins, Flavones
- e) Prebiotics / Probiotics.: Fructo oligosaccharides, Lacto bacillum
- f) Phyto estrogens : Isoflavones, daidzein, Geobustan, lignans
- g) Tocopherols
- h) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.

UNIT III

07 hours

- a) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.

- b) Dietary fibres and complex carbohydrates as functional food ingredients..

UNIT IV

10 hours

- a) Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.
- b) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, - Lipoic acid, melatonin
Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole.
- c) Functional foods for chronic disease prevention

UNIT V

06 hours

- a) Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals.
- b) Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods.
- c) Pharmacopoeial Specifications for dietary supplements and nutraceuticals.

References:

1. Dietetics by Sri Lakshmi
2. Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPublication.
3. Advanced Nutritional Therapies by Cooper. K.A., (1996).
4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).
5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997).
6. G. Gibson and C.williams Editors 2000 *Functional foods* Woodhead Publ.Co.London.
7. Goldberg, I. *Functional Foods*. 1994. Chapman and Hall, New York.
8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf Life Testing in *Essentials of Functional Foods* M.K. Sachmidl and T.P. Labuza eds. Aspen Press.
9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
10. Shils, ME, Olson, JA, Shike, M. 1994 *Modern Nutrition in Health and Disease*. Eighth edition. Lea and Febiger

Semester VIII – Elective course on Pharmaceutical Product Development

No of Hours: 3

Tutorial:1

Credit points:4

Unit-I

10 Hours

Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms

Unit-II

10 Hours

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- i. Solvents and solubilizers
- ii. Cyclodextrins and their applications
- iii. Non - ionic surfactants and their applications
- iv. Polyethylene glycols and sorbitols
- v. Suspending and emulsifying agents
- vi. Semi solid excipients

Unit-III

10 Hours

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- i. Tablet and capsule excipients
- ii. Directly compressible vehicles
- iii. Coat materials
- iv. Excipients in parenteral and aerosols products
- v. Excipients for formulation of NDDS

Selection and application of excipients in pharmaceutical formulations with specific industrial applications

Unit-IV

08 Hours

Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.

Unit-V

07 Hours

Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.

Recommended Books (Latest editions)

1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, Charles Bon; Marcel Dekker Inc.
2. Encyclopedia of Pharmaceutical Technology, edited by James Swarbrick, Third Edition, Informa Healthcare publishers.
3. Pharmaceutical Dosage Forms, Tablets, Volume II, edited by Herbert A. Lieberman and Leon Lachman; Marcel Dekker, Inc.
4. The Theory and Practice of Industrial Pharmacy, Fourth Edition, edited by R. K. Khar, S. P. Vyas, Farhan J. Ahmad, Gaurav K. Jain; CBS Publishers and Distributors Pvt. Ltd. 2013.
5. Martin's Physical Pharmacy and Pharmaceutical Sciences, Fifth Edition, edited by Patrick J. Sinko, BI Publications Pvt. Ltd.
6. Targeted and Controlled Drug Delivery, Novel Carrier Systems by S. P. Vyas and R. K. Khar, CBS Publishers and Distributors Pvt. Ltd, First Edition 2012.
7. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., Nicholas B. Popovich, Howard C. Ansel, 9th Ed. 40
8. Aulton's Pharmaceutics – The Design and Manufacture of Medicines, Michael E. Aulton, 3rd Ed.
9. Remington – The Science and Practice of Pharmacy, 20th Ed.
10. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman and Joseph B. Schwartz
11. Pharmaceutical Dosage Forms – Disperse Systems Vol 1 to 3, H.A. Liberman, Martin, M.R. and Gilbert S. Banker.
12. Pharmaceutical Dosage Forms – Parenteral Medication Vol 1 & 2, Kenneth E. Avis and H.A. Libermann.
13. Advanced Review Articles related to the topics.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

Subject	PHARMACEUTICAL ANALYSIS – I	Course Code	15R00401
Course year	B. Pharmacy II year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr/week
End exam	70 marks	Internal exam	30 marks
Credits	3		

COURSE OBJECTIVE

To acquire adequate scientific knowledge regarding basic principles of pharmaceutical analysis.

UNIT I

a) Definition of Analytical chemistry and role of pharmaceutical analysis in pharmaceutical industry.

Significant figures, concept of error, precision, accuracy, rejection of doubtful values with special

reference to volumetric analysis. Calibration of glassware used in volumetric analysis- Burette, pipette and volumetric flask. Methods of expression of concentration(w/w,w/v,v/v).

b) **Theory of Neutralization Titrations:** Acid-base concept, Acidimetry, Alkalimetry, Common ion

effect and solubility product, indicators, Ostwald and quinonoid theories of Indicators

c) **Non-aqueous titration:** Theory, types, solvents used and application in pharmaceutical analysis.

Application of the above methods in the analysis of drugs and formulations as under IP 2007 and 2010.

UNIT II

a) General principles, theory and examples of **oxidation-reduction methods**, permanganometry,

ceriometry, iodometry, iodimetry indicators used in these titrations, self indicators.

b) General principles, theory and examples of **Precipitation methods:** Mohr's method, volhard's

method, account of the indicators used in these titrations, Adsorption indicators.

c) **Complexometric titration:** Theory, types and application in pharmaceutical analysis. Indicators

used, Masking and demasking and their applications.

Application of the above methods in the analysis of drugs, as under IP 2007 and 2010.

UNIT III

a) Potentiometry: Introduction to EMF, electrochemical cells and half cells, Electrodes, measurement

of potential, pH curve, EMF curve, derivative curve in application to end point determination.

b) Conductometric titrations: Basic concepts, conductivity cell, different types of conductometric

titrations.

c) Polarography: Basic concepts, apparatus and principles, different currents, polarographic maxima,

general polarographic analysis, applications in identification and quantification of metals.

d) Amperometric titrations with one polarized electrode, general procedure, titration curves, applications in pharmaceutical analysis.

UNIT IV

Fluorimetry: Theory, Fluorescence and chemical structure, Stokes and anti-Stokes, quantum efficiency, factors affecting the intensity of fluorescence, Instrumentation (double beam), Applications in Pharmaceutical analysis.

Flame Emission photometry Vs Atomic absorption spectroscopy: Emission spectra, Absorption spectra, line spectra, principle of absorption / emission of UV light by elements, instrumentation, applications in pharmaceutical analysis. Focus on interference.

Nephelo-turbidimetry: Introduction, principle, instrumentation of Nephelo-turbidimeter, pharmaceutical application as specified in IP, determination of chlorides and sulphates.

UNIT V

a) Principle and applications of the following instruments and various grades of reagents in a QC laboratory.

i) Refractometry ii) Polarimetry. iii) LR Grade iv) AR grade v) HPLC grade.

b). Role of moisture content determination in QC of pharmaceuticals (including Karl-Fisher method, LOD, IR balance).

TEXT BOOKS:

1. A.H. Beckett & J.B Stanlake Vol. I & II., *Practical Pharmaceutical Chemistry*, Athlone Press of the Univ of London

2. B.K. Sharma, *Instrumental Chemical Analysis*, Goel Publishers.

3. Chatwal & Anand, *Instrumental Methods of Analysis*. Himalaya Publishing Home, 2009.

REFERENCE BOOKS:

1. A.I Vogel, *Quantitative Chemical Analysis*, VI edition, Pearson education Delhi.

2. *Pharmacopoeia (IP, BP, USP)*.

3. D. A. Skoog, *Principles of Instrumental Analysis*, V edition, Thomson Brooks Bangalore.

4. Connors, *a Textbook of Pharmaceutical Analysis*. Wiley India Pvt. Ltd

OUTCOME:

Graduates will conduct, analyze and interpret data of experiments in production, Analytical and clinical aspects

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	PHARMACOGNOSY-II	Course Code	15R00402
Course year	B. Pharmacy II year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr/week
End exam	70 marks	Internal exam	30 marks
Credits	3		

Objectives: To make the student aware of Secondary metabolites production in plants and its medicinal significance, cosmeceuticals and nutraceuticals importance.

UNIT I

Glycosides

Definition, classification, properties and general tests of glycosides and detailed Pharmacognostic study of the following glycosides containing drugs:

- a. **Saponin glycosides**- Glycyrrhiza, Ginseng, Dioscorea, Senega, Sarsaparilla
- b. **Cardioactive glycosides**-Digitalis, Squill, Strophanthus, Thevetia
- c. **Anthraquinone glycosides**-Aloe, Senna, Rhubarb, Cascara
- d. **Bitter Glycosides**- Psoralea, Gentian, Chirata

UNIT II

- A) General introduction to cosmeceuticals, role of herbs in cosmetics.
- Study of the following cosmeceuticals - Amla, Henna, Cyperus, Soap Nut, Aloe Vera, Turmeric, Sandal Wood and Bitter Orange Peel.
- B) Definition and study of Nutraceuticals: Garlic, Spirulina, Soya and Royal jelly.

UNIT III

Alkaloids:

Definition, classification, properties and general tests and detailed pharmacognostic study of the following alkaloid containing drugs:

- a. **Pyridine-Piperidine alkaloids**- Tobacco, Lobelia
- b. **Tropane**- Belladonna, Hyoscyamus, Datura, Coca.
- c. **Indole**-Ergot, Rauwolfia, Vinca, Nux Vomica
- d. **Imidazole**-Pilocarpus
- e. **Steroid**- Kurchi, Veratrum, Aswagandha

UNIT IV

- a. **Quinoline-Isoquinoline**-Cinchona, Ipecac, Opium
- b. **Alkaloidal amine**- Ephedra, Colchicum
- c. **Glycoalkaloid**-Solanum
- d. **Purine**-Coffee, Tea, cola
- e. **Quinazoline** -Vasaka

UNIT V

- A) **Biogenesis**: General techniques of biosynthetic studies and basic metabolic pathways.
 - Biogenesis of secondary metabolites of pharmaceutical importance.
- B) **Extraction of herbal materials**: Definition of extraction, principle involved in extraction, different types of extraction.
 - Factors affecting the process of extraction.
- C) **Phytochemical Screening**: Preparation of extracts, identification and screening of alkaloids, saponins, cardiac glycosides, flavonoids, tannins and anthraquinones in plant extracts.

Text Books:

1. Kokate CK, Purohit A.P. & Gokhale; *Pharmacognosy Nirali Prakashan, New Delhi.*
2. *Text book of Pharmacognosy by Handa and Kapoor.*
3. Peach K and Tracey MV, *Modern methods of Plant analysis, Narose publishing house, New Delhi.*
4. *Pharmacognosy by Brady & Tyler.*
5. *Tutorial Pharmacy by Cooper and Gunn.*
6. *text book of pharmacognosy and phytochemistry by Vinod D Rangari, Vol I and II.*

Reference Books:

1. *Text book of Pharmacognosy by Wallis.*
2. *Herbal drug technology by Pulkok Mukharjee*
3. *Pharmacognosy by Trease and Evans*
4. *Biosynthesis of natural products by Manitto P*
5. *Harbone JB, Phytochemical methods, Chapman and Hall*

OUTCOME

- a. know the scientific name, geographical distribution, chemical nature and uses of crude drugs.
- b. know the role of glycosides, alkaloids in treating of various ailments of human beings.
- c. know the significance of nutraceuticals and cosmeceuticals in maintaining the health conditions and appearance.
- d. know various techniques used in biogenesis of secondary metabolites.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

Subject	PHARMACEUTICAL TECHNOLOGY – I	Course Code	15R00403
Course year	B. Pharmacy II year	Semester	II
Theory	3 hrs/week	Tutorial	1hr/week
End exam	70 marks	Internal	30 marks
Credits	3		

Scope and objectives:1. This course is designed to understand the aspects of preformulation and formulation of liquid and semi solids
2. To gain the knowledge on stability associated ICH guidelines.
3. To gain basic knowledge on blood products.

UNIT I

Preformulation: Goals, Physicochemical properties like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution, partition coefficient, organoleptic additives, hydrolysis, oxidation-reduction, racemization, polymerization, etc and their effect on formulation, drug-excipient incompatibility studies,. Introduction to Stability testing of finished products as per ICH guidelines.

UNIT II

Liquid dosage forms: Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others, manufacturing packaging and evaluation of clear liquids, suspensions and emulsions official in pharmacopoeia.

Dry syrups: Requirements, formulation, methods of preparation, containers, evaluation.

UNIT III

Semisolid dosage forms: Definitions, types, mechanisms of drug penetration, factors influencing

penetration, semisolid bases and their selection. General formulation of semi solids, clear gels manufacturing procedure, evaluation and packaging.

Suppositories: Ideal requirements of bases, Different types of bases, displacement value, manufacturing procedure, packing and evaluation.

UNIT IV

Pharmaceutical aerosols: Definition, propellants general formulation, manufacturing and packaging methods, pharmaceutical applications. Quality control tests for aerosols.

UNIT V

Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, Concentrated human RBC's, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, foam plasma substitutes, ideal requirements, PVP, Dextran etc. For control of blood pressure as per IP.

Text Books:

1. L. Lachman, H.A, Lieberman and J.L. Kanig, *Theory & Practice of industrial pharmacy*, Lea & Febieger, Philadelphia Latest Edn.
2. L. V. Allen Jr., N. G. Popovich, H. C. Ansel. *Ansel's pharmaceutical dosage forms and drug delivery systems*. Lippincott Williams & Wilkins, 2005.
3. M. E. Aulton *Pharmaceutics. The science of dosage form design*. - 2nd ed. Churchill-Livingstone, 2002
4. B.M.Mithal. *a text book of pharmaceutical formulations*, 6thed., vallabh prakashan, 2010.

Reference Books:

1. Banker and Rhodes, *Modern pharmaceutics*, marcel dekker series.
2. James Swarbrick, *Encyclopedia of pharmaceutical technology*, 3rd edi, informa healthcare.

Upon the completion of the course the student should be able to:

- a. Acquire sufficient knowledge of preformulation and formulation of liquid and semi solids.
- b. Understand the importance of blood products.
- c. Describe what the pharmaceutical suspension and emulsion is and what roles they play in pharmaceutical science.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

Subject	PHYSICAL PHARMACY – II	Course Code	15R00404
Course year	B. Pharmacy II year	Semester	II
Theory	3 hrs/week	Tutorial	1hr/week
End exam	70 marks	Internal	30 marks
Credits	3		

Scope and objectives: This course is designed to understand the physico-chemical fundamental aspects of solubility, distribution, flow of liquids & solids, complexation & interfacial phenomenon, and to gain knowledge on formulation & stability aspects of dispersion systems, drug decomposition & their kinetics.

UNIT I

Solubility and distribution phenomena: Solvent-solute interaction, solubility of gases in liquids, solubility of liquids in liquids, solubility of solids in liquids, distribution of solutes in immiscible solvents.

Introduction to phenomena of diffusion: Fick's first law and second law.

Complexation: Classification of complexes, methods of preparation, analysis and applications.

UNIT II

Interfacial Phenomena: Liquid interfaces, spreading coefficient, measurement of surface and interfacial tensions, adsorption at liquid interfaces. Adsorption isotherms only (Freundlich's isotherms and Langmuir's isotherms). Surface-active agents and HLB classification, solubilization, detergency. Parachor, Adsorption at solid interfaces. Solid gas and solid liquid interfaces, complex films, electrical properties of interfaces.

UNIT III

Micromeritics and Powder Rheology: Particle size and size distribution, number and weight distribution, particle number, methods for determining particle volume, methods of determining particle size: optical microscopy and sedimentation, measurement of particle shape, specific surface area: methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness and flow properties.

UNIT IV

Rheology: Newton's law of flow, kinematic viscosity, effect of temperature, Newtonian systems, non-Newtonian systems: pseudoplastic, dilatant, plastic, thixotropy, negative thixotropy. Determination of viscosity, capillary, falling ball and rotational viscometers.

UNIT V

Colloids: Introduction, types of colloidal systems, protective colloids, applications of colloids in pharmacy.

Coarse Dispersions:

Suspensions: Types and theories of suspensions, effect of Brownian motion, interfacial properties of suspended particles, settling in suspensions. Sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations.

Emulsions: Theories of emulsification, physical stability of emulsions.

TEXT BOOKS:

1. Patrick J. Sinko, *Martin's Physical Pharmacy and Pharmaceutical Sciences 5th Edition*. Lippincott Williams.
2. CVSSubhramanyam, *Physical Pharmaceutics*, Vallabhprakashan.
3. Manavalan & Ramaswamy. *Physical pharmaceutics*. 2nd ed. Vignesh publisher, 2008.

REFERENCE BOOKS:

1. Lippincott Williams and Wilkins, *Remington Pharmaceutical Sciences*
2. L. Lachman, H. Lieberman *The Theory And Practice Of Industrial Pharmacy* J. L Kaniz Lee & Febiger Philadelphia, USA.

OUTCOME**Upon the completion of the course the student should be able to:**

- a. Acquire sufficient knowledge of surface and interfacial tension and its measurement.
- b. Appreciate the role of surface active agents in controlling the solubility and stability of the liquids
- c. Understand the different types of flow, thixotropic properties in order to identify and choose the suitable characters for each formulation
- d. Describe what the pharmaceutical suspension and emulsion is and what roles they play in pharmaceutical science.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

<i>Subject</i>	PATHOPHYSIOLOGY	<i>Course Code</i>	15R00405
<i>Course year</i>	B. Pharmacy II year	<i>Semester</i>	II
<i>Theory</i>	2 hrs/week	<i>Tutorial</i>	1 hr/week
<i>End exam</i>	70 marks	<i>Internal exam</i>	30 marks
<i>Credits</i>	2		

Objectives: This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.

UNIT I:

Basic Principles of Cell Injury, Adaptation: Causes of cellular injury, pathogenesis and morphology of cell injury-autolysis, necrosis, apoptosis. Cellular adaptations-atrophy, hypertrophy.

Inflammation: Basic mechanism involved in inflammation and repair, alteration in vascular permeability and blood flow. Acute and chronic inflammation, mediators of inflammation.

UNIT II:

Cancer: Types of cancer, causes of cancer, cell cycle of normal & cancer cell. Apoptosis and cell differentiation. Carcinogenesis and molecular mechanism of carcinogenesis. Markers involved in diagnosis of cancer.

UNIT III:

Pathophysiology of common diseases like hypertension, angina, congestive cardiac failure, atherosclerosis, myocardial infarction, diabetes and thyroid.

UNIT IV:

Pathophysiology of common diseases like epilepsy, psychosis, depression, mania, parkinson's disease, arthritis, gout, osteoporosis and peptic ulcer.

UNIT V:

Pathophysiology of common diseases like asthma, tuberculosis, AIDS, acute & chronic renal failure and urinary tract infections, hepatitis and obesity.

TEXT BOOKS:

1. Harsh mohan, text book of pathology, latest edition.
2. Joseph Dipiro, Pathophysiology and applied therapeutics.

REFERENCE BOOKS:

1. Robbins, SL & Kumar, Basic Pathology. 8th Edition Elsevier.
2. Mary V. Buras, Pathophysiology: A self Instructional programme. Prentice Hall.
3. Mary Lou Mulvihill, Human Diseases: A Systemic approach. Prentice Hall 6th Edition.

Outcomes:

Upon completion of the subject student shall be able to

- a. Describe the etiology and pathogenesis of the selected disease states;
- b. Name the signs and symptoms of the diseases; and
- c. Mention the complications of the diseases.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

Subject	PHARMACEUTICAL ANALYSIS – I LABORATORY	Course Code	15R00406
Course year	B. Pharmacy II year	Semester	II
Theory	4 hrs/week	Tutorial	--
End exam	70 marks	Internal exam	30 marks
Credits	2		

I. Experiments:

- 1 Calibration of analytical glass ware.
- 2 Assay of Sodium carbonate by acid-base titration.
- 3 Assay of Ferrous sulfate (redox) ceric ammonium sulfate titration.
- 4 Assay of Sodium benzoate by non-aqueous titration.
- 5 Assay of Sodium chloride by precipitation titration.
- 6 Assay of Calcium gluconate by complexometry.
- 7 Potentiometric titration : Determination of strength of unknown solution HCl, HCl –Acetic acid mixture) against std. NaOH Solution.
- 8 Assay of any drug by potentiometry, (eg. Frusemide, metronidazole).
- 9 Conductometric titration – Determination of strength of unknown solution (HCl, HCl–Acetic Acid mixture) against std. NaOH Solution.
- 10 Determination of refractive index of any sample by Abbe's refractometer.
- 11 Determination of sucrose concentration by Polarimetry.
- 12 Determination of moisture content by Karl-Fishcer reagent.

II. Demo/work shop

1. Demonstration on gel electrophoresis
2. Demonstration on Polarography

III. Seminar/Assignment/Group discussion

1. List out various drugs that can be assayed by acid-base titration, as per I.P.2007.
2. What is the need of determination of moisture content, what is the limit of moisture in various natural and synthetic drugs?

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Subject	PHARMACOGNOSY-II LABORATORY	Course Code	15R00407
Course year	B. Pharmacy II year	Semester	II
Theory	4 hrs/week	Tutorial	NIL
End exam	70 marks	Internal exam	30 marks
Credits	2		

EXPERIMENTS:

1. Study of various morphological characters of the drugs mentioned in theory under alkaloids
2. Study of various morphological characters of the drugs mentioned in theory under glycosides.
3. Microscopy (Transverse section & powder) of Datura and Vinca leaf
4. Microscopy (Transverse section & powder) of Cinchona and Ephedra
5. Microscopy (Transverse section & powder) of Nux vomica and Rauwolfia
6. Microscopy (Transverse section & powder) of Digitalis and Senna
7. Microscopy (Transverse section & powder) of Squill and Liquorice
8. Preparation and evaluation of any one herbal cosmeceutical preparation
9. Preliminary phytochemical screening of any one plant
10. Determination of crude fibre content for any one nutraceutical listed under theory.

Seminar/ Assignment/Group discussion

Seminar/assignment related to theory.

Workshop/Demo

Extraction of plant material using Soxhlet apparatus

References

1. Practical Pharmacognosy, C K Kokate, Nirali Prakashan
2. Practical Pharmacognosy, Khandelwal, Nirali Prakashan
3. Practical Pharmacognosy Iyengar, Manipal Press Ltd.
4. Peach K and Tracey MV, Modern methods of Plant analysis, Narose publishing house, New Delhi.

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Subject	PHARMACEUTICAL TECHNOLOGY – I LABORATORY	Course Code	15R00408
Course year	B. Pharmacy II year	Semester	II
Theory	4 hrs/week	Tutorial	--
End exam	70 marks	Internal	30 marks
Credits	2		

I. EXPERIMENTS:

1. Preparation, evaluation and packaging of

- a) Solutions: Paracetamol syrup, codeine phosphate linctus
- b) Ferrous sulphate syrup
- c) Suspensions: Milk of magnesia
- d) Emulsions: o/w or w/o type
- e) Benzyl benzoate lotion
- f) Ointments: Benzoic acid ointment
- g) Methyl salicylate ointment
- h) Suppositories: Boric acid
- i) Eye drops: Gentamycin.
- j) Eye ointments: Chloramphenicol.
- k) Sodiumchloride eye lotion
- l) Cream: Cetrimide
- m) Cold cream
- n) Zinc oxide jelly
- o). Preparation of gel

II. DEMO/ WORKSHOP

Drug-excipient incompatibility studies, ointment filling machine.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

- 1) Excipients and their concentrations in various dosage forms.
- 2) Seminar on blood products

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Subject	PHYSICAL PHARMACY – II LABORATORY	Course Code	15R00409
Course year	B. Pharmacy II year	Semester	II
Theory	4 hrs/week	Tutorial	NIL
End exam	70 marks	Internal	30 marks
Credits	2		

I. EXPERIMENTS:

1. Determination of bulk density, true density and percentage porosity.
2. Effect of particle size and effect of glidant on angle of repose.
3. Study of particle/globule size distribution by optical microscopy
4. Determination of CMC of a surfactant.
5. Determination of partition coefficient
Iodine between water and carbon tetrachloride
6. Determination of sedimentation volume and degree of flocculation.
7. Effect of addition of Salt/pH/co-solvent on the solubility
8. Surface tension using Stalagmometer.
9. HLB value estimation of surfactants.
10. Viscosity – by Ostwald Viscometer.

II. DEMO/ WORKSHOP

Determination of particle size by AndreasonPipette, Plotting of an adsorption isotherm
Brook field viscometer.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

Viscoelasticity, solubulisation techniques

References

1. *Physical Pharmaceutics, By Mohanta, and Guru Prasad B.S. Publications*

List Of Minimum Equipments Required

1. Ostwald"s viscometer
2. Stalgnometer
3. Digital pH meter
4. Microscopes
5. Stage and eyepiece micrometer
6. Digital electronic balance
7. Thermometer
8. Andreasonpipetter
9. Adequate glasswares

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., Act. No. 30 of 2008)
ANANTHAPURAMU – 515 002 (A.P.) INDIA.

Course Structure for B.Pharmacy-R15 Regulations

B.Pharmacy

B.Pharm III-I Semester

S. No.	Course Code	Subject	L	T	P	C
1.	15R00501	Medicinal Chemistry-I	3	1	-	3
2.	15R00502	Pharmacology-I	3	1	-	3
3.	15R00503	Pharmaceutical Technology-II	3	1	-	3
4.	15R00504	Pharmaceutical Biotechnology	3	1	-	3
5.	15R00505	MOOCS - I (Application of spectroscopic methods in molecular structure Determination) / Conventional/ Self study	3	1	-	3
6.	15R00506	Medicinal Chemistry-I Laboratory	-	-	4	2
7.	15R00507	Pharmacology-I Laboratory	-	-	4	2
8.	15R00508	Pharmaceutical Technology-II Laboratory		-	4	2
9.	15R00509	Pharmaceutical Biotechnology Laboratory	-	-	4	2
10.	15A99501	Audit course –Social Values & Ethics	2	0	2	
Total:			17	5	18	23

Note: MOOC-I- NPTEL (<http://nptel.ac.in>) Chemistry & Biochemistry and Biotechnology

B.Pharm III-II Semester

S. No.	Course Code	Subject	L	T	P	C
1.	15R00601	Pharmacology-II	3	1	-	3
2.	15R00602	Pharmaceutical Analysis-II	3	1	-	3
3.	15R00603	Biopharmaceutics & Pharmacokinetics	3	1	-	3
4.	15R00604	Pharmaceutical Jurisprudence	3	1	-	3
5.	15R00605 15R00606 15R00607	CBCC-I 1. Pharmacy Administration 2. Clinical Trials 3. Cosmetic Technology	3	1	-	3
6.	15R00608	Pharmacology-II Laboratory	-	-	4	2
7.	15R00609	Pharmaceutical Analysis-II Laboratory	-	-	4	2
8.	15R00610	Biopharmaceutics & Pharmacokinetics Laboratory		-	4	2
9.	15A52602	Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course)	-	-	2	-
10.	15R00611	Comprehensive Online Exam - II	-	-	-	1
Total:			15	5	16	22

B.Pharm IV-I Semester

S. No.	Course Code	Subject	L	T	P	C
1.	15R00701	Novel Drug Delivery Systems	3	1	-	3
2.	15R00702	Pharmacology -III	3	1	-	3
3.	15R00703	Clinical and Hospital Pharmacy	3	1	-	3
4.	15R00704	Medicinal Chemistry-II	3	1	-	3
5.	15R00705 15R00706 15R00707	CBCC-II 1. Chemistry of Natural Products 2. Computer Aided Drug Design 3. Pharmacovigilance.	3	1	-	3
6.	15R00708	Novel Drug Delivery Systems Laboratory	-	-	4	2
7.	15R00709	Clinical and Hospital Pharmacy Laboratory	-	-	4	2
8.	15R00710	Medicinal Chemistry-II Laboratory		-	4	2
Total:			15	5	12	21

B.Pharm IV-II Semester

S. No.	Course Code	Subject	L	T	P	C
1.	15R00801	MOOCS -II (Biostatistics and Design of Experiments) / Conventional/ Self study	3	1	-	3
2.	15R00802	MOOCS - III (Intellectual Property Rights) / / Conventional/ Self study	3	1	-	3
3.	15R00803	Comprehensive viva voice	-	-	4	2
4.	15R00804	Technical Seminar	-	-	4	2
5.	15R00805	Project Work	-	-	24	13
Total:			06	02	32	23

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MEDICINAL CHEMISTRY – I	Code	15R00501
Course year	B. Pharm III year	Semester	I
Theory	3 hrs/week	Tutorial	1 hr / week
End Exam	70 Marks	Internal marks	30 Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn medicinal chemistry information about the drugs. In this subject student will be able to understand the properties and its biological activity of the drugs.

Objectives: Upon completion of the subject student shall be able to

1. Understand various drugs structure, their properties and biological activities.
2. Correlate and apply the knowledge.
3. Influence of chemical structure on biological activities.

Outcomes:

1. Acquire skill in the structure of drugs and their biological activities.
2. Acquire the knowledge of synthesis of chemical compounds.
3. Assay of some official compounds.

UNIT I

Physico chemical properties of drug molecules in relation to biological activity –

Solubility, partition-coefficient, Ionization, hydrogen bonding, Chelation, redox potential and surface activity, Bioisosterism and steric features of drugs, drug distribution and protein binding. Types of receptor and its relation with biological activity.

Enzyme stimulation, Enzyme inhibition. Theories of drug action (Ferguson's, Dale's, perturbation and occupation). Drug metabolism: Introduction to Biotransformation, concept of soft and hard drug, phase I & II (With one drug example). Introduction, basic concepts and clinical importance of Prodrug.

UNIT II

Drugs acting on ANS

Adrenergic and antiadrenergic agents: **Adrenergic agonist:** Chemistry and metabolism of neurotransmitters, Dopamine, Ephedrine*, Isoprenaline*, Oxymetazoline*, Salbutamol, **Adrenergic antagonist:** Classification, Phenoxybenzamine*, Prazosin*, Propranolol, Atenolol, Metoprolol. SAR Sympathomimetics (Catecholamines)

Cholinergic and anti-cholinergic agents: Cholinergic receptor and neuro chemistry and concept of neuromuscular blocking agents. Succinylcholine*, pilocarpine,

Physostigmine, Malathion, Pralidoxime, Nicotine, Dicyclomine*, Biperiden*. SAR- Cholinergic agonists, Anti-cholinergics, Neuro muscular blockers.

UNIT III

Drugs acting on CNS

Depressants and Central dopaminergic signalling agents

Anxiolytics, Sedatives and Hypnotics: Benzodiazepines (Diazepam*, Oxazepam, Midazolam, Alprazolam), Barbiturates (Phenobarbital*), Glutethimide*, Meprobamate*, SAR- Benzodiazepines, Barbiturates.

Anti-Psychotics: Phenothiazines (Chlorpromazine*, Thioridazine), thioxanthines (Thiothixene*), Butyrophenones (Haloperidol*, Droperidol), Miscellaneous- Lithium salts, Clozapine and Olanzapine. SAR- Phenothiazines, Butyrophenones.

Anti-convulsants: Phenytoin*, Valproic acid, Carbamazepine*, Ethosuximide. SAR- Hydantoins, Oxazolidinediones, Succinimides.

Anti-parkinsonism: Levodopa*-Carbidopa, Amantidine*, Selegiline, Apomorphine, Ropinirole, Entacapone, Tolcapone.

UNIT IV

Analeptics: Picrotoxin, Doxapram*, Methyl xanthines (Caffeine, Theophylline, Theobromine) Psychomotorstimulant: Dextro amphetamine*, Methamphetamine, Phenfluramine, Sibutramine, Methylphenidate.

Anti-depressants: Types, Phenelzine, Tranylcypromine*, Tricyclic anti-depressants: Imipramine*, Desipramine, Fluoxetine*, Newer agents: Venlafaxine, Bupropion. SAR- Tricyclic antidepressants, MAOIs.

Miscellaneous: Psilocybin, Dimethyltryptamine, Mescaline, Lysergic acid and Tetrahydro cannabinol.

UNIT V

Anaesthetics:

General anaesthetics: Chemical classification, Inhaled and Injectable, Meyer-Overton theory, Halothane*, Propofol, Ketamine, Thiopental sodium*.

Local anaesthetics: Cocaine, Lignocaine*. Adjuvant to local anaesthetics. SAR- Esters and amides.

NOTE: Introduction, definition, chemical classification with structure, nomenclature, synthesis (only for *marked drugs), mechanism of action, SAR including stereo chemical aspects, metabolites (including its ADR) and therapeutic uses of the following classes of drugs from UNIT II to UNIT V.

Text Books:

1. William O. Foye, *Textbook of Medicinal Chemistry*, Lea Febiger, Philadelphia.
2. JH Block & JM Beale (Eds), *Wilson & Giswold's Text book of organic Medicinal Chemistry and pharmaceutical chemistry*, 11th Ed, Lipcolt, Raven, Philadelphia, 2004

Reference Books:

1. Hansch, *Comprehensive medicinal chemistry*, Vol 1 – 6 Elsevier pergmon press, Oxford
2. D. Abraham (Ed), *Burger Medicinal chemistry ad Drug discovery*, Vol. 1 & 2. John Wiley & Sons, New York 2003, 6th Ed.
3. M. Atherden, Bentley and Driver's *Textbook of Pharmaceutical Chemistry* Ed: I. Oxford University Press, Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – I	Code	15R00502
Course Year	B.Pharmacy III year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope:

This subject provides an insight to know the class and mode of action of drugs, their unwanted effects and therapeutic actions.

Objectives: Upon completion of the subject student shall be able to

1. Understand various pharmacological aspects like pharmacokinetics, side effects, drug interactions, contraindications and indications of drugs falling under below mentioned chapters.
2. Correlate and apply the knowledge.

Outcomes:

1. Acquire the knowledge in basic mechanism of action of drugs.
2. Therapeutic uses of drugs of the following chapters.

UNIT I**General Pharmacology:****a. Introduction**

Definition, historical development and scope of pharmacology. Sources of drugs and routes of administration. Principles of discovery and development of new drugs, phases of clinical trials.

b. Pharmacodynamics

Mechanism of action with special emphasis on receptors, drug-receptor interaction theories, factors modifying drug action.

c. Pharmacokinetics

Drug absorption, distribution, metabolism and excretion. Factors affecting/modifying Pharmacokinetic parameters.

UNIT II**Pharmacology of Peripheral Nervous System**

- a. Neurohumoral transmission (autonomic and somatic), cholinergic receptors and adrenergic receptors.
- b. Parasympathomimetics, parasympatholytics, sympathomimetics and sympatholytics.
- c. Ganglionic stimulants and blocking agents.
- d. Neuromuscular blocking agents and local anesthetic agents.

UNIT III**Pharmacology of Central Nervous System: I**

- a. Neurohumoral transmission in the C.N.S with special emphasis on dopamine, GABA and 5-HT neurotransmission.
- b. General anesthetics, sleep cycle, sedatives, hypnotics and anti-anxiety agents.
- c. CNS stimulants and centrally acting muscle relaxants.
- d. Alcohols and disulfiram. Drug addiction, abuse, tolerance and dependence.

UNIT IV**Pharmacology of Central Nervous System: II**

- a. Pharmacology of drugs used in affective/mood disorders like depression and mania and behavioral disorders like psychosis.
- b. Pharmacology of drugs used in neurodegenerative disorders like Parkinsonism and Alzheimer's disease.
- c. Pharmacology of drugs used in epilepsy

UNIT V

- a. Analgesics, Antipyretics, and Anti-inflammatory drugs.
- b. Narcotic analgesics and antagonists.

Text Books:

1. H.P Rang, M. M. dale & J.M. Ritter, Pharmacology, Churchill living stone, 4th Ed.
2. J.G. Hardman and Lee E. Limbard, Good Mann & Gilmann, The Pharmacological basis of therapeutics, Mc Grawhill, Health Professions Dvn.

Reference Books

1. Bertram. G. Katzung, Basic and clinical pharmacology, 9th Edn; Prentice Hall International
2. Sathoskar, Pharmacology and pharmaco therapeutics Vol. 1 & 2, Publ by Popular Prakashan, Mumbai.
3. Tripathi, Essentials of Medical Pharmacology, Jaypee Brothers, Latest Edition

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL TECHNOLOGY –II	Code	15R00503
Course Year	B.Pharmacy III year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the formulation, evaluation and manufacturing of various types of tablets, capsules and also provide insights about aseptic area and parenteral.

Objectives: Upon completion of the subject student shall be able to

1. Understand various formulation aspects of tablets and capsules and also provide knowledge about selection of excipients in the preparation of same.
2. Provide knowledge on packaging materials used in pharmaceutical products.

Outcomes:

1. Acquire skill in preparation of different types of tablets.
2. Demonstrate the handling of equipment for evaluation of various dosage forms.
3. Acquire the knowledge of processing of dosage form on large scale that suit pharma industry.
- 4.

UNIT I

Tablets: Introduction to different types of tablets, Formulation of tablets, direct compression, Granulation technology on large-scale by various techniques and equipments. Tablet processing problems and their remedy. Types of tablet compression machinery and the equipments employed and evaluation of tablets.

Coating of Tablets: Types of coating, coating materials and their selection, formulation of coating solution, equipment for coating, coating processes, evaluation of coated tablets. Tablet coating defects and their remedy.

UNIT II

Capsules: Advantages and disadvantages of capsule dosage forms, material for production of hard and soft gelatin capsules, sizes of capsules, capsule filling, soft processing problems in capsule manufacturing, importance of base absorption and minimum/gm factors in soft capsules, quality control, stability testing and storage of capsule dosage forms.

UNIT III

Microencapsulation: Types of microencapsulation and importance of microencapsulation in

Pharmacy, microcapsulation by coacervation phase separation, multi orifice centrifugal separation. Spray drying, spray congealing, polymerization complex emulsion, air suspension technique, and pancoating techniques, evaluation of microcapsules.

UNIT IV**Parenteral Products**

- a. Preformulation factors, routes of administration, water for injection, treatment of apyrogenicity, non-aqueous vehicles, isotonicity and methods of its adjustment.
- b. Formulation details, containers, closures and their selection.
- c. Prefilling treatment, washing and sterilization of containers and closures, preparation of solutions and suspensions, filling and closing of ampoules, vials, infusion fluids, lyophilization & preparation of sterile powders, equipment for large-scale manufacture and evaluation of parenteral products.
- d. Aseptic techniques, sources of contamination and methods of prevention. Design of aseptic area, laminar flow benches, Environmental control monitoring.

UNIT V**Packaging of Pharmaceutical products:**

Packaging components, types, specifications and methods of evaluation as per I.P. Factors influencing choice of containers, package testing, legal and other official requirements for containers, package testing. Methods of packing of solid, liquid and semi-solid dosage forms, Factors influencing packaging material, stability aspects of packaging.

Text Books:

1. L. Lachman, H.A. Lieberman and J.L. Kanig, Theory & Practice of industrial pharmacy, Lea & Febiger, Philadelphia Latest Edn.
2. L. V. Allen Jr., N. G. Popovich, H. C. Ansel. Ansel's pharmaceutical dosage forms and drug delivery systems. Lippincott Williams & Wilkins, 2005.

Reference Books:

1. M. E. Aulton Pharmaceutics. The science of dosage form design. - 2nd ed. Churchill-Livingstone, 2002
2. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences.
3. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, Elbs publ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL BIOTECHNOLOGY	Code	15R00504
Course Year	B.Pharmacy III year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: To study the Fermentation, Recombinant and Enzyme Technology

Objective: To know the various technologies types, design, preparation and operation

Outcome: The Student has to know the Application of below mentioned technologies and uses of immunological preparations.

UNIT I

Fermentation Technology: Isolation, Selection, Screening of Industrially important microbes, Strain improvement. Types, design & operation of Bioreactor. Types of fermentations, optimization of fermentation process, Principle and Procedure involving in downstream process and effluent treatment. **Specific Fermentations:** Selection of organism, fermentation & purification of antibiotics (penicillin, streptomycin, tetracycline, and erythromycin), vitamins (riboflavin and cyanocobalamine), lactic acid, alcohol and acetone.

UNIT II

Recombinant DNA Technology: Introduction to r-DNA technology and genetic engineering, steps involved in isolation of enzymes, vectors, recombination and cloning of genes. Production of bio technology derived therapeutic proteins like humulin, humatrop, activase, intron a, monoclonal antibodies by hybridoma technique, recombinax HB (hepatitis b). Stem cells and their applications.

UNIT III

Immunology & Immunological Preparations: Principles of Immunity, Humoral immunity, cell mediated immunity, antigen – antibody reactions, hypersensitivity and its applications. Active & passive immunizations vaccine preparation, standardization & storage of BCG, cholera, smallpox, polio, typhus, tetanus toxoid, immuno serum & diagnostic agents.

UNIT IV

Enzyme Technology: Techniques of immobilization of enzymes, factors affecting enzyme kinetics, advantages of immobilization over isolated enzymes. Study of

enzymes such as hyaluronidase, penicillinase, streptokinase, streptodornase, amylase, protease etc. immobilization of bacteria & plant cells.

UNIT V

Introductory study & applications of bioinformatics, proteomics and genomics, Nanobiotechnology, Gene therapy.

Text Books:

1. Wulf Crueger and Anneliese Crueger, Biotechnology, 2 nd Ed, Publ- Panima publication cooperation, New Delhi.
2. P. F. Stanbury & A. Whitaker, Principles of fermentation technology, Pergamon Press. J. D. Watson, Recombinant DNA technology. 2 nd Edition, W.H. Freeman1992.
3. S.P.Vyas and Dixit, Pharmaceutical Biotechnology, CBS Publishers New Delhi.

Reference Books:

1. Prescott and Dunne, "Industrial Microbiology" MC Graw Hill Book Company.
2. K. Kielslich "Biotechnology" Vol 6, Verlegchemic, Switzerland.
3. PF Standury& A. Whitaker, "Principles of fermentation Technology" Pergamon Press, Oxford. Wiseman, Handbook of enzyme biotechnology. A. 3rdEdition Elis Horwood.
4. Alexande M Moo-young, Comprehensive Biotechnology, Pergamon Press, New York.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	(MOOCS-I) APPLICATION OF SPECTROSCOPIC METHODS IN MOLECULAR STRUCTURE DETERMINATION	Code	15R00505
Course Year	B.Pharmacy III year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30 Marks
Credits	3		

Objectives:

1. Introduction, Modern approaches in Bioanalysis and Bioassays.
2. Spectroscopic techniques: UV-Visible spectroscopy, Fluorescence spectroscopy, IR spectroscopy, CD spectroscopy, and Mass spectroscopy.

Out comes:

1. Chemists are molecule makers; whenever a new molecule is synthesized it is essential to determine its structure using spectroscopic techniques.
2. This course is all about practical applications of spectroscopic methods for the determination of organic molecules.

UNIT-I

UV-Vis spectroscopy - Electronic transitions in organic molecules, selection rules, application of Beer Lambert law, qualitative and quantitative analysis by UV-Vis spectroscopy.

UNIT-II**Electrophoresis Techniques**

Electrophoresis; Principle, Design of horizontal and vertical gel electrophoresis apparatus, performing electrophoresis techniques, application of electrophoresis in analyzing macromolecules.

UNIT-III

NMR spectroscopy – Nuclear magnetic resonance spectroscopy (NMR), spin $\frac{1}{2}$ nuclei, ^1H and ^{13}C -NMR spectroscopy. Chemical shifts, spin-spin coupling, spin-spin splitting pattern recognition for structure elucidation, coupling constants.

UNIT-IV

Mass Spectrometry – various ionization methods – EI, CI, ESI and MALDI methods, fragmentation patterns of simple organic molecules, Use of HRMS. Infra-red spectroscopy – basic concepts, experimental methods, functional group analysis and identification using IR spectroscopy, structural effects on vibrational frequency.

UNIT-V**Introduction & Bioanalytical Spectroscopic techniques**

Introduction, Modern approaches in Bioanalysis and Bioassays, Spectroscopic techniques: UV-Visible spectroscopy and IR spectroscopy.

Sources: NPTEL

1. <http://nptel.iitm.ac.in> Biotechnology (Bioanalytical Techniques and Bioinformatics)
2. <http://nptel.ac.in> Chemistry and Biochemistry (Application of Spectroscopic methods in molecular structure determination)

Text Books

1. Spectroscopy, D. L. Pavia, G. M. Lampman, G. S. Kriz, J. R. Vyvyan, Cengage Learning (Indian Edition), 2007.
2. Organic Spectroscopy, William Kemp, 3rd Edition, 1991, Macmillan (Indian Edition).
3. NMR Spectroscopy, H. Gnther, second edition, John Wiley and sons, 1998

References:

1. GA. Manz, N. Pamme and D. Iossifidis, Bioanalytical Chemistry, World Scientific Publishing Company, 2004
2. Baxevanis, B. F. F. Ouellette, Bioinformatics -A practical Guide to the analysis of Genes and Proteins, 2nd Ed, John Wiley and Sons Inc., 2001.
3. T. Lengauer; Bioinformatics - From Genomes to Drugs, Vols 1 & 2, Wiley-VCH, 2002.
4. Live Cell Imaging: A Laboratory Manual R. D. Goldman, J. R. Swedlow and D. L. Spector Cold Spring.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MEDICINAL CHEMISTRY – I LABORATORY	Code	15R00506
Course year	B. Pharm III year	Semester	I
Practical	4hrs/week	Tutorial	Nil
End Exam	70Marks	Internal marks	30Marks
Credits	2		

Scope: This subject will provide an opportunity for the student on synthesis of various compounds.

Objectives: Upon completion of the subject student shall be able to

- Synthesis various chemical compounds.
- Provide knowledge on monograph analysis of some chemical compounds.

Outcomes:

- Acquire skills in synthesis various chemical compounds.
- Demonstrate of stereo models of some drugs relevant to theory.
- Acquire skills of extraction of drugs from different dosage forms.

I. EXPERIMENTS

- Synthesis of Barbituric acid from Diethyl Malonate
 - Synthesis of Phenytoin from Benzoin or Benzil
 - Synthesis of Diphenyl quinoxaline from o-phenylene diamine and benzil
 - Synthesis of phenothiazine from o-phenylene diamine
 - Synthesis of Benzocaine from Para amino benzoic acid
 - Synthesis of Dibromo succinic acid from malic acid
 - Synthesis of Benzoxazine from Anthranilic acid
 - Monograph analysis of Caffeine
 - Monograph analysis of Phenytoin
 - Monograph analysis of Barbituric acid
 - Monograph analysis of Benzocaine
 - Monograph analysis of carbamazepine citrate
- (Literature, Journal reported lead compounds synthesis relevant to theory can also be Included)

II Demo/Workshop

- Stereo models of some drugs relevant to theory.
- Extraction of drugs from different dosage forms

III Seminar/Assignment/Group discussion

Photochemistry as a green synthetic method, novel methods for the separation of optical isomers, highly selective metalation reactions, QSAR, high throughput screening, combinatorial chemistry, In silico drug design.

References:

1. A.I. Vogel, Text Book of Practical Organic Chemistry, 5th Edition. Pearson Prentice Hall.
2. F.G. Mann & B.C. Saunders, Practical Organic Chemistry, 4th Edition. Pearson Publishers.

LIST OF MINIMUM EQUIPMENTS REQUIRED

1. Water bath
2. Suction pumps
3. Analytical/physical balance
4. Triple beam balance
5. Reflux flask with condenser
6. Hot plates
7. Refrigerator
8. Mechanical and magnetic stirrer with thermostat
9. Distillation unit
10. Oven
11. Adequate glass wares

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – I LABORATORY	Code	15R00507
Course Year	B.Pharmacy III year	Sem	I
Practical	4hrs/week	Tutorial	NIL
End exam	70 Marks	Internal exam	30 Marks
Credits	2		

Scope:

- To find out the agents suitable for clinical use.
- Study the toxicity and mechanism of Action and Site of action
- Study the actions of drugs in Preclinical

Objectives:

To know and understand pharmacological investigation techniques applied in the research

Outcomes:

- Knows to administration of drugs to experiments rats by various routes.
- Have insight fundamental difference between agonists and antagonists
- Enlighted with basic equipments, anesthetics, lab animals that are to be handled in the pharmacology lab

1.EXPERIMENTAL PART**(To use appropriate softwares for animal experimentation)****1. Introduction to Experimental Pharmacology**

- Preparation of different solutions for experiments.
 - Drug dilutions, use of molar and % w/v solutions in experimental Pharmacology.
 - Common laboratory animals and anaesthetics used in animal studies.
 - Commonly used instruments in experimental pharmacology.
 - Different routes of administration in animals
 - Collection of blood samples from animals
2. Study the effect of autonomic drugs on rabbit's eye
 3. Record the concentration response curve (CRC) of acetylcholine using rectus abdominus muscle preparation of frog.
 4. Record the CRC of 5-HT on rat fundus preparation.
 5. Record the CRC of histamine on guinea pig ileum preparation.

6. To study the inotropic and chronotropic effects of drugs on isolated frog heart.
7. To study the effects of various agonists and antagonists and their characterisation using isolated preparations like frog's rectus abdominus muscle and isolated ileum preparation of rat & guinea pig.

II. DEMO/ WORK SHOP

Arterial and venous cannulations, organ isolation and its application in research.

III. SEMINAR/ ASSIGNMENT/ GROUP DISCUSSION

1. Isolation, characterization and nomenclature of receptors.
2. Metabolic disorders and their complications
3. Novel targets for the treatment of various disorders

References:

1. Practicals in pharmacology By Dr.R.K.Goyal
2. Handbook of experimental pharmacology By S.K.Kulakarni
3. Experimental pharmacology By M.N.Ghosh
4. EXPO – Experimental pharmacology software.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL TECHNOLOGY – II LABORATORY	Code	15R00508
Course Year	B.Pharmacy III year	Sem	I
Practical	4hrs/week	Tutorial	NIL
End exam	70 Marks	Internal exam	30 Marks
Credits	2		

Scope: This subject will provide an opportunity for the student to learn manufacturing of dosage forms such as tablets, capsules and parenteral.

Objectives: Upon completion of the subject student shall be able to

- Manufacture the various types of tablets.
- Evaluate the finished pharmaceutical products.

Outcomes:

1. Acquire skills in manufacture the various types of tablets.
2. Learn how to evaluate the tablets.
3. Acquire skills of manufacturing and evaluation of parental dosage forms.

I. EXPERIMENTS:

1. Manufacturing of tablets:

- a. Ordinary compressed tablets by wet granulation.
- b. Tablets prepared by direct compression
- c. Soluble tablets/dispersible granules
- d. Chewable tablets
- e. Effervescent tablets.

2. Evaluation of tablets (Weight variation, hardness, friability, disintegration and dissolution)

3. Formulation and filling of hard gelatin capsules.

4. Parenteral:

- a. Manufacturing of parenterals (Ampoule sealing (Pull sealing and tip sealing)
- b. Evaluation of parenterals (Clarity test, and leaking test).

II. DEMO/ WORKSHOP

Coating of tablets (sugar/film/enteric)

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

1. Advances in granulation technology.
2. Multifunctional excipients.
3. Excipients and their commercial names.

Text Books:

1. L. Lachman, H.A. Lieberman and J.L. Kanig, Theory & Practice of industrial pharmacy, Lea &Febieger, Philadelphia Latest Edn.
2. L. V. Allen Jr., N. G. Popovich, H. C. Ansel. Ansel's pharmaceutical dosage forms and drugdelivery systems. Lippincott Williams & Wilkins, 2005.

Reference Books:

1. M. E. Aulton Pharmaceutics. The science of dosage form design. - 2nd ed. Churchill-Livingstone, 2002
2. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences.
3. E.A.Rawlkins, Bentley's Text Book of Pharmaceutics, Elbspubl

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL BIOTECHNOLOGY LABORATORY	Code	15R00509
Course Year	B.Pharmacy III year	Sem	I
Practical	4hrs/week	Tutorial	Nil
End exam	70 Marks	Internal exam	30Marks
Credits	2		

I.EXPERIMENTS:

1. Isolation of antibiotic producing microorganism from soil.
2. Enzyme immobilization by Ca-alginate method.
3. Determination of minimum inhibitory concentration of the given antibiotic.
4. Standardization of Cultures.
5. Microbiological assay of Antibiotics / Vitamins.
6. Production of alcohol by fermentation techniques.
7. Comparison of efficacy of immobilized cells.
8. Isolation of mutants by gradient plate technique.
9. Preparation of bacterial vaccine.
10. Preparation of blood products / Human normal immunoglobulin injection
11. Extraction of DNA and RNA and their estimations by colorimetry.
12. Separation techniques: Various types of Gel Electro Phoresis, Centrifugation.

II.DEMO/WORKSHOP:

Production of Antibiotics by Fermentation, Development of a Simple Biosensor.

III.ASSIGNEMENT/SEMINAR/GROUP DISCUSSION:

Monoclonal antibodies and Diagnosis, New Drug Targets and Vaccine Development, Stem cells and their applications.

LIST OF MINIMUM EQUIPMENTS REQUIRED

1. Micropipettes
2. Eppendorf's tubes
3. Ultra centrifuge
4. Dessicators
5. Gel electrophoresis unit
6. Small scale bioreactor
7. Syringes
8. laminar flow bench
9. Autoclave

10. Hot air oven
11. BOD incubator
12. Rotary shaker
13. Anerobic jar
14. Colorimeter
15. Adequate glassware

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Pharmacy III-I Sem.

L	T	P	C
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15A99501 SOCIAL VALUES & ETHICS (AUDIT COURSE)

*(Common to all Branches)***UNIT - I**

Introduction and Basic Concepts of Society: Family and Society: Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

Channels of Youth Moments for National Building: NSS & NCC: History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):** Activities – Socio Cultural and Sports.

UNIT – II

Activities of NSS, NCC, NYK:

Citizenship: Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

Youth and Crime: Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

UNIT – III

Environment Issues: Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

Health, Hygiene & Sanitation: Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

Disaster Management: Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

Civil/ Self Defense: Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

UNIT – IV

Gender Sensitization: Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic

Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

UNIT - V

Physical Education : Games & Sports: Health and Recreation – Biological basis of Physical activity – benefits of exercise – Physical, Psychological, Social; Physiology of Muscular Activity, Respiration, Blood Circulation.

Yoga: Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

TEXT BOOKS:

1. NSS MANUAL
2. SOCIETY AND ENVIRONMENT: A.S.Chauha, Jain Brothers Publications, 6th Edition, 2006
3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House
4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications
5. HUMAN SOCIETY: Kingsley Davis, Macmillan
6. SOCIETY: Mac Iver D Page, Macmillan
7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos, Oxford University Press
8. CONSTITUTION OF INDIA: D.D.Basu, Lexis Nexis Butterworth Publishers
9. National Youth Policy 2014 (available on www.yas.nic.in)
10. TOWARDS A WORLD OF EQUALS: A.Suneetha, Uma Bhugudanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu
11. LIGHT ON YOGA : B.K.S.Iyengar, Penguin Random House Publishers

www.un.org

www.india.gov.in

www.yas.nic.in

<http://www.who.int/countries/ind/en/>

<http://www.ndma.gov.in>

<http://ayush.gov.in/event/common-yoga-protocol-2016-0>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – II	Code	15R00601
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn pharmacological information about the drugs. In this subject drugs acting on cardiovascular system, drugs acting on hematopoietic system, drugs acting on renal system, drugs acting on respiratory system and drugs acting on autacoids will be taught.

Objectives: Upon completion of the subject student shall be able to

- Understand various pharmacological aspects like mechanism of action, pharmacokinetics, side effects, drug interactions, contraindications and indications of drugs falling under below mentioned chapters.
- Correlate and apply the knowledge.
- Handle the animals and carry out the experiments on animals

Outcomes:

- Acquire the knowledge in basic mechanism of action of drugs.
- Therapeutic uses of drugs of the following chapters.

UNIT I**Drugs acting on cardiovascular System**

- Pharmacology of drugs used in hypertension and CHF
- Pharmacology of drugs used in coronary artery diseases (Atherosclerosis, Angina and MI)
- Pharmacology of drugs used in arrhythmias
- Shock and treatment of different types of shock

UNIT II Drugs acting on hematopoietic system

- Coagulants, anticoagulants
- Fibrinolytics, antifibrinolytics, antiplatelet drugs
- Hematinics and plasma expanders

UNIT III**a. Drugs acting on urinary system**

- i) Diuretics and antidiuretics

b. Drugs acting on respiratory system

- i) Antiasthmatics
- ii) Antitussives, expectorants and respiratory stimulants

UNIT IV**Autacoids**

- a. Amine autacoids- Histamine and 5-HT
- b. Lipid derived autacoids-Prostaglandins, thromboxanes and leukotrienes.
- c. Peptide autacoids- Angiotensin, bradykinin

UNIT V**Hormones and hormone antagonists**

- a. Insulin, Oral hypoglycaemics agents
- b. Thyroid and antithyroid drugs
- c. Adrenocortical steroids and their analogues
- d. Uterine stimulants and relaxants

Text Books:

1. H.P Rang, M. M. Dale & J.M. Ritter, Pharmacology, Churchill Livingstone, 4th Ed.
2. J.G. Hardman and Lee E. Limbard, Goodman & Gilman, The Pharmacological basis of therapeutics, McGraw-Hill, Health Professions Division.
3. Illustrated Pharmacology by Lippincott

References:

1. Tripathi, Essentials of Medical Pharmacology, Jaypee Brothers, Latest Edition
2. Satoskar, Pharmacology and pharmacotherapeutics Vol. 1 & 2, Published by Popular Prakashan, Mumbai.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL ANALYSIS- II	Code	15R00602
CourseYear	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the spectroscopic and chromatographic techniques.

Objective:

- The course is designed to explore the knowledge in modern analytical instrumental techniques i.e., both spectroscopy and chromatography.
- The course helps to assess the process for identification, determination, quantification and purification of a substance and separation of the components of a solution or mixture.

Outcome:

1. To gain knowledge on basic fundamentals of modern analytical instrumental techniques.
2. Analyze the drug structure, identification, purity determination, and quantification of the drug substance.

UNIT I

a) Study of separations, introduction to chromatography, classifications, types, various stationary and mobile phase in the following techniques and their applications in pharmacy (IP 2010 and 2014).

b) **Column chromatography:** Adsorption and partition theory, concept of theoretical plates, HETP, adsorbents used, preparation, procedure and methods of detection.

c) **Paper Chromatography:** Theory, different techniques employed, filter papers used, qualitative and quantitative detection.

e) **Thin layer chromatography:** Principle, 1D and 2D techniques, preparation of plates, R_f, R_x, R_m values and detection techniques. Concept of HPTLC.

f) **Ion Pair Chromatography,** Ion suppression and Ion Exchange Chromatography, Introduction to Theory and Principle, Instrumentation. Advantages and limitations. Pharmaceutical and other Applications.

g) **Size exclusion chromatography:** Introduction, principle, instrument. Column packing, Applications.

UNIT-II

Gas Chromatography: Principle, adsorption isotherm and its relation to tailing and fronting, Instrumentation - carrier gas, flow regulators, injectors columns, detectors. Various parameters used in GC analysis. Brief note on GC-MS.

UNIT III

a) Basic Principles (exothermic and endothermic reactions), Instrumentation and applications of the following: Differential Scanning Colorimetry (DSC), DTA, & TGA in analysis of Pharmaceuticals,

b) Quality Assurance

Concept of Quality control and Quality Assurance, ISO 9000, TQM, QC, Vs QA, Concepts of ICH, GMP and GLP, Calibration of UV and IR, Validation of analytical methods as per ICH guidelines.

UNIT IV

HPLC: Principle, Instrumentation- mobile phase, degassing, pumps, injectors, columns, detectors. Normal Phase Vs Reverse Phase HPLC, Isocratic and gradient elution in RP-HPLC. Various parameters in chromatogram of HPLC.

UNIT V

Optical Rotatory dispersion: Principle of optical activity, optical purity, concept of Optical Rotatory dispersion (ORD).

XRD: Production X-ray, types of X-rays, Braggs law, Octant rule, Cotton effect, XRD pattern in identification and comparison of polymorphs with examples.

Radio Immuno Assay & Enzyme Linked Immuno Sorbate Assay: Principle and procedure of RIA, Principle, Types, Procedures of ELISA and application of RIA and ELISA in various diagnosis.

Text books:

1. Willard HH, Merritt LL, Dean JA and Settle FA. (2001). *Instrumental Methods of Analysis*, 7th ed., CBS Publishers and Distributors, Delhi, ISBN: 9788123909431.
2. Douglas A. Skoog, F. James Holler and Stanley R. Crouch. (2006). *Principles of Instrumental Analysis*, Cengage Learning; 6th edition, ISBN-10: 0495012017

References:

1. Settle, *Handbook of Instrumental Techniques for Analytical Chemistry*. Prentice Hall.
2. Robert M Silverstein. *Spectrometric Identification of Organic compounds*. Sixth edition, John Wiley & Sons, 2004.
3. B.K. Sharma, *Instrumental Chemical Analysis*, Goel Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	BIOPHARMACEUTICS AND PHARMACOKINETICS	Code	15R00603
Course Year	B. Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Biopharmaceutics and pharmacokinetic.

Objective:

- The course is designed to explore the knowledge in ADME.
- The course helps to learn significance of plasma drug concentration measurement.

Outcomes:

1. Graduate will acquire knowledge on the factors influencing absorption, distribution, protein binding and also on pharmacokinetic models.
2. Able to calculate the pharmacokinetic parameters based on plasma level-time data & urine data.
3. Understand the importance of clinical pharmacokinetics and the bioavailability and bio equivalence studies.

UNIT – I

Biopharmaceutics, Pharmacokinetics and Pharmacodynamics. Structure of GI membrane. Routes of drug administration and absorption from different routes.

Drug Absorption. Mechanisms of GI absorption, physico-chemical, biological and dosage form factors influencing absorption.

Drug distribution. Factors affecting drug distribution, physiological barriers of drug diffusion, apparent volume of distribution, drug binding to blood, tissues, protein binding – factors affecting, significance and kinetics of protein binding.

UNIT – II

Drug Metabolism: Pathways of drug metabolism. Phase-I (oxidative, reductive and hydrolytic reactions). Phase II reactions (conjugation) Enzyme induction and inhibition, hepatic clearance, pharmacological activity of metabolites, first pass effect.

Drug excretion. Glomerular filtration, tubular secretion and reabsorption, effect of pH and other drugs. Clearance concept, excretion through bile, feces, lungs and skin in brief.

UNIT – III

Bioavailability and bioequivalence: concept of equivalents, Definitions of various types of equivalents, types of Bioavailability studies, measurement of Bioavailability, plasma level and urinary excretion studies. Bioequivalence study design, IVIVC.

UNIT – IV

Pharmacokinetics. Basic considerations, compartment modeling, one compartment open model - i.v. bolus and extra vascular administration, urinary excretion studies. Apparent volume of distribution, elimination rate constant, biological half life, area under the curve and clearance. Calculation of pharmacokinetic parameters. Method of residuals, Wagner and Nelson method , excretion rate method, sigma minus method. Solving of simple problems

UNIT – V

Nonlinear kinetics. Non compartmental models, reasons for non linearity, concepts of linearity and non linearity , Michaelis- Menten equation and its significance.

Text Books:

1. L. Shargel and ABC Yu, textbook of applied biopharmaceutics & Pharmacokinetics, 4th edn, Appleton – century – crofts, Connecticut, 2004.
2. Milo Gibaldi, Biopharmaceutics and clinical pharmacokinetics 4/Edn. Pharma Book
3. Syndicate.Hyderabad.
4. DM Brahmanekar and SB Jaiswal, biopharmaceutics and pharmacokinetics- a treatise, Vallabh Prakasham, Delhi.

Reference Books:

1. Ronald & Truett. Clinical pharmacokinetics concepts & applications. 3rd ed, Wolters Kluwer Pvt Ltd., 2007.
2. Robert E. Notari, Biopharmaceutics and pharmacokinetics – an introduction, Marcel Dekker Inc., NY
3. Basic pharmacokinetics by Hedaya, CRC Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL JURISPRUDENCE	Code	15R00604
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to review Pharmaceutical Legislations, Pharmaceutical ethics & policy.

Objectives:

- The course is designed to explore the knowledge Pharmaceutical Education.
- The course helps to learn various laws and acts in pharmacy.

Outcomes:

1. Graduate will acquire knowledge on Pharmaceutical Education.
2. Able to understand drugs & pharmaceutical industry.
3. Understand the importance of Pharmacy Acts.

UNIT I**Introduction**

- a. Pharmaceutical Legislations - A brief review
- b. Drugs & Pharmaceutical Industry - A brief review
- c. Pharmaceutical Education - A brief review.
- d. Pharmaceutical ethics & policy
- e. Pharmacy Act 1948

UNIT II

Drugs and Cosmetics Act 1940 and Rules 1945

UNIT III

Narcotic Drugs & Psychotropic Substances Act 1985

UNIT IV

Drugs (Prices Control) Order 1995.

Medicinal & Toilet Preparations (Excise Duties) Act 1955

Drugs and Magic Remedies (Objectionable Advertisements) Act 1954 and Rules 1955.

UNIT V

Study of the salient features of the following.

- a. Prevention of Cruelty to animals Act 1960.
- b. Medical termination of pregnancy act 1970 and rules 1975
- c. Factories Act 1948.
- d. WTO, GATT and The Indian Patents Act 1970

Text Books:

- 1. B.M. Mithal, Text book of Forensic Pharmacy, publ by Vallabh Prakashan
- 2. Suresh.B, Text book of Forensic Pharmacy
- 3. C.K. Kokate & S.B. Gokhale, Textbook of Forensic Pharmacy, Pharmabook, Syndicate.
- 4. N.K. Jain. Textbook of Forensic Pharmacy. 7thed, Vallabh prakashan, 2007.

Reference Books:

- 1. Bare Acts and Rules Publ by Govt of India/state Govt from time to time.
- 2. Pharmaceutical policy of India
- 3. Notification from NPPA
- 4. Vijay Malik, Drugs & Cosmetics act 1940 and Rules, Eastern Law House Co. Delhi, Kolkata.
- 5. K. Sampath, Pharmaceutical Jurisprudence (Forensic Pharmacy) Jai Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACY ADMINISTRATION (CBCC-I)	Code	15R00605
Course Year	B.Pharmacy III year	Sem	II
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Organization of Distribution and Marketing, Principles of drug store and community pharmacy administration.

Objectives:

- To learn Manufacturing Management, work study insurance in pharma industry.
- To gain knowledge on drug store planning and layout.

Outcome:

1. To gain knowledge on basic fundamentals of management and administration in pharma industry.
2. To acquire knowledge on organization of distribution and marketing.
(organization =correct spelling)

UNIT – I***Features of Business Organizations & New Economic Environment:***

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-Liberalisation scenario.

Manufacturing Management: Goals of Production Management and Organization– Production, Planning and Control – Plant location - Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production).

UNIT – II

Work Study -Basic procedure involved in Method Study and Work Measurement- Statistical Quality Control: \bar{X} chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

Organization of Distribution and Marketing: Functions of Marketing, Marketing Strategies based on Product Life Cycle., Channels of distribution – Factors influencing channels of distribution, sales organization and sales promotion.

UNIT - III

Pharma Industry: Growth of Pharma Industry in India – current status and its role in building national economy and national health – Structure of Pharma Industry in India – PSUs in Pharma Industry –Progress in the manufacture of basic drugs, synthetic and drugs of vegetable origin. Export and import of drugs and pharmaceuticals – Export and import Trade.

UNIT – IV

Insurance and Pharma: Various types of insurance including marine and health insurance.

UNIT – V

Principles of drug store and community pharmacy administration:

Drug store planning and layout, sales promotion and salesmanship in drug store. Accounting records in drug stores.

Text Books

1. Aryasri and Subbarao, Pharmaceutical Administration, TMH.
2. Smarta, Strategic Pharma Marketing
3. G.Vidya Sagar, Pharmaceutical Industrial Management. PBS/BS Publication 2005.

References

1. Subbarao Chaganti, Pharmaceutical Marketing in India – Concepts and Strategy Cases, Pharma Book Syndicate.
2. O.P.Khanna, Industrial Management, Dhanpatrai, New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	CLINICAL TRIALS (CBCC-I)	Code	15R00606
Course year	B. Pharmacy III year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr / week
End Exam	70 Marks	Internal marks	30 Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about the Introduction to clinical trials.

Objective:

- To learn Phase I, II and III levels of clinical trials.
- To gain knowledge on statistical approaches for various endpoints.

Outcome:

1. To gain knowledge on clinical trials.
2. To acquire knowledge on Phase I, II, III toxicity studies and dosage calculations.
3. To learn the selection of volunteers for clinical trials.

UNIT –I**Overview of clinical trials**

Introduction to clinical trials, Issues in modern clinical trials, Study population.

UNIT –II**Phase I trials:**

Up-and-down design, Single patient per cohort design, Titration design.

Phase II trials:

Randomized dose ranging design, Randomized titration design, Two-stage phase II designs, Multistage design, Bayesian design, Randomized phase II design, Multiple outcomes design.

UNIT –III**Phase III trials:**

Randomized controlled clinical trials, Uncontrolled trials, Historical controls, Crossover designs, Withdrawal studies, Factorial designs, Group allocation designs, Studies of equivalency.

Randomization methods: Simple randomization, Replacement randomization, Random permuted blocks, Blinded studies.

UNIT –IV

Baseline assessment, subgroup analysis, recruitment, multicenter trials: Use of baseline data, Analysis of baseline comparability, Balance and imbalance, Difficulties of subgroup analysis, Recruitment of study subjects, Multicenter trials

UNIT –V

Statistical approaches for various endpoints: t-test, chisquare test, Fisher's exact test, analysis of variance, regression analysis, longitudinal analysis, nonparametric statistics

Text Books

1. Chow SC, Liu JP. Design and Analysis of Clinical Trials: Concepts and Methodologies. New York, NY: Wiley; 1998.
2. Geller N, Chow SC. Advances in Clinical Trial Biostatistics. New York, NY: Marcel Dekker; 2004.

Reference Books

1. *Interdisciplinary Statistics*. New York, NY: Chapman & Hall; 1997.
2. Jennison C, Turnbull BW. *Group Sequential Methods with Applications to Clinical Trials*. New York, NY: Chapman & Hall; 2000.
3. Machin D, Day S, Green S, Everitt B, George S. *Textbook of Clinical Trials*. New York, NY: Wiley; 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	COSMETIC TECHNOLOGY (CBCC-I)	Code	15R00607
Course year	B. Pharmacy III year	Semester	II
Theory	3 hrs/week	Tutorial	1 hr / week
End Exam	70 Marks	Internal marks	30 Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn about Cosmetics, scientific background technology and its future.

Objectives: Upon completion of the subject student shall be able to

- Understand various formulation aspects of cosmetic preparations.
- Provide knowledge on excipients & its applications in cosmetics.

Outcomes:

- Acquire skill in preparation of different types of cosmetics.
- Demonstrate the handling of equipment for evaluation of various cosmetics.
- Acquire the knowledge of processing of cosmetic, selection of materials for containers.

UNIT – I

Introduction of Cosmetics: Purposes of Cosmetics meaning of Cosmetics and cosmeceuticals. Classification of Cosmetics Quality characteristics and Quality Assurance Development Process of Cosmetics. Scientific background technology and its future.

UNIT – II**Excipients & its applications in cosmetics.**

a. Oily Materials: Introduction, Oils and Fats, Wax, Hydrocarbons, Higher Fatty Acids, Higher Alcohols, Esters, Silicones.

b. Surface Active Agents: Introduction Anionic Surfactant, Cationic, Surfactants, Amphoteric Surfactant, Non-ionic, Surfactant. Other Surfactants.

c. Humectants: Introduction, Choice of Humectants Unusual Humectants, Special Uses of Humectants.

d. Antioxidants: Introduction, General Oxidative theory, Measurement of Oxidation and Assessment of Oxidant efficiency, Choice of Antioxidant.

UNIT – III

Safety of Cosmetics: Basic Concept of Cosmetic Safety, Safety test items & Evaluation method: Skin irritation, sensitization, Testing on Human (Patch test, Usage test)

UNIT – IV

Cosmetics Containers: Introduction, Characteristics required by Cosmetic Containers-Quality Maintenance functional Design, Optimum Packaging.

Types of Cosmetic Containers:- Narrow Mouth bottles, Wide Mouth Bottles (Containers), Tubes, tubular Containers, Powders Containers, Compact containers, Stick containers, pencil containers Applicator containers.

UNIT – V

Material of construction for containers: Types of Material Forming and processing methods. Container design procedure. Material test methods & Specifications. Trends in Container materials

Text Books

- 1) New Cosmetic Science by Takeo Mitsui
- 2) Harry's Cosmetology.

Reference Books

- 1) Cosmetic Science & Technology by Sagarin C.B.
- 2) Hand book of Cosmetic science & Technology by Marc paye, Andre O. Barel.
- 3) Cooper & Gunn Dispensing for Pharmaceutical Students.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – II LABORATORY	Code	15R00608
CourseYear	B. Pharmacy III year	Sem	II
Lab	4hrs/week	Tutorial	Nil
End exam	70 Marks	Internal exam	30Marks
Credits	2		

Scope:

- To find out the drugs that is beneficial in clinics.
- Study the mechanism of Action and Site of action and their toxicities.
- Study the actions of drugs existing in Preclinicals

Objectives:

To know and understand pharmacological investigation techniques applied in the research

Outcomes:

- Acquires ability to apply experimental approaches in characterization of drugs.
- Able to use the knowledge to screen novel drugs in different animal models.

A. EXPERIMENTAL PART

- Experiments on Isolated Preparations:
 - Calculate the PA_2 value of atropine using acetylcholine as an agonist on rat ileum preparation.
 - Calculate the PA_2 value of chlorpheniramine using histamine as an agonist on guinea pig ileum preparation.
 - Find out the strength of the given sample (e.g. Acetylcholine, Histamine, 5-HT, Oxytocin etc.) using a suitable isolated muscle preparation by
 - Interpolation bioassay
 - Matching or bracketing bioassay
 - Three point bioassay
 - Four point bioassay

2. Experiments on intact animals like

- a. Study of drug induced catatonia in rats
- b. Study of muscle relaxant activity (rotarod apparatus)
- c. Study of antipsychotic activity (pole climb response apparatus)
- d. Study of antianxiety activity (elevated plus maze)
- e. Study of analgesic activity (analgesiometer)
- f. Study of anti-inflammatory activity (plethysmometer)
- g. Study of antidepressant activity (swim test & tail suspension test)
- h. Study of anticonvulsant activity (electroconvulso meter)

i. Study of spontaneous motor activity and locomotor activity (actophotometer)**B. DEMO/ WORK SHOP**

- a. Screening of antiulcer activity
- b. Invitro antioxidant activity
- c. Screening of antihistaminic activity (histamine chamber)

C. SEMINAR/ ASSIGNMENT/ GROUP DISCUSSION

- a. BABE studies
- b. Invitro-in vivo correlation studies
- c. Pharmacovigilance
- d. Biostatistics and its application

REFERENCES

- 1. Practicals in pharmacology By Dr.R.K.Goyal
- 2. Handbook of experimental pharmacology By S.K.Kulakarni
- 3. Experimental pharmacology By M.N.Ghosh
- 4. Experimental Pharmacology and Toxicology By Dr.B.M.VrushabendraSwamy and Prof.K.N.Jayaveera, S.Chand& Co.,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACEUTICAL ANALYSIS-II LABORATORY	Course Code	15R00609
Course Year	B. Pharmacy III Year	Semester	II
Lab	4 Hrs/ Week	Tutorial	NIL
End Exam	70 Marks	Internal Exam	30 marks
Credits	2		

Scope:

This subject will provide an opportunity for the student on handling of modern analytical instruments or equipment.

Objective:

- The course is designed to explore the knowledge in handling of modern analytical instruments or equipment.
- The course helps to understand the instrumental or equipment operational procedures

Outcomes:

- Analyze the drug compound independently by using the instrument.
- Design and deepen their practical skills so as to be capable of performing the analysis in a good manner.
- Compare the results in determination of percent purity of drug performed by self with monographs.

I. Experiments

1. Determination of λ - max of KMnO_4
2. Determination of λ - max of any one drug
3. Determination of isobestic point of any 2 drugs.
4. Estimate the unknown concentration of Paracetamol by UV Spectrophotometric method.
5. Estimate the unknown concentration of ciprofloxacin in the ciprofloxacin injection by colorimetric method.
6. Estimate the unknown concentration of Riboflavin by fluorimetric method.
7. Assay of Ibuprofen (any one drug) by UV-spectrophotometric method using calibrative curve method.
8. Assay of Paracetamol (any one drug) by UV-spectrophotometry-A (1%, 1 cm) method.

9. Assay of Pheniramine Maleate by UV-spectrophotometry-A (1%, 1 cm) method.
10. Study of quenching effect of quinine by Fluorimetry.
11. Determination of Na/K ions by Flame photometry.
12. Interpretation of UV Spectra.
13. Interpretation of IR Spectra
14. Interpretation of Mass Spectra
15. Interpretation of NMR Spectra

II. Demo/ Work Shop

1. Demonstration of UV instrumentation of single and double beam spectrophotometer.
2. Demonstration of IR instrumentation including KBr pressed pellet technique, ATR, liquid film technique.

III. Seminar/Assignment/Group Discussion

1. Determination of two drugs simultaneously by using UV spectrophotometer.
2. Reagent mechanisms: Ninhydrin, FC, MBTH, PDAC, PDAB (at least two)

LIST OF MINIMUM INSTRUMENTS/EQUIPMENTS REQUIRED

1. Fluorimeter
2. UV-Spectrophotometer
3. Digital balance
4. IR Spectrometer
5. Digital Colorimeter
6. Flame photometry
7. Hot air oven
8. Adequate glassware

REFERENCES:

1. Monographs: Indian Pharmacopoeia, British Pharmacopoeia, United States of Pharmacopoeia, European Pharmacopoeia, Japanese Pharmacopoeia.
2. AH Beckett & Stenlake, Text book of Practical Pharmaceutical chemistry, Vol. II Continuum International Publishing Group, Althone.
3. Martindale: The Complete Drug Reference. 34th and 35th editions.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	BIOPHARMACEUTICS AND PHARMACOKINETICS LABORAOTORY	Code	15R00610
Course Year	B. Pharmacy III year	Sem	II
Lab	4hrs/week	Tutorial	Nil
End exam	70 Marks	Internal exam	30Marks
Credits	2		

Scope: This subject will provide an opportunity for the student to learn about the Biopharmaceutics and pharmacokinetic.

Objective:

- The course is designed to analysis of biological samples for drug content.
- The course helps to estimation of the pharmacokinetic parameters.

Outcomes:

1. Graduate will acquire knowledge on analysis of biological samples for drug content.
2. Able to calculate the pharmacokinetic parameters based on plasma level-time data & urine data.
3. Understand the statistical treatment of pharmaceutical data.

I. EXPERIMENTS

1. Analysis of biological samples for drug content and estimation of the pharmacokinetic parameters.
2. *In vitro* evaluation of tablet/capsule for drug release
3. Drug-protein binding studies.
4. Statistical treatment of pharmaceutical data.
5. Problems related to pharmacokinetics – determination of PK Parameters
6. Problems related to bioavailability and bioequivalence.

II. DEMO/ WORKSHOP

1. Absorption studies – *in vitro*.
2. Experiments designed for the estimation of various pharmacokinetic parameters.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

Chronopharmacokinetics.

Text Books:

1. L. Shargel and ABC Yu, textbook of applied biopharmaceutics & Pharmacokinetics, 4th edn, Appleton – century – crofts, Connecticut, 2004.
2. Milo Gibaldi, Biopharmaceutics and clinical pharmacokinetics 4/Edn. Pharma BookSyndicate.Hyderabad.
3. DM Brahmankar and SB Jaiswal, biopharmaceutics and pharmacokinetics- a treatise, vallabh prakasham, Delhi.

Reference Books:

1. Ronald & trouser. Clinical pharmacokinetics concepts & applications. 3rd ed, wolterskluwer Pvt Ltd., 2007.
2. Robert E notary, Biopharmaceutics and pharmacokinetics – an introduction, marcel dekker inc., NY
3. Basic pharmacokinetics by Hedaya, CRC press.

B. Pharmacy III-II Sem.

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**15A52602 ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS
(AELCS) LAB (Audit Course)**

1. INTRODUCTION

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

UNIT-I: COMMUNICATION SKILLS

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

UNIT-II: WRITING SKILLS

1. Report writing
2. Resume Preparation
3. E-mail Writing

UNIT-III: PRESENTATION SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation

UNIT-IV: GETTING READY FOR JOB

1. Debates
2. Group discussions
3. Job Interviews

UNIT-V: INTERPERSONAL SKILLS

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

4. LEARNING OUTCOMES:

- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities
-

5. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system

- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and G

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skills lab**
3. **DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.**
4. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. **Train2success.com**

7. BOOKS RECOMMENDED:

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 3rd Edn. 2015.
3. **Essay Writing for Exams, Audrone Raskauskiene, Irena Ragaisiene & Ramute Zemaitiene, OUP, 2016**
4. **Soft Skills for Everyone**, Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate**, Gangadhar Joshi, Sage Publications, 2015
7. **Communicative English**, E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams**, Philip Sunil Solomon OUP, 2015

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	NOVEL DRUG DELIVERY SYSTEMS	Code	15R00701
Course year	B. Pharm IV year	Semester	I
Theory	3 hrs/week	Tutorial	1hr/week
End exam	70 marks	Internal exam	30 marks
Credits	3		

Scope: The novel drug delivery systems course provide the knowledge about various novel and targeted systems- formulation, evaluation and applications

Objectives: To learn the novel technologies in drug delivery systems

Outcomes: Student must able to formulate the drug delivery systems for drugs.

UNIT I

Concepts of controlled release, sustained release, extended release, timed release and delayed release. Rationale behind the design of above delivery systems. Factors influencing the design and performance of sustained and controlled release dosage forms.

UNIT II

Oral Control Drug Delivery Systems: Fundamentals, Dissolution Controlled, Diffusion Controlled, Ion Exchange Resins, Osmotic based systems, pH Independent Systems, altered density systems and use of polymers in controlled drug delivery.

UNIT III

Targeted Drug Delivery Systems: Fundamentals and applications, formulation and evaluation of nano particles, resealed erythrocytes and liposomes and niosomes.

UNIT IV

Transdermal Drug Delivery Systems: Fundamentals, permeation of drugs across the skin, types of TDDS, Materials employed and Evaluation of TDDS.

UNIT V

Mucoadhesive Delivery Systems: Mechanism of bioadhesion, mucoadhesive materials, formulation and evaluation of Buccal and Nasal drug delivery systems.

Text Books:

1. Robinson JR and Vincent HL lee. Controlled drug delivery fundamentals and applications, 2ed, marcel dekker 2005.
2. YiewChien, Novel drug delivery systems, 2nded, marcel dekker 2003.

Reference Books:

1. N.K. Jain, Advances in Control & Novel drug delivery, CBS Publishers.
2. Lippincott Williams and Wilkins, Remington Pharmaceutical Sciences
3. E.ARawilkins, Bentley's Text Book of Pharmaceutics, Elbspubl

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOLOGY – III	Code	15R00702
Course Year	B.Pharmacy IVyear	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn pharmacological information about the drugs. In this subject drugs acting on gastrointestinal system, chemotherapeutic agents, principles of toxicology and bioassays will be taught.

Objectives: Upon completion of the subject student shall be able to Understand various pharmacological aspects like mechanism of action, pharmacokinetics, sideeffects, drug interactions, contraindications and indications of drugs falling under below mentioned chapters.

Outcomes:

- Correlate and apply the knowledge.
- Handle the animals and carry out the experiments on animals
- Understand the chemotherapy of various diseases

UNIT I. Drugs acting on the gastrointestinal tract

- Anti-ulcers Drugs
- Laxatives and anti-diarrhoeal drugs
- Emetics and anti-emetics
- Appetite Stimulants and Suppressants

UNIT II. Chemotherapeutic agents and their applications

- General principles of chemotherapy.
- Sulphonamides, co-trimoxazole and β -lactam antibiotics
- Tetracyclines, aminoglycosides, chloramphenicol, macrolides, quinolones, fluoroquinolones and polypeptide antibiotics

UNIT III.

- Chemotherapy of tuberculosis & leprosy
- Chemotherapy of malignancy and immunosuppressive agents.

UNIT IV.

- Chemotherapy of fungal and viral diseases
- Chemotherapy of protozoal diseases and helminthic infections

UNITV. Principles of toxicology & Principles of bioassays.

- a. Definition of poison, general principles of treatment of poisoning
- b. Treatment of barbiturate, opiod, organophosphorous and atropine poisoning.
Heavy metals and heavy metal antagonisits. LD₅₀, ED₅₀ and therapeutic index
- c. Principles of bioassays and errors in bioassys.
- d. Study of bioassay methods for the following drugs
 - i. Digitalis ii. d-tubocurarine, iii. Oxytocin iv. Insulin v. HCV

Text Books:

1. H.P Rang, M. M. dale & J.M. Ritter, Pharmacology, Churchill living stone, 4th Ed.
2. J.G. Hardman and Lee E. Limbard, Good Mann & Gilmann, The Pharmacological basis of therapeutics, Mc Grawhill, Health Professions Dvn.
3. Illiterated Pharmacology by Lippincotts

REFERENCES

1. Tripathi, Essentials of Medical Pharmacology, Jaypee Brother's, Latest Edition
2. Sathoskar, Pharmacology and pharmaco therapeutics Vol. 1 & 2, Publ by Popular Prakashan, Mumbai.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	CLINICAL AND HOSPITAL PHARMACY	Code	15R00703
CourseYear	B.Pharmacy IV year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: To acquire the Knowledge about Clinical Procedures and study of case reports.

Objectives: Patient counseling and Dispensing of Drugs and identification of drug interactions in Prescriptions.

Outcomes: To council the patients about usage of drugs and drug interactions

UNIT I**Introduction to clinical pharmacy:**

- Prospects and perspectives of clinical pharmacy in national and international scenario, scope of clinical pharmacy
- Therapeutic Drug Monitoring.
- Clinical Pharmacokinetics and individualization of Drug Therapy.
- Concept of Essential Drugs and Rational Drug use.

UNIT II**Introduction to daily activities of Clinical pharmacist**

- Drug therapy monitoring (Medication chart review)
- Adverse Drug Reactions & Drug Interactions
- Patient counseling
- Drug and poison information.
- Ward round participation.

UNIT III**Clinical laboratory tests and interpretation of test results.**

- Hematological (complete blood picture)
- Pulmonary function tests
- Tests associated with cardiac disorders
- Liver, Renal function tests

UNIT IV**Hospital Management**

Organization of a hospital and hospital pharmacy (drug store), responsibilities of a hospital pharmacist, pharmacy and therapeutic committee. Hospital formulary,

purchase and inventory control, role of Pharmacist in community health care and education.

UNIT V

Drug distribution and records

Procedural manual, drug distribution, dispensing to out-patients, in-patients and ambulatory patient dispensing of ancillary and controlled substances. Prescription filling, drug profile.

Text Books:

- a. A Textbook of clinical pharmacy practice: Essential concepts and skills. Dr G Parthasarathi et al. Orient Longman Pvt Ltd. ISBN: 8125026
- b. Leon Shargel, Comprehensive pharmacy review, Latest Edition
- c. Health Education and Community Pharmacy, Gupta AK, CBS, Publ. and Distributors New Delhi – (2010).

Reference Books:

1. J.G. Hardman and Lee E. Limbard, Good Mann & Gilman, The Pharmacological basis of therapeutics, Mc Grawhill, Health Professions Divn.
2. Health Education and Community Pharmacy, NK Jain, CBS, Publ. and Distributors New Delhi.
3. *Hospital pharmacy by Hassan.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MEDICINAL CHEMISTRY-II	Code	15R00704
CourseYear	B.Pharmacy IV year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: This subject will provide an opportunity for the student to learn medicinal chemistry information about the drugs. In this subject student will be able to understand the properties and its biological activity of the drugs.

Objectives: Upon completion of the subject student shall be able to

1. Understand various drugs structure, their properties and biological activities.
2. Correlate and apply the knowledge.
3. Influence of chemical structure on biological activities.

Outcomes:

1. Acquire skill in the structure of drugs and their biological activities.
2. Acquire the knowledge of synthesis of chemical compounds.
3. Assay of some official compounds.

UNIT I

Drugs acting on renal system Renin-Angiotensin system inhibitors: Captopril*, Enalapril*, Losartan*.

Diuretics: Acetazolamide, Hydrochlorthiazide*, Furosemide*, Ethacrynic acid*, Spironolactone, Amiloride, Triamterene and Mannitol. SAR- Carbonic anhydrase inhibitors, Thiazides, Loop diuretics.

UNIT II

Drugs acting on CVS

Anti anginal agents & vasodilators: Nitroglycerin*, Isosorbide dinitrate*. Ion channel blockers- Verapamil, Diltiazem, Nifedipine, Amlodipine*.

Antithrombotic agents- Aspirin, Dipyridamole, Clopidogrel*

Antiarrhythmic drugs: Quinidine, Procainamide*, Lidocaine, Mexiletine*, Amiodarone, Sotalol.

Antihypertensive agents: classification, Reserpine, Prazosin, Clonidine, Hydralazine, Sildenafil citrate, Minoxidil, Amrinone,. SAR- beta-blockers.

Antihyperlipidemic agents: Fenofibrate*, Dextrothyroxine, Colestipol, Nicotinic acid, β -Sitosterol, Probucol, Ezetimibe, Simvastatin, Atorvastatin, Rosuvastatin. SAR-HMG CO-A inhibitors

UNIT III

Drugs acting on Blood, hypoglycemic agents and thyroid.

Anticoagulants: Factors, Warfarin sodium*, Dicumarol

Synthetic hypoglycemic agents: Tolbutamide*, Tolazamide, Glipizide, Glimepiride, Gliclazide, Pioglitazone, Metformin*, Miglitol.

Thyroid and antithyroid drugs: Levothyroxine, Liothyronine, Propylthiouracil.

UNIT IV

Analgesic, antipyretic and anti-inflammatory agents

Opioids: Morphine, Levorphanol, Pentazocine, Meperidine*, Methadone, Tramadol*, Buprenorphine. Opioid antagonist: Naltrexone, Naloxane, Methylnaltrexone.

NSAIDs: A note on prostaglandins and leukotrienes. Aspirin, Indomethacin, Sulindac*, Ketorolac, Ibuprofen, Naproxen, Mefenamic acid, Diclofenac*, Piroxicam, Celecoxib, Paracetamol*.

Management of Gout and Hyperuricemia: Allopurinol*, Sulfinpyrazole.

Antimigraine drugs: Sumatriptan, SAR – Salicylates, Aryl propionic acids.

UNIT V

Antibiotics β - Lactams: Penicillin G, Ampicillin*, Amoxicillin. β - Lactamase inhibitors: Clavulanate potassium, Sulbactam.

Cephalosporins: Cephalexin*, Cefixime. SAR-Penicillins and Cephalosporin

Aminoglycosides and Tetracyclines: Streptomycin, Gentamicin, Tobramycin, Tetracycline, Doxycycline. SAR- Aminoglycosides and tetracyclines

Macrolides and Lincomycins: Erythromycin, Azithromycin, Clindamycin.

Miscellaneous: Chloramphenicol,

NOTE: Introduction, definition, chemical classification with structure, nomenclature, synthesis (only for * marked drugs), mechanism of action, SAR including stereo chemical aspects, metabolites (including its ADR) and therapeutic uses of the following classes of drugs from UNIT I to UNIT V.

Text Books

1. William O. Foye, Textbook of Medicinal Chemistry, Lea Febiger, Philadelphia.
2. An Introduction to Medicinal Chemistry by Graham. L. Patrick, Oxford University publishers.

3. JH Block & JM Beale (Eds), Wilson & Giswold's Text book of organic Medicinal Chemistry and pharmaceutical chemistry, 11th Ed, Lipcolt, Raven, Philadelphia, 2004
4. Rama Rao Nadendla, Medicinal Chemistry; Mc Millan Publishers.

Reference Books:

1. Hansch, Comprehensive medicinal chemistry, Vol 1 – 6 Elsevier pergmon press, Oxford
2. Abraham (Ed), Burger Medicinal chemistry and Drug discovery, Vol. 1 & 2. John Wiley & Sons, New York 2003, 6th Ed.
3. M. Atherden, Bentley and Driver's Textbook of Pharmaceutical Chemistry Ed: I.Oxford University Press, Delhi.
4. Daniel lednicer, Strategies for Organic Drug Synthesis and Design, John Wiley, N. Y. 1998. 5. D. Lednicer, Organic drug synthesis, Vol, 1 – 6, J.Wiley N.Y.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	CHEMISTRY OF NATURAL PRODUCTS (CBCC-II)	Code	15R00705
Courseyear	B. PharmIV year	Semester	I
Theory	3 hrs/week	Tutorial	1hr/week
End exam	70 marks	Internal exam	30 marks
Credits	3		

Scope: To Study the Phytochemical evaluation and Synthesis of natural Products

Objectives: To identify the structure and screening of the natural products

Outcomes: Acquire the skills in determination of structure, mechanism of action and uses of Natural products.

UNIT I

Phytochemical Screening: Preparation of extracts, screening of alkaloids, saponins, cardiac

glycosides, flavonoids, tannins and anthraquinones in plant extracts. Identification and estimation of various phytoconstituents.

Plant tissue culture: History, types, media requirements, methodology for establishment of cell cultures; growth measurements, viability measurements and applications. Micropropagation, immobilization, hairy root culture.

Cosmeceuticals:

General introduction to cosmeceuticals, role of herbs in cosmetics. Study of the following cosmeceuticals- Amla, Henna, Cyperus, Soap Nut, Aloe Vera, Turmeric, Sandal Wood and Bitter Orange Peel.

Neutraceuticals: Definition, introduction and study of Garlic, Spirulina, Soya and Royal jelly.

Introduction and importance of trade in herbal medicine, herbal cosmetics and Indian herbal drug industry.

UNIT II

General structural elucidation of natural products

Chemical methods for determination of active hydrogen, methoxy, hydroxyl, N-methyl and degradation (Hoffmann, Edmann etc) techniques for the determination of ring size. Structural elucidation of Ephedrine, Atropine, Morphine, Papaverine.

UNIT III

Alkaloids

Definition of alkaloids, pseudoalkaloids and protoalkaloids. General methods of extraction, isolation, Properties and tests for alkaloids.

Opium alkaloids: Structural features of Morphin molecule – Peripheral groups. Modification of structure and effect on analgesic activity – SAR of morphine and morphine-like analgesics.

Narcotic antagonists: Nalorphine, Levallorphan. Anti-tussive agents: Noscapine, Dextromethorphan.

Smooth muscle relaxants: Papaverine and related compounds like ethaverine, Dioxylone. Structures and uses of these compounds.

Tropane alkaloids: Structures of Atropine/hyoscyamine, Hyoscyne, Hydrolytic products of these – Tropine and Scopine. Relationship between tropine & pseudotropine. Biological actions and uses of tropane alkaloids. Homatropine.

Rauwolfia alkaloids: Structures and uses of Reserpine, Rescinnamine, Deserpidine, ajmaline, syrosingapine. Hydrolysis of reserpine and rescinnamine. Mechanism of action of reserpine.

Ergot alkaloids: Classification, structures, hydrolytic products, pharmacological actions, therapeutic uses and toxicity. Synthetic derivatives: Methyl ergonovine (Methyl ergometrine), LSD, Ethysergide.

UNIT IV

Terpenes & Terpenoids:

Introduction to Volatile oils, terpene vs terpenoids, Classification, isoprene, special isoprene and gem-dialkyl rules. Sources and structures, general extraction procedure for Citral, citral-a (Geranial), citral-b (Neral). Alpha-terpeniol, Carvone, Menthol, Menthone, 1,8-Cineole, Camphor. Chemical transformation and interconversion of citral to citronellal, citronellol, geraniol, nerol, geranic acid, p-cymene, alpha-terpeneol and ionones. Conversion and interconversion of camphor into camphoric acid, camphoric acids, p-cymene, Borneol, isoborneol.

UNIT V

Steroids: Introduction, nomenclature and classification of steroids. Stereochemistry of Cholesterol. Uses of Bile acids, steroidal hormones. Different Sources of steroidal drugs like diosgenin, cholesterol, stigmasterol and ergosterol.

Synthetic oestrogens like diethylstilbesterol, hexosterol, 17-alpha ethinyloestradiol, Interconversions of Estrone, Estril, Estradiol. Chemistry of keto and nonketo adrenocorticoids. Anabolic steroids (Structures and uses).

Cardiac glycosides: Structures of glycosides from Digitalis, Strophanthus, Squill and Bufa. Enzymatic and acid hydrolytic reactions of the glycosides. Mechanism of action, SAR, therapeutic uses and toxicity.

TextBooks:

1. IL Finar, Organicchemistry, Vol. 1 &2, the Englishlanguagebooksociety, London, NewDelhi.
2. O.P. Agarwal, Naturalproductsby. Vol.1 &2, Goelpublications– Meerut.
3. Kokate CK, PurohitA.P. &Gokhale;PharmacognosyNiraliPrakashan, New Delhi.

ReferenceBooks:

1. RTMorrison and R.NBoyd, Organic chemistry, AllynandBacon,inc., boston
2. Me–Wolf,ed., Burger’smedicinalchemistry,J. Wiley&sons, NY.
3. F.G. Mann &B. Saunders,PracticalOrganicchemistryLongmansgreen&Co. Ltd., UK.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	COMPUTER AIDED DRUG DESIGN (CBCC- II)	Code	15R00706
CourseYear	B.Pharmacy IV year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Objectives:

1. CADD course covers the key areas of computational chemistry methods as applied to the modelling of biological processes and to rational drug design, building on students' knowledge of theoretical chemistry.
2. This course also deals with cheminformatics, relations between thermodynamic properties and protein-ligand binding by structure.

Outcomes:

1. Describe the use of lead candidates and database representations
2. Explain the drug development pipeline and understand where computational chemistry fits in chemistry
3. Apply how to use software in structure prediction, ligand design methods, docking programs etc.,

UNITI

Introduction to computer aided drug design: Introduction, types of enzyme inhibition, how drugs are discovered, and the basics of mechanistic drug design, important techniques **UNITII**

Uses of computer graphics in computer aided drug design: Computer graphics displays, Computed molecular models, Molecular modeling systems for drug design, uses of computer-assisted drug design, extending molecular modeling.

UNITIII

Molecular mechanics and molecular dynamics: Potential energy function, Non-bonded energy terms, electrostatic energy, hydrogen bonds, energy minimization, applications of theoretical techniques to drug design.

UNITIV**Computer-Aided Drug Design**

EARLY METHODS: Statistical Prediction of Pharmacological Activity, Molecular descriptors based on lipophilicity (Partition coefficient 'logP', substituent hydrophobicity

constant ' π '), polarizability (Molar refractivity, Molar volume), steric (Taft's Steric Factor 'Es', Charton's steric parameter r_v , Verloopparameters), electrostatics (Hammett substitution constant ' σ ', ionization 'pKa') and quantum mechanical (Partial atomic charges, dipolemoment, HOMO/LUMO)

NEWER METHODS: Forces Involved with Drug–Receptor Interactions, Optical Isomerism and Biological Activity, conformational analysis, Comparative/Homology modeling, Molecular Docking, Pharmacophore modeling, Quantitative Structure–Activity Relationships, Structural alerts, Database Searching and Mining, Isosterism.

UNITY

Inhibitors of Dihydrofolate Reductase: The enzyme, enzyme – inhibitor interactions, inhibitor design. **Approaches to antiviral drug design:** Rhinovirus as a drug receptor, Designing Antiviral drugs. **Conformational Biological activity relationships for Receptor-selective, conformationally constrained Opioid peptides:** Design of conformationally constrained Delta and μ Opioid Receptor-selective peptides, Problems and prospects for rational design of Receptor-selective peptides.

Text Books:

1. **Computer aided drug design** Methods and Applications by Thomas J. Perun, C.L. Propst; Marcel Dekker, 2010.
2. **Wilson and Gisvold's Text book of Organic Medical and Pharmaceutical Chemistry** by John M. Beale, John H. Block; Lippincott Williams & Wilkins, 12th Edition, 2011.
3. **Molecular Modelling: Principles and Applications** by Andrew R. Leach, Published by Pearson Education EMA, January 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	PHARMACOVIGILANCE (CBCC- II)	Code	15R00707
CourseYear	B.Pharmacy IV year	Sem	I
Theory	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30Marks
Credits	3		

Scope: To study Adverse effects and monitoring of adverse Drug Reactions

Objectives: To Identify the Adverse drug reactions and surveillance of Reports.

Outcomes: Should have the Knowledge about the terminology of adverse medication related events, roles and responsibilities in Pharmacovigilance.

UNIT –I**Introduction to Pharmacovigilance**

- History and development of Pharmacovigilance
- Importance of safety monitoring / Why Pharmacovigilance

National and international scenario

- Pharmacovigilance in India
- Pharmacovigilance global perspective
- WHO international drug monitoring programme

UNIT –II**Basic terminologies used in Pharmacovigilance**

- Terminologies of adverse medication related events
- Information resources in Pharmacovigilance

Establishing Pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Establishing a national programme
- SOPs – Types, designing, maintenance and training
- Roles and responsibilities in Pharmacovigilance
- Licence Partners, Contract Research Organisations (CROs) and Market Authorisation Holders (MAH)

UNIT –III

- Pharmacovigilance methods
- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study

UNIT –IV

- Adverse drug reaction reporting
- Introduction to reporting systems
- Spontaneous reporting system
- Reporting to regulatory authorities
- Guidelines for reporting ADRs in biomedical literature

UNIT –V

- Communication in Pharmacovigilance
- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media, Doctor Letters to Healthcare Professionals

TEXTBOOKS

1. Textbook of Pharmacovigilance by S.K. Gupta, Jaypee brothers.
2. Pharmacovigilance by Ronald D. Mann, Elizabeth B.Andrews, 2nd edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	NOVEL DRUG DELIVERY SYSTEMS LABORATORY	Code	15R00708
Course year	B. Pharm IV year	Semester	I
Lab	4 hrs/week	Tutorial	NIL
End exam	70 marks	Internal exam	30 marks
Credits	2		

Scope: This subject will provide an opportunity for the student to learn about preparation and evaluation of Novel Drug Delivery Systems.

Objectives: Upon completion of the subject student shall be able to

- Understand various Novel Drug delivery systems and their preparations.
- Provide knowledge on filing of various regulatory agencies.

Outcomes:

- Acquire skill in preparation and evaluation of various Novel formulations.
- Acquire the knowledge of Product development and filing to various regulatory agencies.

I. EXPERIMENTS:

- Preparation and evaluation of Matrix Tablets
- Preparation and evaluation of Transdermal Drug Delivery Systems.
- Formulation and evaluation of Mucoadhesive Delivery Systems.
- Evaluation of Market Sustained Release Formulations.
- Preparation and evaluation of microspheres.
- Assignment on Product development and filing to various regulatory agencies, FDA, TGA, Etc (Ref.: www.fda.gov)

II. Demo/ Workshop

Floating drug delivery system.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION

Advances in novel drug delivery.

Text Books:

1. N.K. Jain, Advances in Control & Novel drug delivery, CBS Publishers.
2. NK Jain, Pharmaceutical product development, CBS publishers.
3. L. Lachman, H.A. Lieberman and J.L. Kanig, Theory & Practice of industrial pharmacy by, Lea &Febieger, Philadelphia Latest Edn.

Reference Books:

1. Gilbert S. Banker and Christopher T Rhodes, Modern Pharmaceutics, IVthed, marcel dekker,usa, 2005.
2. Controlled drug delivery systems by Robinson.
3. YiewChien, novel drug delivery systems, 2nded, marcel dekker 2003.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	CLINICAL AND HOSPITAL PHARMACY LABORATORY	Code	15R00709
Course year	B. Pharm IV year	Semester	I
Lab	4 hrs/week	Tutorial	NIL
End exam	70 marks	Internal exam	30 marks
Credits	2		

Scope: This subject will provide an opportunity for the student to learn about various parental preparations.

Objectives: Upon completion of the subject student shall be able to Underst and various Sterilization techniques and parenteral preparations. Provide knowledge on Role of Pharmacist in patient counseling.

Outcomes:

1. Acquire skill in preparation parenteral Preparations.
2. Acquire the knowledge on First Aid treatment and improving patient Compliance.

I. EXPERIMENTS:

1. Preparation of water for injection IP
2. Test for pyrogens on water for injection IP
3. Determination of suitability of NaCl for preparation of transfusion fluid by flame photometer
4. Hydrolytic resistance test on glass used for transfusion fluids
5. Preparation of 5% W/V dextrose IV infusion IP
6. Preparation of 0.9% W/V NaCl IV infusion IP
7. Preparation of Compound NaCl injection (Ringers solution) IP
8. Preparation of NaCl& dextrose injection IP
9. Preparation of sodium bicarbonate intravenous infusion BP
10. Determination of sinking time and water holding capacity of absorbent cotton wool IP
11. Demonstration: Sterilization of surgical instruments, syringes, needles, rubber gloves, hospital fabrics and surgical dressings

II. ASSIGNMENT

1. Assignment 1: Study of role of pharmacist in first aid treatment
2. Assignment 2: Study of role of pharmacist in improving patient compliance

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MEDICINAL CHEMISTRY-II LABORATORY	Code	15R00710
Course Year	B.Pharmacy IV year	Sem	I
Lab	4hrs/week	Tutorial	NIL
End exam	70 Marks	Internal exam	30 Marks
Credits	2		

Scope: This subject will provide an opportunity for the student on synthesis of various compounds.

Objectives: Upon completion of the subject student shall be able to

- c. Synthesis various chemical compounds.
- d. Provide knowledge on monograph analysis of some chemical compounds.

Outcomes:

1. Acquire skills in synthesis various chemical compounds.
2. Demonstrate of stereo models of some drugs relevant to theory.
3. Acquire skills of extraction of drugs from different dosage forms.

EXPERIMENTS:

1. Synthesis of Paracetamol from p-amino phenol
2. Synthesis of Cinnamic acid from benzaldehyde
3. Synthesis of Benzotriazole from o-phenylene diamine
4. Synthesis of 1-phenyl-3-methyl-5-pyrazolone from hydrazine hydrate
5. Synthesis of 7-Hydroxy-4-methyl coumarin from resorcinol and ethyl acetoacetate
6. Synthesis of Salicylaldehyde from phenol
7. Identification and test for purity for Aspirin tablet as per IP
8. Identification and test for purity for Acetazolamide tablet as per IP
9. Identification and test for purity for propranolol tablet as per IP
10. Identification and test for purity for Diclofenac sodium tablet as per IP
11. Identification and test for purity for Paracetamol tablet as per IP

II. DEMO/WORKSHOP: Microwave assisted organic synthesis, Purification of synthesized compounds (Column chromatography), Demo on Thin layer chromatography.

III. SEMINAR/ASSIGNMENT/GROUP DISCUSSION Antibiotic discovery in the twenty-first century: Current trends and future perspectives, Current Trends in β -Lactam based β -Lactamase inhibitors and CVS agents.

References:

1. A.I. Vogel, Text Book of Practical Organic Chemistry, 5th Edition. Pearson, Prentice Hall.
2. F.G. Mann & B.C. Saunders, Practical Organic Chemistry, 4th Edition, Pearson Publishers.

LIST OF MINIMUM EQUIPMENTS REQUIRED

1. Water bath
2. Suction pumps
3. Analytical/physical balance
4. Triple beam balance
5. Reflux flask with condenser
6. Hot plates
7. Refrigerator
8. Mechanical and magnetic stirrer with thermostat
9. Distillation unit
10. Oven
11. Adequate glass wares

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MOOCS -II (Biostatistics and Design of Experiments) / Conventional/ Self study	Code	15R00801
Course Year	B.Pharmacy IV year	Sem	II
Lab	3hrs/week	Tutorial	1hr/week
End exam	70 Marks	Internal exam	30 Marks
Credits	3		

SCOPE: Biostatistics is the application of statistics to different topics in biology including medicine, pharmacy, public health science, agriculture and fishery. It involves the analysis of data from experiments; its interpretation and drawing conclusion from the results. It involves the application of statistical theory to real-world problems, the practice of designing and conducting biomedical experiments and clinical trials. Design of experiments is planning experimental strategy, screening a large number of parameters and selecting the important ones, determining the minimum number of experiments and deciding on the mode and manner in which experiment have to be conducted. The course encompasses topics such as distribution of data, sample size, tests of significance, data reduction, regression analysis, comparison of performance of drugs in clinical trials, design of experiments, screening and second order designs.

UNIT I

Introduction to Statistics

Various Distributions: Normal Distribution, sample and Population, Z distribution.

UNIT II

Test of Significance, t- test, F test, ANOVA.

UNIT III

2 test/odds ratio, Non-Parametric test, other tests.

UNIT IV

Design of Experiments: Introduction to design of experiments, screening designs – Data Analysis.

UNIT V

Higher order Designs - Data analysis

Regression Analysis – Data reduction

REFERENCES:

1. 'Biostatistics', KS Negi, AITB Publishers, Delhi.
2. 'Fundamentals of Biostatistics', Irfan Ali Khan, Ukaaz Publications
3. 'Biostatistics for Pharmacy', Khan and Khanum, Ukaaz Publications
4. 'Basic statistics and Pharmaceutical applications', J.E, Demuth, Mercel & Dekker.
5. 'Applied statistics' by S.C.Gupta & V.K.Kapoor
6. 'Fundamentals of mathematical statistics' by S.C.Gupta & V.K.Kapoor

NPTEL: <http://nptel.ac.in/courses/102106051/>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Subject	MOOCS – III (Intellectual Property Rights) / /Conventional/ Self study	Code	15R00802
Course Year	B.Pharmacy IV year	Sem	II
Lab	3hrs/week	Tutorial	1 hr/week
End exam	70 Marks	Internal exam	30 Marks
Credits	3		

SCOPE: The course is designed to introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries. The course introduces all aspects of the IPR Acts. It also includes case studies to demonstrate the application of the legal concepts in Science, Engineering, Technology and Creative Design.

UNIT I**OVERVIEW OF INTELLECTUAL PROPERTY**

Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development, IPR in abroad, Some important examples of IPR

UNIT II**PATENTS AND UTILITY MODELS**

PATENTS: Patent document, searching a patent, Drafting of a patent, Filing of a patent Macro-economic impact of the patent system, Patent and kind of inventions protected by a patent, Granting of patent, Rights of a patent Protecting your inventions – extension in patent protection The different layers of the international patent system (national, regional and international options)

UTILITY MODELS: Differences between a utility model and a patent, Trade secrets and know-how agreements.

UNIT III**COPYRIGHTS, TRADEMARKS AND GEOGRAPHICAL INDICATIONS**

COPYRIGHTS: Copyright, things covered by copyright, period of copyright, Rights covered by copyrights and protection of copyrights.

RELATED RIGHTS: Related rights, Distinction between related rights and copyright
TRADEMARKS: Trademark –Rights, kind of signs, types and function of trademarks Registration, period, extension and protection of trademark.Well-known marks and their protection, Domain name and its relation to trademarks.

GEOGRAPHICAL INDICATIONS

Geographical indication - its protection, reasons for protection

UNIT IV**INDUSTRIAL DESIGNS AND NEW PLANT VARIETIES**

INDUSTRIAL DESIGNS: Protection, kinds of protection, needs for protection

NEW PLANT VARIETIES: New varieties of plants – protection and extension

Breeder – Rights and protection

UNIT V**UNFAIR COMPETITION AND ENFORCEMENT OF INTELLECTUAL PROPERTY RIGHTS**

UNFAIR COMPETITION: Unfair competition, Relationship between unfair competition and intellectual property laws.

ENFORCEMENT OF INTELLECTUAL PROPERTY RIGHTS: Infringement of intellectual property rights, Enforcement Measures and Emerging Issues in Science and technologies.

Overview of Biotechnology and Intellectual Property Rights in Biotechnology Research. Management - Licensing and Enforcing Intellectual Property, Commercializing Biotechnology Invention and Case studies of Biotechnology. Case studies of patents in other areas – Pharmaceutical Research

TEXT BOOKS

1. T. M Murray and M.J. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000

REFERENCES

1. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985
2. D. Balasubramaniam, C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman, Concepts in Biotechnology, University Press (Orient Longman Ltd.), 2002
3. Bourgaize, Jewell and Buiser, Biotechnology: Demystifying the Concepts, Wesley Longman, USA, 2000.
4. AjitParulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India Ltd , 2006.
5. B.L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000
6. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi , 2010

NPTEL: <http://nptel.ac.in/syllabus/syllabus.php?subjectId=110999906>

**ACADEMIC REGULATIONS COURSE
STRUCTURE AND DETAILED SYLLABI**

PHARM D

AND

PHARM D (*POSTBACCALAUREATE*)

PHARM D. (REGULAR SIX YEAR COURSE)

AND

**PHARM D. (*POST BACCALAUREATE*) (REGULAR THREE
YEAR COURSE)**

**(APPLICABLE FOR THE BATCHES ADMITED
FROM 2017-18)**

Doctor of Pharmacy (Pharm.D) Syllabus

Academic Regulations 2017 for Pharm. D and D (Post Baccalaureate) (Regular)

(Effective for the students admitted into I year from the Academic Year 2017-2018 onwards)

1. Award of Pharm. D Degree

A student will be declared eligible for the award of the Pharm. D. Degree if he/she fulfils the following academic regulations:

i. Duration of the course. –

a) Pharm.D: The duration of the course shall be six academic years (five years of study and one year of internship or residency) full time with each academic year spread over a period of not less than two hundred working days. The period of six years duration is divided into two phases –

Phase I – consisting of First, Second, Third, Fourth and Fifth academic year.

Phase II – consisting of internship or residency training during sixth year involving posting in speciality units. It is a phase of training wherein a student is exposed to actual pharmacy practice or clinical pharmacy services and acquires skill under supervision so that he or she may become capable of functioning independently.

b) Pursue the course of study for not less than SIX academic years and is not more than TWELVE years.

c) Students, who fail to fulfil all the academic requirements for the award of the degree within TWELVE academic years from the year of their admission, shall forfeit their seat in Pharm D. course and their admission is cancelled.

2. Award of the Pharm. D (Post Baccalaureate) Degree.

A student will be declared eligible for the award of the Pharm. D (Post Baccalaureate). Degree if he fulfils the following academic regulations:

a) Pharm.D. (Post Baccalaureate): The duration of the course shall be for three academic years (two years of study and one year internship or residency) full time with each academic year spread over a period of not less than two hundred working days. The period of three years duration is divided into two phases –

Phase I – consisting of First and Second academic year.

Phase II – consisting of Internship or residency training during third year involving posting in speciality units. It is a phase of training wherein a student is exposed to actual pharmacy practice or clinical pharmacy services, and acquires skill under supervision so that he or she may become capable of functioning independently.

b) Pursue the course of study for not less than THREE academic years and is not more than SIX years.

c) Students, who fail to fulfil all the academic requirements for the award of the degree within SIX academic years from the year of their admission, shall forfeit their seat in Pharm D (PB) course and their admission is cancelled.

d) To add prefix 'Dr.' before the name of the candidate while awarding the degree 'Doctor of Pharmacy' vide regulation 18 of the Pharm D regulation, 2008.

3. Minimum qualification for admission to. –

a) Pharm.D. Part-I Course – A pass in any of the following examinations –

(1) 10+2 examination with Physics and Chemistry as compulsory subjects along with one of the following subjects: Mathematics or Biology.

(2) A pass in D.Pharmacy course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

(3) Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations. Provided that a student should complete the age of 17 years on or before 31st December of the year of admission to the course. Provided that there shall be reservation of seats for the students belonging to the Scheduled Castes, Scheduled Tribes and other Backward Classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration as the case may be from time to time.

b) Pharm.D. (Post Baccalaureate) Course - A pass in B.Pharm from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act: Provided that there shall be reservation of seats for the students belonging to the Scheduled Castes, Scheduled Tribes and other Backward Classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration as the case may be from time to time.

4. Course of study. –

The course of study for Pharm.D. shall include the subjects as given in the Tables below. The number of hours in a week, devoted to each subject for its teaching in theory, practical and tutorial shall not be less than that noted against it in columns (3), (4) and (5) below.

COURSE STRUCTURE

First Year:

S.No.	Subjects Codes	Name of Subject	No. of hours of Theory	No. of hours of Tutorial	No. of hours of Practical	Lab	S.No.	Subjects codes
(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
1.1	17T00101	Human Anatomy and Physiology	3	1	3		1.7	17T00107
1.2	17T00102	Pharmaceutics	2	1	3		1.8	17T00108
1.3	17T00103	Medicinal Biochemistry	3	1	3		1.9	17T00109
1.4	17T00104	Pharmaceutical Organic Chemistry	3	1	3		2.0	17T00110
1.5	17T00105	Pharmaceutical Inorganic Chemistry	2	1	3		2.1	17T00111
1.6	17T00106	Remedial Mathematics/Biology	3	1	3*		2.2	17T00112*
		Total hours	16	6 = (40)	18			

* For Biology

Second Year:

S.No	Subjects Codes	Name of Subject	No. of hours of Theory	No. of hours of Tutorial	No. of hours of Practical	Lab	S.No	Subjects Codes
(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
2.1	17T00201	Pathophysiology	3	1	-	-		-
2.2	17T00202	Pharmaceutical Microbiology	3	1	3	✓	2.7	17T00207
2.3	17T00203	Pharmacognosy &Phytopharmaceuticals	3	1	3	✓	2.8	17T00208
2.4	17T00204	Pharmacology-I	3	1	-	-		-
2.5	17T00205	Community Pharmacy	2	1	-	-		-
2.6	17T00206	Pharmacotherapeutics-I	3	1	3	✓	2.9	17T00209
		Total Hours	17	6 = 32	9			

Third Year:

S.N O	Subjects Codes	Name of Subject	No. of hours of Theory	No. of hours of Tutorial	No. of hours of Practical	Lab	S.No	Subjects Codes
(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
3.1	17T00301	Pharmacology-II	3	1	3	✓	3.7	17T00307
3.2	17T00302	Pharmaceutical Analysis	3	1	3	✓	3.8	17T00308
3.3	17T00303	Pharmacotherapeutics-II	3	1	3	✓	3.9	17T00309
3.4	17T00304	Pharmaceutical Jurisprudence	2	-	-	-		-
3.5	17T00305	Medicinal Chemistry	3	1	3	✓	4.0	17T00310
3.6	17T00306	Pharmaceutical Formulations	2	1	3	✓	4.1	17T00311
		Total hours	16	5 = 36	15			

Fourth Year:

S.No.	Subjects Codes	Name of Subject	No. of hours of Theory	No. of hours of Tutorial	No. of hours of Practical/ Hospital Posting	Lab	S.No	Subjects Codes
(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
4.1	17T00401	Pharmacotherapeutics-III	3	1	3	✓	4.7	17T00407
4.2	17T00402	Hospital Pharmacy	2	1	3	✓	4.8	17T00408
4.3	17T00403	Clinical Pharmacy	3	1	3	✓	4.9	17T00409
4.4	17T00404	Biostatistics & Research Methodology	2	1	-	-		-
4.5	17T00405	Biopharmaceutics & Pharmacokinetics	3	1	3	✓	4.10	17T00410
4.6	17T00406	Clinical Toxicology	2	1	-	-		-
		Total hours	15	6 = 33	12			
For Pharm D Post Baccalaureate								
4.11	17T00411	Pharmacotherapeutics I & II	3	1	3	✓	4.12	17T00412
			18	7=39				

Fifth Year:

S.No.	Subjects Codes	Name of Subject	No. of hours of Theory	No. of hours of Seminar	No. of hours of Hospital posting*
(1)	(2)	(3)	(4)	(5)	(6)
5.1	17T00501	Clinical Research	3	1	-
5.2	17T00502	Pharmacoepidemiology and Pharmacoeconomics	3	1	-
5.3	17T00503	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	2	1	-
5.4		Clerkship*	-	1	-
5.5		Project work (Six Months)	-	-	20
		Total hours	8	4 = 32	20

* Attending ward rounds on daily basis.

Note: The entire class work be spread for the entire Academic Year along with Project work and clerkship

Sixth Year:

Internship or residency training including postings in speciality units. Student should independently provide the clinical pharmacy services to the allotted wards.

- (i) Six months in General Medicine department, and
- (ii) Two months each in three other speciality departments

5. Syllabus. – The syllabus for each subject of study in the said Tables shall be as specified in **Appendix -A** to these regulations.

6. Examination. –

- (1) Every year there shall be an examination to examine the students.
- (2) Each examination may be held twice every year. The first examination in a year shall be the annual examination and the second examination shall be supplementary examination. **Supplementary examination (advanced) may be conducted within three months after announcement of the regular examination results.**
- (3) The examinations shall be of written and practical (including oral nature) carrying maximum marks for each part of a subject as indicated in Table below:

T A B L E S

First Year examination:

S.No	Name of Subject	Maximum marks for Theory			Maximum marks for Practicals		
		Examination	Sessional	Total	Examination	Sessional	Total
1.1	Human Anatomy and Physiology	70	30	100	70	30	100
1.2	Pharmaceutics	70	30	100	70	30	100
1.3	Medicinal Biochemistry	70	30	100	70	30	100
1.4	Pharmaceutical Organic Chemistry	70	30	100	70	30	100
1.5	Pharmaceutical Inorganic Chemistry	70	30	100	70	30	100
1.6	Remedial Mathematics/Biology	70	30	100	70	30	100
				600			600 = 1200

Second Year examination:

S.No	Name of Subject	Maximum marks for Theory			Maximum marks for Practicals		
		Examination	Sessional I	Total	Examination	Sessional	Total
2.1	Pathophysiology	70	30		-	-	-
2.2	Pharmaceutical Microbiology	70	30	100	70	30	100
2.3	Pharmacognosy &Phytopharmaceuticals	70	30	100	70	30	100
2.4	Pharmacology-I	70	30	100	-	-	-
2.5	Community Pharmacy	70	30	100	-	-	-
2.6	Pharmacotherapeutics-I	70	30	100	70	30	100
				600			300 = 900

Third Year examination:

S.No	Name of Subject	Maximum marks for Theory			Maximum marks for Practicals		
		Examination	Sessional	Total	Examination	Sessional I	Total
3.1	Pharmacology-II	70	30	100	70	30	100
3.2	Pharmaceutical Analysis	70	30	100	70	30	100
3.3	Pharmacotherapeutics-II	70	30	100	70	30	100
3.4	Pharmaceutical Jurisprudence	70	30	100	-	-	-
3.5	Medicinal Chemistry	70	30	100	70	30	100
3.6	Pharmaceutical Formulations	70	30	100	70	30	100
				600			500 = 1100

Fourth Year examination:

S.No	Name of Subject	Maximum marks for Theory			Maximum marks for Practicals		
		Examination	Sessional	Total	Examination	Sessional I	Total
4.1	Pharmacotherapeutics-III	70	30	100	70	30	100
4.2	Hospital Pharmacy	70	30	100	70	30	100
4.3	Clinical Pharmacy	70	30	100	70	30	100
4.4	Biostatistics & Research Methodology	70	30	100	-	-	-
4.5	Biopharmaceutics & Pharmacokinetics	70	30	100	70	30	100
4.6	Clinical Toxicology	70	30	100	-	-	-
				600			500 = 1100

Fifth Year examination:

S.No	Name of Subject	Maximum marks for Theory			Maximum marks for Practicals		
		Examination	Sessional	Total	Examination	Sessional	Total
5.1	Clinical Research	70	30	100	-	-	-
5.2	Pharmacoepidemiology and Pharmacoeconomics	70	30	100	-	-	-
5.3	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	70	30	100	-	-	-
5.4	Clerkship*	-	-	-	70	30	100
5.5	Project work (Six Months)	-	-	-	100**	-	100
				300			200 = 500

*Attending ward rounds on daily basis.

** 30 marks – viva-voce (oral)

70 marks – Thesis work

7. Attendance requirements:

A student shall be eligible to appear for University examinations if he acquires a minimum of 80% of attendance in aggregate of all the subjects in a year.

7.1 Condonation of shortage of attendance in aggregate from 70% and above and below 80% in each year may be granted by the College Academic Committee, on medical grounds/valid reasons.

7.2 Shortage of Attendance below 70% in aggregate shall in NO case be condoned.

7.3 Students whose shortage of attendance is not condoned in any year are not eligible to take their end examination of that class and their registration shall stand cancelled.

7.4 A student will not be promoted to the next year unless he/she satisfies the attendance requirements of the present year, as applicable. They may seek readmission for that year when offered next.

7.5 A stipulated fee shall be payable towards condonation of shortage of attendance to the University.

8. Mode of examinations

(1) Theory examination shall be of three hours and practical examination shall be of four hours duration.

(2) A Student who fails in theory or practical examination of a subject shall re-appear both in theory and practical of the same subject.

(3) Practical examination shall also consist of a viva –voce (Oral) examination.

(4) Clerkship examination – Oral examination shall be conducted after the completion of clerkship of students. An external and an internal examiner will evaluate the student. Students may be asked to present the allotted medical cases followed by

discussion. Students' capabilities in delivering clinical pharmacy services, pharmaceutical care planning and knowledge of therapeutics shall be assessed.

9. Award of sessional marks and maintenance of records.

(1) A regular record of both theory and practical class work and examinations conducted in an institution imparting training for Pharm.D. or as the case may be, Pharm.D. (Post Baccalaureate) course, shall be maintained for each student in the institution and 30 marks for each theory and 30 marks for each practical subject shall be allotted as sessional.

(2) There shall be at least three periodic sessional examinations during each academic year and the highest aggregate of any two performances shall form the basis of calculating sessional marks.

(3) The sessional marks in practicals shall be allotted on the following basis:-

(i) Actual performance in the sessional examination (20 marks);

(ii) Day to day assessment in the practical class work, promptness, viva-voce record maintenance, etc. (10 marks).

10. Minimum marks for passing examination:

A student shall not be declared to have passed examination unless he or she secures at least 50% marks in each of the subjects separately in the theory examinations, including sessional marks and at least 50% marks in each of the practical examinations including sessional marks. The students securing 60% marks or above in aggregate in all subjects at the Pharm. D or as the case may be, Pharm. D (Post Baccalaureate) course examination shall be declared to have passed in first class. Students securing 75% marks or above in aggregate in all subjects shall be declared to have passed with distinction provided the student completes the course in 6 years for Pharm. D and 3 Years for Pharm. D (Post baccalaureate). Pass class shall be awarded to such of the candidates who would have passed the examination in subsequent number of attempts after completion of 6/3 years of the course.

11. Eligibility for promotion to next year.-

All students who have appeared for all the subjects and passed the first year annual examination are eligible for promotion to the second year and, so on. However, failure in more than three subjects (excluding Remedial Mathematics/ Biology) including supplementary examinations shall debar him or her from promotion to the next year classes.

Note: At any time of the course study a student should not have failed in more than 3 subjects (excluding Remedial Mathematics/ Biology) to be eligible for promotion to next higher class.

12. Internship.

(1) Internship is a phase of training wherein a student is expected to conduct actual practice of pharmacy and health care and acquires skills under the supervision so that he or she may become capable of functioning independently.

(2) Every student has to undergo one year internship as per PCI norms for Pharm D (Appendix B).

13. Certificate of passing examination. Every student who has passed the examinations for the Pharm.D. (Doctor of Pharmacy) or Pharm.D. (Post Baccalaureate) (Doctor of Pharmacy) as the case may be, shall be granted a certificate by the examining authority.

14. Hospital posting. Every student shall be posted in constituent hospital for a period of not less than fifty hours to be covered in not less than 200 working days in each of second, third & fourth year course. Each student shall submit report duly certified by the preceptor and duly attested by the Head of the Department or Institution as prescribed. In the fifth year, every student shall spend half a day in the morning hours attending ward rounds on daily basis as a part of clerkship. Theory teaching may be scheduled in the afternoon.

15. Project work.

(1) To allow the student to develop data collection and reporting skills in the area of community, hospital and clinical pharmacy, a project work shall be carried out under the supervision of a teacher. The project topic must be approved by the Head of the Department or Head of the Institution. The same shall be announced to students within one month of commencement of the fifth year classes. Project work shall be presented in a written report and as a seminar at the end of the year. External and the internal examiners shall do the assessment of the project work.

(2) Project work shall comprise of objectives of the work, methodology, results, discussions and conclusions.

16. Objectives of project work. The main objectives of the project work is to

(i) Show the evidence of having made accurate description of published work of others and of having recorded the findings in an impartial manner; and

(ii) Develop the students in data collection, analysis and reporting and interpretation skills.

17. Methodology. To complete the project work following methodology shall be adopted, namely:

(i) Students shall work in groups of not less than two and not more than four under an authorised teacher;

- (ii) Project topic shall be approved by the Head of the Department or Head of the Institution;
- (iii) Project work chosen shall be related to the pharmacy practice in community, hospital and clinical setup. It shall be patient and treatment (Medicine) oriented, like drug utilisation reviews, pharmacoepidemiology, pharmacovigilance or pharmacoeconomics;
- (iv) Project work shall be approved by the institutional ethics committee;
- (v) student shall present at least three seminars, one in the beginning, one at middle and one at the end of the project work; and
- (vi) two-page write-up of the project indicating title, objectives, methodology anticipated benefits and references shall be submitted to the Head of the Department or Head of the Institution.

18. Reporting.

- (1) Student working on the project shall submit jointly to the Head of the Department or Head of the Institution a project report of about 40-50 pages. Project report should include a certificate issued by the authorised teacher, Head of the Department as well as by the Head of the Institution
- (2) Project report shall be computer typed in double space using Times Roman font on A4 paper. The title shall be in bold with font size 18, sub-titles in bold with font size 14 and the text with font size 12. The cover page of the project report shall contain details about the name of the student and the name of the authorised teacher with font size 14.
- (3) Submission of the project report shall be done at least one month prior to the commencement of annual or supplementary examination.

19. Evaluation. The following methodology shall be adopted for evaluating the project work

- (i) Project work shall be evaluated by internal and external examiners.
- (ii) Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of four students).

(iii) Three seminars presented by students shall be evaluated for twenty marks each and the average of best two shall be forwarded to the university with marks of other subjects.

(iv) Evaluation shall be done on the following items:	Marks
a) Write up of the seminar	(7.5)
b) Presentation of work	(7.5)
c) Communication skills	(7.5)
d) Question and answer skills	(7.5)
Total	(30 marks)

(v) Final evaluation of project work shall be done on the following items:	Marks
a) Write up of the seminar	(17.5)
b) Presentation of work	(17.5)
c) Communication skills	(17.5)
d) Question and answer skills	(17.5)
Total	(70 marks)

Explanation. For the purposes of differentiation in the evaluation in case of topic being the same for the group of students, the same shall be done based on item numbers b, c and d mentioned above.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR**

Pharm.D-IV

APPENDIX A

INTERNSHIP

1. SPECIFIC OBJECTIVES :

- i) to provide patient care in cooperation with patients, prescribers, and other members of an interprofessional health care team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social cultural, economic, and professional issues, emerging technologies, and evolving biomedical, pharmaceutical, social or behavioral or administrative, and clinical sciences that may impact therapeutic outcomes.
- ii) to manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers, and administrative and supportive personnel, to promote health; to provide, assess, and coordinate safe, accurate, and time-sensitive medication distribution; and to improve therapeutic outcomes of medication use.
- iii) to promote health improvement, wellness, and disease prevention in co-operation with patients, communities, at-risk population, and other members of an interprofessional team of health care providers.
- iv) to demonstrate skills in monitoring of the National Health Programmes and schemes, oriented to provide preventive and promotive health care services to the community.
- v) to develop leadership qualities to function effectively as a member of the health care team organised to deliver the health and family welfare services in existing socio-economic, political and cultural environment.
- vi) to communicate effectively with patients and the community.

2. OTHER DETAILS :

- i) All parts of the internship shall be done, as far as possible, in institutions in India. In case of any difficulties, the matter may be referred to the Pharmacy Council of India to be considered on merits.
- ii) Where an intern is posted to district hospital for training, there shall be a committee consisting of representatives of the college or university, and the district hospital administration, who shall regulate the training of such trainee. For such trainee a certificate of satisfactory completion of training shall be obtained from the relevant administrative authorities which shall be countersigned by the Principal or Dean of College.
- iii) Every candidate shall be required, after passing the final Pharm.D. or Pharm.D. (Post Baccalaureate) examination as the case may be to undergo

compulsory rotational internship to the satisfaction of the College authorities and University concerned for a period of twelve months so as to be eligible for the award of the degree of Pharm.D. or Pharm.D. (Post Baccalaureate) as the case may be.

3. ASSESSMENT OF INTERNSHIP :

- i) The intern shall maintain a record of work which is to be verified and certified by the preceptor (teacher practitioner) under whom he works. Apart from scrutiny of the record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skills and attitude during and at the end of the training. Based on the record of work and date of evaluation, the Dean or Principal shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him eligible for it.
- ii) Satisfactory completion of internship shall be determined on the basis of the following:-
 - (1) Proficiency of knowledge required for each case management SCORE 0-5
 - (2) The competency in skills expected for providing Clinical Pharmacy Services SCORE 0-5
 - (3) Responsibility, punctuality, work up of case, involvement in patient care SCORE 0-5
 - (4) Ability to work in a team (Behavior with other healthcare professionals including medical doctors, nursing staff and colleagues). SCORE 0-5
 - (5) Initiative, participation in discussions, research aptitude. SCORE 0-5

Poor	Fair	Below Average	Average	Above Average	Excellent
0	1	2	3	4	5

A Score of less than 3 in any of above items will represent unsatisfactory completion of internship.

APPENDIX - B

20. Internship

Specific Objectives:

- (i) To provide patient care in cooperation with patients, prescribers, and other members of an interprofessional health care team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social cultural, economic, and professional issues, emerging technologies, and evolving biomedical, pharmaceutical, social or behavioral or administrative, and clinical sciences that may impact therapeutic outcomes.
- (ii) To manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers, and administrative and supportive personnel, to promote health; to provide, assess, and coordinate safe, accurate, and time-sensitive medication distribution; and to improve therapeutic outcomes of medication use.
- (iii) To promote health improvement, wellness, and disease prevention in cooperation with patients, communities, at-risk population, and other members of an interprofessional team of health care providers.
- (iv) To demonstrate skills in monitoring of the National Health Programmes and schemes, oriented to provide preventive and promotive health care services to the community.
- (v) To develop leadership qualities to function effectively as a member of the health care team organised to deliver the health and family welfare services in existing socio-economic, political and cultural environment.
- (vi) To communicate effectively with patients and the community.

Other details

- 1) All parts of the internship shall be done, as far as possible, in institutions in India. In case of any difficulties, the matter may be referred to the Pharmacy Council of India to be considered on merits.
- 2) Where an intern is posted to district hospital for training, there shall be a committee consisting of representatives of the college or university, and the district hospital administration, who shall regulate the training of such trainee. For such trainee a certificate of satisfactory completion of training shall be obtained from the relevant administrative authorities which shall be countersigned by the Principal or Dean of College.

- 3) Every candidate shall be required, after passing the final Pharm.D. or Pharm.D. (Post Baccalaureate) examination as the case may be to undergo compulsory rotational internship to the satisfaction of the College authorities and University concerned for a period of twelve months so as to be eligible for the award of the degree of Pharm.D. or Pharm.D. (Post Baccalaureate) as the case may be.

Assessment of Internship

- (i) Each intern student shall have a minimum of 80% attendance in every month, and a total of 80% at end for satisfactory completion of internship.
- (ii) The intern shall maintain a record of work which is to be verified and certified by the preceptor (teacher practitioner) under whom he works. Apart from scrutiny of the record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skills and attitude during and at the end of the training. Based on the record of work and date of evaluation, the Dean or Principal shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him eligible for it.
- (iii) Satisfactory completion of internship shall be determined on the basis of the following:
 1. Proficiency of knowledge required for each case management SCORE 0-5
 2. The competency in skills expected for providing Clinical Pharmacy Services SCORE 0-5
 3. Responsibility, punctuality, work up of case, involvement in patient care SCORE 0-5
 4. Ability to work in a team (Behaviour with other healthcare professionals including medical doctors, nursing staff and colleagues). SCORE 0-5
 5. Initiative, participation in discussions, research aptitude. SCORE 0-5

Poor	Fair	Below Average	Average	Above Average	Excellent
0	1	2	3	4	5

A Score of less than 3 in any of above items will represent unsatisfactory completion of internship.

21. Transitory regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2. and continue to be in the academic regulations they were first admitted.

22. With – holding of results:

If the candidate has not paid dues to the university or if any case of in-discipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed/ promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

23. General:

- i. The academic regulations should be read as a whole for purpose of any interpretation.
- ii. Disciplinary action for Malpractice / improper conduct in examinations is appended
- iii. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- v. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the University.

24. RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two

		consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the

		<p>remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</p> <p>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</p>
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

25. Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
 - (i) A show cause notice shall be issued to the college.
 - (ii) Impose a suitable fine on the college.
 - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

(17T00101) HUMAN ANATOMY & PHYSIOLOGY (THEORY)

Theory:3 Hrs. /Week

1. Scope and Objectives: This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.

2. Upon completion of the course the student shall be able to:

- describe the structure (gross and histology) and functions of various organs of the human body;
- describe the various homeostatic mechanisms and the ir imbalances of various systems;
- identify the various tissues and organs of the different systems of the human body;
- perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes;
- appreciate coordinated working pattern of different organs of each system; and
- appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body

3. Course materials:

Text books

- Tortora Gerard J. and Nicholas, P. Principles of anatomy and physiology Publisher Harpercollins college New York.
- Wilson, K.J.W. Ross and Wilson's foundations of anatomy and physiology. Publisher: Churchill Livingstone, Edinburg.

Reference books

- Guytonarthur, C. Physiology of human body. Publisher: Holtsaunders.
- Chatterjee,C.C. Human physiology. Volume 1&11. Publisher: medical allied agency, Calcutta.
- Peter L. Williams, Roger Warwick, Mary Dyson and Lawrence, H.
- Gray's anatomy. Publisher: Churchill Livingstone, London.

4. Lecture wise program :

Topics

- Scope of anatomy and physiology, basic terminologies used in this subject (Description of the body as such planes and terminologies)
 - Structure of cell – its components and their functions.
Elementary tissues of the human body: epithelial, connective, Muscular and nervous tissues-their sub-types and characteristics
 - Osseous system - structure, composition and functions of theSkeleton. (done in practical classes - 6hrs)
 - Classification of joints, Types of movements of joints and disorders of joints (Definitions only)
- Haemopoetic System
 - Composition and functions of blood
 - Haemopoiesis and disorders of blood components (definition of d isorder)

- c) Blood groups
- d) Clotting factors and mechanism
- e) Platelets and disorders of coagulation

ii) Lymph

- a) Lymph and lymphatic system, composition, formation and circulation.
- b) Spleen: structure and functions, Disorders
- c) Disorders of lymphatic system (definition only)

iii) Cardiovascular system

- a) Anatomy and functions of heart
- b) Blood vessels and circulation (Pulmonary, coronary and systemic circulation)
- c) Electrocardiogram (ECG)
- d) Cardiac cycle and heart sounds
- e) Blood pressure – its maintenance and regulation
- f) Definition of the following disorders
Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias

3 i) Respiratory system

- a) Anatomy of respiratory organs and functions
- b) Mechanism / physiology of respiration and regulation of respiration
- c) Transport of respiratory gases
- d) Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.

ii) Digestive system

- a) Anatomy and physiology of GIT
- b) Anatomy and functions of accessory glands of GIT
- c) Digestion and absorption
- d) Disorders of GIT (definitions only)

iii) Nervous system

- a) Definition and classification of nervous system
- b) Anatomy, physiology and functional areas of cerebrum
- c) Anatomy and physiology of cerebellum
- d) Anatomy and physiology of mid brain
- e) Thalamus, hypothalamus and Basal Ganglia
- f) Spinal cord: Structure & reflexes – mono-poly-planter
- g) Cranial nerves – names and functions
- h) ANS – Anatomy & functions of sympathetic & parasympathetic N.S.

4 i) Urinary system

- a) Anatomy and physiology of urinary system
- b) Formation of urine
- c) Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
- d) Clearance tests and micturition

ii) Endocrine system

- a) Pituitary gland
- b) Adrenal gland
- c) Thyroid and Parathyroid glands
- d) Pancreas and gonads

iii) Reproductive system

- a) Male and female reproductive system
- b) Their hormones – Physiology of menstruation
- c) Spermatogenesis & Oogenesis

- d)Sex determination (genetic basis)
- e)Pregnancy and maintenance and parturition
- f)Contraceptive devices

5 i) Sense organs

- a)Eye
- b)Ear
- c)Skin
- d)Tongue & Nose

ii) Skeletal muscles

- a)Histology
- b)Physiology of Muscle contraction
- c)Physiological properties of skeletal muscle and their disorders (definitions)

iii) Sports physiology

- a)Muscles in exercise, Effect of athletic training on muscles and muscle performance,
- b)Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise,
- c)Drugs and athletics

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00107) HUMAN ANATOMY & PHYSIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

General Requirements: Dissection box, Laboratory Napkin, muslin cloth, record, Observation book(100pages), Stationary items, Blood lancet.

Course materials:

Text books

Goyal, R. K, Natvar M.P, and Shah S.A, Practical anatomy, physiology and biochemistry, latest edition, Publisher: B.S Shah Prakashan, Ahmedabad.

Reference books

Ranade VG, Text book of practical physiology, Latest edition, Publisher: PVG, Pune Anderson
Experimental Physiology, Latest edition, Publisher: NA

List of Experiments:

1. Study of tissues of human body
 - (a) Epithelial tissue.
 - (b) Muscular tissue.
2. Study of tissues of human body
 - (a) Connective tissue.
 - (b) Nervous tissue.
3. Study of appliances used in hematological experiments.
4. Determination of W.B.C. count of blood.
5. Determination of R.B.C. count of blood.
6. Determination of differential count of blood.
7. Determination of
 - (a) Erythrocyte Sedimentation Rate.
 - (b) Hemoglobin content of Blood.
 - (c) Bleeding time & Clotting time.
8. Determination of
 - (a) Blood Pressure.
 - (b) Blood group.
9. Study of various systems with the help of charts, models & specimens
 - (a) Skeleton system part I-axial skeleton.
 - (b) Skeleton system part II- appendicular skeleton.
 - (c) Cardiovascular system.
 - (d) Respiratory system.
 - (e) Digestive system.
 - (f) Urinary system.
 - (g) Nervous system.
 - (h) Special senses.
 - (i) Reproductive system.

10. Study of different family planning appliances.
11. To perform pregnancy diagnosis test.
12. Study of appliances used in experimental physiology.
13. To record simple muscle curve using gastrocnemius sciatic nerve preparation.
14. To record simple summation curve using gastrocnemius sciatic nerve preparation.
15. To record simple effect of temperature using gastrocnemius sciatic nerve preparation.
16. To record simple effect of load & after load using gastrocnemius sciatic nerve preparation.
17. To record simple fatigue curve using gastrocnemius sciatic nerve preparation.

Scheme of Practical Examination:

	Sessionals	Annual
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00102) PHARMACEUTICS (THEORY)

Theory: 2 Hrs. /Week

1. Scope and objectives: This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.
2. Upon the completion of the course the student s hould be able to:
 - a. know the formulation aspects of different dosage forms;
 - b.do different pharmaceutical caluculation involved in formulation;
 - c.formulate different types of dosage forms; and
 - d.appreciate the importance of good formulation for effectiveness.

3. Course materials:

Text books

- a. Cooper and Gunns Dispensing for pharmacy students.
- b.A text book Professional Pharmacy by N.K.Jain and S.N.Sharma.

Reference books

- a. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
- b. Remington's Pharmaceutical Sciences.
- c. Register of General Pharmacy by Cooper and Gunn.
- d. General Pharmacy by M.L.Schroff.

4. Lecture wise programme:

Topics

1.
 - a. Introduction to dosage forms - classification and definitions
 - b.Prescription: definition, parts and handling
 - c.Posology: Definition, Factors affecting dose selection. Calculation of childrenand infant doses.
 - d. Historical back ground and development of profession of pharmacy and pharmaceutical industry in brief.
2.
 - i) Development of Indian Pharmacopoeia and introduction to o ther Pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra pharmacopoeia and Indian national formulary.
 - ii) Weights and measures, Calculations involving percentage solutions, allegation, proof spirit, isotonic solutions etc.
3.
 - i) Powders and Granules: Classification advantages and disadvantages, Preparation of simple, compound powders, Insufflations, Dusting powders, Eutectic and Explosive powders, Tooth powder and effervescent powders and granules.
 - ii) Monophasic Dosage forms: Theoretical aspects of formulation including adjuvant like stabilizers, colorants, flavours with examples. Study of Monophasic liquids like gargles,mouth washes, Throat paint, Ear drops, Nasal drops, Liniments and lotions, Enemas and collodions.
4.
 - A) Biphasic dosage forms: Suspensions and emulsions, Definition, advantages and disadvantages, classification, test for the type of emulsion, formulation, stability and evaluation.
 - B) Suppositories and pessaries: Definition, advantages and disadvantages, types of base, method of preparation, Displacement value and evaluation.

C)Galenicals: Definition, equipment for different extraction processes like infusion, Decoction, Maceration and Percolation, methods of preparation of spirits, tinctures and extracts.

5. i) Pharmaceutical calculations.

ii) Surgical aids: Surgical dressings, absorbable gelatin sponge, sutures, ligatures and medicated bandages.

iii) Incompatibilities: Introduction, classification and methods to overcome the incompatibilities.

(17T00108) PHARMACEUTICS (PRACTICAL)

Practical : 3 Hrs. /Week

List of Experiments:

1. Syrups

- a. Simple Syrup I.P
- b. Syrup of Ephedrine Hcl NF
- c. Syrup Vasaka IP
- d. Syrup of ferrous Phosphate IP
- e. Orange Syrup

2. Elixir

- a. Piperizine citrate elixir BP
- b. Cascara elixir BPC
- c. Paracetamol elixir BPC

3. Linctus

- a. Simple Linctus BPC
- b. Pediatric simple Linctus BPC

4. Solutions

- a. Solution of cresol with soap IP
- b. Strong solution of ferric chloride BPC
- c. Aqueous Iodine Solution IP
- d. Strong solution of Iodine IP
- e. Strong solution of ammonium acetate IP

5. Liniments

- a. Liniment of turpentine IP*
- b. Liniment of camphor IP

6. Suspensions*

- a. Calamine lotion
- b. Magnesium Hydroxide mixture BP

7. Emulsions*

- a. Cod liver oil emulsion
- b. Liquid paraffin emulsion

8. Powders*

- a. Eutectic powder
- b. Explosive powder
- c. Dusting powder
- d. Insufflations

9. Suppositories*

- a. Boric acid suppositories
- b. Chloral suppositories

10. Incompatibilities

a.Mixtures with Physical

b.Chemical & Therapeutic incompatibilities

*Colourless bottles required for dispensing Paper envelope (white), butter paper and white paper required for dispensing.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00103) MEDICINAL BIOCHEMISTRY (THEORY)

Theory: 3 Hrs. /Week

- 1. Scope of the Subject:** Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases

- 2. Objectives of the Subject** (Know, do, appreciate) :

The objective of the present course is providing biochemical facts and the principles to the students of pharmacy. Upon completion of the subject student shall be able to –

- a. understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases;
- b. know the metabolic process of biomolecules in health and illness (metabolic disorders);
- c. understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism;
- d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and
- e. do the qualitative analysis and determination of biomolecules in the body fluids.

Text books (Theory)

- a. Harpers review of biochemistry - Martin
- b. Text book of biochemistry – D. Satyanarayana
- c. Text book of clinical chemistry- Alex kaplan & Laverne L. Szabo

Reference books (Theory)

- a. Principles of biochemistry -- Lehninger
- b. Text book of biochemistry -- Ramarao
- c. Practical Biochemistry- David T. Plummer.
- d. Practical Biochemistry- Pattabhiraman.

3. Lecture wise programme:

Topics

- 1. a. Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.
- b. Enzymes:** Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.
- 2. i) Carbohydrate metabolism:** Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.
- ii) Lipid metabolism:** Oxidation of saturated (-oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid

metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).

3. **i) Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;

iii) Protein and amino acid metabolism: protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.

iv) Nucleic acid metabolism: Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism.

4. **Introduction to clinical chemistry:** Cell; composition; malfunction; Role of the clinical chemistry laboratory.

The kidney function tests: Role of kidney; Laboratory tests for normal function includes-

- a) Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.)
- b) Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid)
- c) Urine concentration test
- d) Urinary tract calculi. (stones)

Liver function tests: Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation.

- a) Test for hepatic dysfunction-Bile pigments metabolism.
 - b) Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen.
 - c) Dye tests of excretory function.
 - d) Tests based upon abnormalities of serum proteins.
- Selected enzyme tests.

5. **i) Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.

ii) Immunochemical techniques for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases.

Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)

iii) Electrolytes: Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00109) MEDICINAL BIOCHEMISTRY (PRACTICAL)

practical: 3 Hrs. /Week

Title of the Experiment:

1. Qualitative analysis of normal constituents of urine.*
2. Qualitative analysis of abnormal constituents of urine.*
3. Quantitative estimation of urine sugar by Benedict's reagent method.**
4. Quantitative estimation of urine chlorides by Volhard's method.**
5. Quantitative estimation of urine creatinine by Jaffe's method.**
6. Quantitative estimation of urine calcium by precipitation method.**
7. Quantitative estimation of serum cholesterol by LibermannBurchard's method.**
8. Preparation of Folin Wu filtrate from blood.*
9. Quantitative estimation of blood creatinine.**
10. Quantitative estimation of blood sugar Folin- Wu tube method.**
11. Estimation of SGOT in serum.**
12. Estimation of SGPT in serum.**
13. Estimation of Urea in Serum.**
14. Estimation of Proteins in Serum.**
15. Determination of serum bilirubin**
16. Determination of Glucose by means of Glucoseoxidase.**
17. Enzymatic hydrolysis of Glycogen/Starch by Amylases.**
18. Study of factors affecting Enzyme activity. (pH& Temp.)**
19. Preparation of standard buffer solutions and its pH measurements (any two)*
20. Experiment on lipid profile tests**
21. Determination of sodium,calcium and potassium in serum.**

** indicate major experiments & * indicate minor experiments

Assignments:

Format of the assignment

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00104) PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY)

Theory: 3 Hrs. /Week

1. **Scope and objectives:** This course is designed to impart a very good knowledge about
 - a. IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
 - b. Some important physical properties of organic compounds;
 - c. Free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
 - d. Some named organic reactions with mechanisms; and
 - e. Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

2. Course materials:

Text books

- a. T.R.Morrison and R. Boyd - Organic chemistry,
- b. Bentley and Driver-Text book of Pharmaceutical chemistry
- c. I.L.Finer- Organic chemistry, the fundamentals of chemistry

Reference books

- a. Organic chemistry – J.M.Cram and D.J.Cram
- b. Organic chemistry- Brown
- c. Advanced organic chemistry- Jerry March, Wiley
- d. Organic chemistry- Cram and Hammond, Pine Hendrickson

3. Lecture wise programme :

Topics

1. i) Structures and Physical properties:
 - a. Polarity of bonds, polarity of molecules, M.P, Inter molecular forces, B.P, Solubility, non ionic solutes and ionic solutes, protic and aprotic Solvents, ion pairs,
 - b. Acids and bases, Lowry bronsted and Lewis theories
 - c. Isomerism
- ii) Nomenclature of organic compound belonging to the following classes Alkanes, Alkenes, Dienes, Alkynes, Alcohols, Aldehydes, Ketones, Amides, Amines, Phenols, Alkyl Halides, Carboxylic Acid, Esters, Acid Chlorides And Cycloalkanes.
- iii) Free radicals chain reactions of alkane : Mechanism, relative reactivity and stability
- iv) Alicyclic compounds : Preparations of cyclo alkanes, Bayer strain theory and orbital picture of angle strain.
2. i) Nucleophilic aliphatic substitution mechanism: Nucleophiles and leaving groups, kinetics of second and first order reaction, mechanism and kinetics of SN 2 reactions. Stereochemistry and steric hindrance, role of solvents, phase transfer catalysis, mechanism and kinetics of SN1 reactions, stereochemistry, carbocation and their stability, rearrangement of carbocation, role of solvents in SN1 reaction, Ion dipole bonds, SN2 versus SN1 solvolyses, nucleophilic assistance by the solvents.

- ii) Dehydro halogenation of alkyl halides: 1,2 elimination, kinetics, E2 and E1 mechanism, elimination via carbocation, evidence for E2 mechanism, absence of rearrangement isotope effect, absence hydrogen exchange, the element effect, orientation and reactivity, E2 versus E1, elimination versus substitution, dehydration of alcohol, ease of dehydration, acid catalysis, reversibility, orientation.
 - iii) Electrophilic and free radicals addition: Reactions at carbon-carbon, double bond, electrophile, hydrogenation, heat of hydrogenation and stability of alkenes, Markovnikov rule, addition of hydrogen halides, addition of hydrogen bromides, peroxide effect, electrophilic addition, mechanism, rearrangement, absence of hydrogen exchange, orientation and reactivity, addition of halogen, mechanism, halohydrin formation, mechanism of free radicals addition, mechanism of peroxide initiated addition of hydrogen bromide, orientation of free addition, additions of carbene to alkene, cyclo addition reactions.
 - iv) Carbon-carbon double bond as substituents: Free radical halogenations of alkenes, comparison of free radical substitution with free radical addition, free radical substitution in alkenes, orientation and reactivity, allylic rearrangements.
3.
 - i) Theory of resonance: Allyl radical as a resonance hybrid, stability, orbital picture, resonance stabilisation of allyl radicals, hyper conjugation, allylcation as a resonance hybrid, nucleophilic substitution in allylic substrate, SN1 reactivity, allylic rearrangement, resonance stabilisation of allylcation, hyper conjugation, nucleophilic substitution in allylic substrate, SN2 nucleophilic substitution in vinylic substrate, vinyliccation, stability of conjugated dienes, resonance in alkenes, hyper conjugation, ease of formation of conjugated dienes, orientation of elimination, electrophilic addition to conjugated dienes, 1,4- addition, 1,2-versus 1,4-addition, rate versus equilibrium, orientation and reactivity of free radical addition to conjugated dienes.
 - ii) Electrophilic aromatic substitution: Effect of substituent groups, determination of orientation, determination of relative reactivity, classification of substituent group, mechanism of nitration, sulphonation, halogenation, Friedel-Craft alkylation, Friedel-Craft acylation, reactivity and orientation, activating and deactivating O,P,M directing groups, electron release via resonance, effect of halogen on electrophilic aromatic substitution in alkyl benzene, side chain halogenation of alkyl benzene, resonance stabilization of benzyl radical.
4.
 - i) Nucleophilic addition reaction: Mechanism, ionisation of carboxylic acids, acidity constants, acidity of acids, structure of carboxylate ions, effect of substituent on acidity, nucleophilic acyl substitution reaction, conversion of acid to acid chloride, esters, amide and anhydride. Role of carboxyl group, comparison of alkyl nucleophilic substitution with acyl nucleophilic substitution.
 - ii) Mechanism of aldol condensation, Claisen condensation, Cannizzaro reaction, crossed aldol condensation, crossed Cannizzaro reaction, benzoin condensation, Perkin condensation. Knoevenagel, Reformatsky reaction, Wittig reaction, Michael addition.
 - iii) Hoffman rearrangement: Migration to electron deficient nitrogen, Sandmeyer's reaction, basicity of amines, diazotisation and coupling, acidity of phenols, Williamson synthesis, Fries rearrangement, Kolbe reaction, Reimer-Tiemann's reactions.
5.
 - i) Nucleophilic aromatic substitution: Bimolecular displacement mechanisms, orientation, comparison of aliphatic nucleophilic substitution with that of aromatic.
 - ii) Oxidation reduction reaction.
 - iii) Study of the following official compounds- preparation, test for purity, assay and medicinal uses of Chlorbutol, Dimercaprol, Glyceryl trinitrate, Urea, Ethylene

diamine dihydrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin, methyl salicylate, ethyl benzoate, benzylbenzoate, dimethyl phthalate, sodium lauryl sulphate, saccharin sodium, mephensin.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00110) PHARMACEUTICAL ORGANIC CHEMISTRY (PRACTICAL)

practical: 3 Hrs. /Week

I. Introduction to the various laboratory techniques through demonstration involving synthesis of the following compounds (at least 8 compounds to be synthesised):

1. Acetanilide / aspirin (Acetylation)
2. Benzanilide / Phenyl benzoate (Benzoylation)
3. P-bromo acetanilide / 2,4,6 – tribromo aniline (Bromination)
4. Dibenzylidene acetone (Condensation)
5. 1-Phenylazo-2-naphthol (Diazotisation and coupling)
6. Benzoic acid / salicylic acid (Hydrolysis of ester)
7. M-dinitro benzene (Nitration)
8. 9, 10 – Anthraquinone (Oxidation of anthracene) / preparation of benzoic acid from toluene or benzaldehyde
9. M-phenylene diamine (Reduction of M-dinitrobenzene) / Aniline from nitrobenzene
10. Benzophenoneoxime
11. Nitration of salicylic acid
12. Preparation of picric acid
13. Preparation of O-chlorobenzoic acid from O-chlorotoluene
14. Preparation of cyclohexanone from cyclohexanol

II. Identification of organic compounds belonging to the following classes by :

Systematic qualitative organic analysis including preparation of derivatives Phenols, amides, carbohydrates, amines, carboxylic acids, aldehyde and ketones, Alcohols, esters, hydrocarbons, anilides, nitrocompounds.

III. Introduction to the use of stereo models:

Methane, Ethane, Ethylene, Acetylene, Cis alkene, Trans alkene, inversion of configuration.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00105) PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Theory: 2 Hrs. /Week

1. Scope and objectives: This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
2. Upon completion of the course student shall be able to:
 - a. understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
 - b. know the analysis of the inorganic pharmaceuticals their applications; and
 - c. appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

3. Course materials:

Text books

- a. A text book Inorganic medicinal chemistry by Surendra N. Pandeya
- b. A. H. Beckett and J. B. Stanlake's Practical Pharmaceutical chemistry Vol-I & Vol-II
- c. Inorganic Pharmaceutical Chemistry III-Edition P.Gundu Rao

Reference books

- a. Inorganic Pharmaceutical Chemistry by Anand & Chetwal
- b. Pharmaceutical Inorganic chemistry by Dr. B. G. Nagavi
- c. Analytical chemistry principles by John H. Kennedy d. I.P. 1985 and 1996, Govt. of India, Ministry of health

4. Lecture wise programme:

Topics

1. A. Errors
 - B. Volumetric analysis
 - C. Acid-base titrations
 - D. Redox titrations
2. A. Non aqueous titrations
 - B. Precipitation titrations
 - C. Complexometric titrations
 - D. Theory of indicators
3. A. Gravimetry
 - B. Limit tests
 - C. Medicinal gases
 - D. Acidifiers
4. A. Antacids
 - B. Cathartics
 - C. Electrolyte replenishers
 - D. Essential Trace elements
5. A. Antimicrobials
 - B. Pharmaceutical aids
 - C. Dental Products
 - D. Miscellaneous compounds
 - E. Radio Pharmaceuticals

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Pharm. D - I YEAR

(17T00111) PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)
practical: 3 Hrs. /Week

1. Limit test (6 exercises)

- a. Limit test for chlorides
- b. Limit test for sulphates
- c. Limit test for iron
- d. Limit test for heavy metals
- e. Limit test for arsenic
- f. Modified limit tests for chlorides and sulphates

2. Assays (10 exercises)

- a. Ammonium chloride- Acid-base titration
- b. Ferrous sulphate- Cerimetry
- c. Copper sulphate- Iodometry
- d. Calcium gluconate- Complexometry
- e. Hydrogen peroxide – Permanganometry
- f. Sodium benzoate – Nonaqueous titration
- g. Sodium chloride – Modified Volhard's method
- h. Assay of KI – KIO₃ titration
- i. Gravimetric estimation of barium as barium sulphate
- j. Sodium antimony gluconate or antimony potassium tartarate

3. Estimation of mixture (Any two exercises)

- a. Sodium hydroxide and sodium carbonate
- b. Boric acid and Borax
- c. Oxalic acid and sodium oxalate

4. Test for identity (Any three exercises)

- a. Sodium bicarbonate
- b. Barium sulphate
- c. Ferrous sulphate
- d. Potassium chloride

5. Test for purity (Any two exercises)

- a. Swelling power in Bentonite
- b. Acid neutralising capacity in aluminium hydroxide gel
- c. Ammonium salts in potash alum
- d. Adsorption power heavy Kaolin
- e. Presence of Iodates in KI

6. Preparations (Any two exercises)

- a. Boric acids
- b. Potash alum
- c. Calcium lactate

d. Magnesium sulphate

Scheme of Practical Examination :

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment1&2	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00106) REMEDIAL MATHEMATICS/BIOLOGY (THEORY)

Theory: 3 Hrs. /Week

REMEDIAL MATHEMATICS :

1. **Scope and objectives:** This is an introductory course in mathematics. This subjects deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, laplace transform.
2. **Upon completion of the course the student shall be able to : –**
 - a. Know Trigonometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications;
 - b. solve the problems of different types by applying theory; and
 - c. appreciate the important applications of mathematics in pharmacy.

3. Course materials:

Text books

- a. Differential calculus By Shantinakaran
- b. Text book of Mathematics for second year pre- university by Prof.B.M.Sreenivas

Reference books

- a. Integral calculus By Shanthinarayan
- b. Engineering mathematics By B.S.Grewal
- c. Trigonometry Part-I By S.L.Loney

4. Lecture wise programme :

Topics

- 1 i) **Algebra :** Determinants, Matrices
ii) **Trigonometry :** Sides and angles of a triangle, solution of triangles
- 2 **Differential calculus:** Limit of a function, Differential calculus, Differentiation of a sum, Product, Quotient Composite, Parametric, exponential, trigonometric and Logarithmic function. Successivedifferentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions of two variables
- 3 **Integral Calculus:** Definite integrals, integration by substitution and by parts, Properties of definite integrals.
- 4 **Differential equations:** Definition, order, degree, variable separable,homogeneous, Linear, heterogeneous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.
- 5 i) **Analytical Geometry:**Points, Straight line, circle, parabola
ii) **Laplace transform:** Definition, Laplace transform of elementary functions, Properties of linearity and shifting.

BIOLOGY :

1. **Scope and objectives:** This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduces to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.

2. Course materials:

Text books

- a. Text book of Biology by S.B.Gokhale
- b. A Text book of Biology by Dr.Thulajappa and Dr.Seetaram.

Reference books

- a. A Text book of Biology by B.V.Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M.Ekambaranathaayyer and T.N.Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B.Gokhale and C.K.Kokate.

3. Lecture wise programme :

Topic

PART – A

- 01 Introduction
General organization of plants and its inclusions
Plant tissues
Plant kingdom and its classification
Morphology of plants
Root, Stem, Leaf and Its modifications
- 02 Inflorescence and Pollination of flowers
Morphology of fruits and seeds
Plant physiology
- 03 Taxonomy of Leguminosae, umbelliferae, Solanaceae, Lilliacae, Zinziberaceae, Rubiaceae
Study of Fungi, Yeast, Penicillin and Bacteria

PART-B

- 04 Study of Animal cell
Study animal tissues
Detailed study of frog
- 05 Study of Pisces, Raptiles, Aves
General organization of mammals
Study of poisonous animals

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - I YEAR

(17T00112) BIOLOGY (PRACTICAL)

practical: 3 Hrs. /Week

Title:

1. Introduction of biology experiments
2. Study of cell wall constituents and cell inclusions
3. Study of Stem modifications
4. Study of Root modifications
5. Study of Leaf modifications
6. Identification of Fruits and seeds
7. Preparation of Permanent slides
8. T.S. of Senna, Cassia, Ephedra, Podophyllum.
9. Simple plant physiological experiments
10. Identification of animals
11. Detailed study of Frog
12. Computer based tutorials

Scheme of Practical Examination:

	Sessionals	Annual
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03	01

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance.

(17T00201) PATHOPHYSIOLOGY (THEORY)

Theory: 3 Hrs. /Week

1. **Scope of the Subject:** This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.
2. **Objectives of the Subject :** Upon completion of the subject student shall be able to –
 - a. describe the etiology and pathogenesis of the selected disease states;
 - b.name the signs and symptoms of the diseases; and
 - c.mention the complications of the diseases.

Text books (Theory)

- a.Pathologic basis of disease by- Cotran, Kumar, Robbins
- b.Text book of Pathology- Harsh Mohan
- c.Text book of Pathology- Y.M. Bhide

Reference books (Theory)

- a. Clinical Pharmacy and Therapeutics; Second edition; Roger Walker; Churchill Livingstone publication

3. Detailed syllabus and lecture wise schedule :

Chapter

- 1
 - i) **Basic principles of cell injury and Adaptation**
 - a) Causes, Pathogenesis and morphology of cell injury
 - b) Abnormalities in lipoproteinaemia, glycogen infiltration and glycogen infiltration and glycogen infiltration and glycogen storage diseases
 - ii) **Inflammation**
 - a) Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of chronic inflammation
 - b) Repairs of wounds in the skin, factors influencing healing of wounds
-
- 2
 - i) **Diseases of Immunity**
 - a) Introduction to T and B cells
 - b) MHC proteins or transplantation antigens
 - c) Immune tolerance
 - Hypersensitivity
Hypersensitivity type I, II, III, IV, Biological significance, Allergy due to food, chemicals and drugs
 - Autoimmunity
Criteria for autoimmunity, Classifications of autoimmune diseases in man, mechanism of autoimmunity, Transplantation and immunologic tolerance, allograft rejections, transplantation antigens, mechanism of rejection of allograft.
 - Acquired immune deficiency syndrome (AIDS)
 - Amyloidosis
 - ii) **Infectious diseases :**
Sexually transmitted diseases (HIV, Syphilis, Gonorrhea), Urinary tract infections, Pneumonia, Typhoid, Tuberculosis, Leprosy, Malaria Dysentery (bacterial and amoebic), Hepatitis- infective hepatitis.

- 3 **Cancer:** differences between benign and malignant tumors, Histological diagnosis of malignancy, invasions and metastasis, patterns of spread, disturbances of growth of cells, classification of tumors, general biology of tumors, spread of malignant tumors, etiology and pathogenesis of cancer.
- 4
 - a) Types of shock, mechanisms, stages and management
 - b) Biological effects of radiation
 - c) Environmental and nutritional diseases
 - i) Air pollution and smoking- SO₂, NO, NO₂, and CO
 - ii) Protein calorie malnutrition, vitamins, obesity, pathogenesis of starvation.
- 5 i) Pathophysiology of common diseases
 - a. Parkinsonism
 - b. Schizophrenia
 - c. Depression and mania
 - d. Hypertension,
 - e. Stroke (ischemic and hemorrhage)
 - f. Angina, CCF, Atherosclerosis, Myocardial infarction
 - g. Diabetes Mellitus
 - h. Peptic ulcer and inflammatory bowel diseases
 - i. Cirrhosis and Alcoholic liver diseases
 - j. Acute and chronic renal failure
 - k. Asthma and chronic obstructive airway diseases

Assignments :

Title of the Experiment

- 1 Chemical Mediators of inflammation
- 2 Drug Hypersensitivity
- 3 Cigarette smoking & its ill effects
- 4 Biological Effects of Radiation
- 5 Etiology and hazards of obesity
- 6 Complications of diabetes
- 7 Diagnosis of cancer
- 8 Disorders of vitamins
- 9 Methods in Pathology- Laboratory values of clinical significance
- 10 Pathophysiology of Dengue Hemorrhagic Fever (DHF)

Format of the assignment

- 1 Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy.
5. Name and signature of the student
6. Time allocated for presentation may be 8+2Min.

(17T00202) PHARMACEUTICAL MICROBIOLOGY (THEORY)

Theory: 3 Hrs. /Week

1. **Scope of the Subject:** Microbiology has always been an essential component of pharmacy curriculum. This is because of the relevance of microbiology to pharmaceutical sciences and more specifically to pharmaceutical industry. Pharmaceutical biotechnology is the logical extension of pharmaceutical microbiology, which is expected to change the complete drug product scenario in the future.

This course deals with the various aspects of microorganisms, its classification, morphology, laboratory cultivation identification and maintenance. It also discusses with sterilization of pharmaceutical products, equipment, media etc. The course further discusses the immunological preparations, diseases, its transmission, diagnosis, control and immunological tests.

2. **Objectives of the Subject :**

Upon completion of the subject student shall be able to –

- a. know the anatomy, identification, growth factors and sterilization of microorganisms;
- b. know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
- c. do estimation of RNA and DNA and there by identifying the source ;
- d. do cultivation and identification of the microorganisms in the laboratory;
- e. do identification of diseases by performing the diagnostic tests; and
- f. appreciate the behavior of motility and behavioral characteristics of microorganisms.

Text books (Theory)

- a. Vanitha Kale and KishorBhusari Applied Microbiology Himalaya Publishing house Mumbai.
- b. Mary Louis Turgeon Immunology and Serology in Laboratory Medicines 2nd edition, 1996 Mosby- Year book inc St. Louis Missouri 63146.
- c. Harsh Mohan, Text book of Pathology 3rd edition, 1998, B-3 Ansari road Darya ganj N. Delhi.

Reference books (Theory)

- a. Prescott L.M., Jarley G.P Klein D.A Microbiology 2nd- edition Mc Graw Hill Company Inc
- b. Rawlins E.A. Bentley's Text Book of Pharmaceutics B ailliereTindals 24-28 London 1988
- c. Forbisher Fundamentals of Microbiology Philadelphia W.B. Saunders.
- d. Prescott L.M. Jarley G.P., Klein.D.A. Microbiology. 2nd edition WMC Brown Publishers, Oxford. 1993
- e. War Roitt, Jonathan Brostoff, David male, Immunology 3rd edition 1996, Mosby-year book Europe Ltd, London.
- f. Pharmacopoeia of India, Govt of India, 1996.

3. **Detailed syllabus and lecture wise schedule:**

Title of the topic

- 1
 - a) Introduction to the science of microbiology. Major divisions of microbial world and Relationship among them.
 - b) Different methods of classification of microbes and study of Bacteria, Fungi, virus, Rickettsiae, Spirochetes.
- 2
 - a) Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria &

- fungi. Differential media, enriched media and selective media, maintenance of lab cultures.
- b) Different methods used in isolation and identification of bacteria with emphasis to different staining techniques and biochemical reactions. Counting of bacteria -Total and Viable counting techniques.
- 3 a) Detailed study of different methods of sterilization including their merits and demerits. Sterilization methods for all pharmaceutical products. Detailed study of sterility testing of different pharmaceutical preparations .
Brief information on Validation.
- b) Disinfectants- Study of disinfectants, antiseptics, fungicidal and virucidal agents factors affecting their activation and mechanism of action. Evaluation of bactericidal, bacteristatic, virucidal activities, evaluation of preservatives in pharmaceutical preparations.
- 4 a) Immunology- Immunity, Definition, Classification, General principles of natural immunity, Phagocytosis, acquired immunity(active and passive) .
Antigens, chemical nature of antigens structure and formation of Antibodies, Antigen-Antibody reactions. Bacterial exotoxins and endotoxins. Significance of toxoids in active immunity, Immunization programme, and importance of booster dose.
- b) Diagnostic tests : Schick's Test, Elisa test, Western Blot test, Southern Blot PCR Widal, QBC, Mantoux Peripheral smear. Study of malarial parasite.
- 5 a) Microbial culture sensitivity Testing: Interpretation of results Principles and methods of different microbiological assays, microbiological assay of Penicillin, Streptomycin and vitamin B2 and B12. Standardisation of vaccines and sera.
- b) Study of infectious diseases: Typhoid, Tuberculosis, Malaria, Cholera, Hepatitis, Meningitis, Syphilis & Gonorrhea and HIV.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - II YEAR

(17T00207) PHARMACEUTICAL MICROBIOLOGY (PRACTICAL) practical: 3 Hrs. /Week

Title of the Experiment:

- 1 Study of apparatus used in experimental microbiology*.
- 2 Sterilisation of glass ware's. Preparation of media and sterilisation.*
- 3 Staining techniques – Simple staining ; Gram's staining ; Negative staining**
- 4 Study of motility characters*.
- 5 Enumeration of micro-organisms (Total and Viable)*
- 6 Study of the methods of isolation of pure culture.*
- 7 Bio chemical testing for the identification of micro*-organisms.
- 8 Cultural sensitivity testing for some micro-organisms.*
- 9 Sterility testing for powders and liquids.*
- 10 Determination of minimum inhibitory concentration.*
- 11 Microbiological assay of antibiotics by cup plate method.*
- 12 Microbiological assay of vitamins by Turbidometric method**
- 13 Determination of RWC.**
- 14 Diagnostic tests for some common diseases, Widal, malarial parasite.**

* Indicate minor experiment & ** indicate major experiment

Assignments:

1. Visit to some pathological laboratories & study the activities and equipment/instruments used and reporting the same.
2. Visit to milk dairies (Pasturization) and microbial laboratories (other sterilization methods) & study the activities and equipment/instruments used and reporting the same.
3. Library assignments
 - a. Report of recent microbial techniques developed in diagnosing some common diseases.
 - b. Latest advancement developed in identifying, cultivating & handling of microorganisms.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - II YEAR

(17T00203) PHARMACOGNOSY & PHYTOPHARMACEUTICALS (THEORY)

Theory: 3 Hrs. /Week

1. Scope and objectives: This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.

2. Upon completion of the course student shall be able to:

- understand the basic principles of cultivation, collection and storage of crude drugs;
- know the source, active constituents and uses of crude drugs; and
- appreciate the applications of primary and secondary metabolites of the plant.

3. Course materials:

Text books

- Pharmacognosy by G.E. Trease & W.C. Evans.
- Pharmacognosy by C.K. Kokate, Gokhale & A.C. Purohit.

Reference books

- Pharmacognosy by Brady & Tyler. E.
- Pharmacognosy by T.E. Wallis.
- Pharmacognosy by C.S. Shah & Qadery.
- Pharmacognosy by M.A. Iyengar.

4. Lecture wise programme:

Topics

- Introduction.
Definition, history and scope of Pharmacognosy.
Classification of crude drugs.
Cultivation, collection, processing and storage of crude drugs.
- Detailed method of cultivation of crude drugs.
Study of cell wall constituents and cell inclusions.
Microscopical and powder Microscopical study of crude drugs.
- Study of natural pesticides.
Detailed study of various cell constituents.
Carbohydrates and related products.
- Detailed study carbohydrates containing drugs. (11 drugs)
Definition sources, method extraction, chemistry and method of analysis of lipids.
Detailed study of oils.
- Definition, classification, chemistry and method of analysis of protein.
Study of plants fibers used in surgical dressings and related products.
Different methods of adulteration of crude drugs.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - II YEAR

(17T00208) PHARMACOGNOSY & PHYTOPHARMACEUTICALS (PRACTICAL)

practical: 3 Hrs. /Week

General Requirements: Laboratory Napkin, Observation Book 150 pages Zero brush, Needle, Blade, Match box.

List of experiments:

- 1 Introduction of Pharmacognosy laboratory and experiments.
- 2 Study of cell wall constituents and cell inclusions.
- 3 Macro, powder and microscopic study of Datura.
- 4 Macro, powder and microscopic study of Senna.
- 5 Macro, powder and microscopic study of Cassia. cinnamon.
- 6 Macro, powder and microscopic study of Cinchona.
- 7 Macro, powder and microscopic study of Ephedra.
- 8 Macro, powder and microscopic study of Quassia.
- 9 Macro, powder and microscopic study of Clove
- 10 Macro, powder and microscopic study of Fennel.
- 11 Macro, powder and microscopic study of Coriander.
- 12 Macro, powder and microscopic study of Isapgol.
- 13 Macro, powder and microscopic study of Nux vomica.
- 14 Macro, powder and microscopic study of Rauwolfia.
- 15 Macro, powder and microscopic study of Liquorice.
- 16 Macro, powder and microscopic study of Ginger.
- 17 Macro, powder and microscopic study of Podophyllum.
- 18 Determination of Iodine value.
- 19 Determination of Saponification value and unsaponifiable matter.
- 20 Determination of ester value.
- 21 Determination of Acid value.
- 22 Chemical tests for Acacia.
- 23 Chemical tests for Tragacanth.
- 24 Chemical tests for Agar.
- 25 Chemical tests for Starch.
- 26 Chemical tests for Lipids.(castor oil, sesame oil, shark liver oil, bees wax)
- 27 Chemical tests for Gelatin.

Scheme of Practical Examination:

	Sessionals	Annual
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance.

(17T00204) PHARMACOLOGY – I (THEORY)

Theory: 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, apart from general pharmacology, drugs acting on autonomic nervous system, cardiovascular system, central nervous system, blood and blood forming agents and renal system will be taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters;
 - b. handle and carry out the animal experiments;
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics; and
 - d. correlate and apply the knowledge therapeutically.

Text books(Theory) (Author, Title, Edition, Publication Place, Publisher, Year of Publication)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4t h Ed, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16t h edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. & Dale, M.M. Pharmacology. 4t h edition, 1999. Publisher: Churchill Living stone.

Reference books (Theory)(Author, Title, Edition, Publication Place, Publisher, Publication Year)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9t h Ed, 1996. Publisher Mc Graw Hill, Pergamon press.
- b. Craig, C.R.&Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher : Little Brown.Co
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, Int.
- d. Shargel and Leon. Applied Biopharmaceutics and pharmacokinetics. Latest edition. Publisher: Prentice Hall, London.

Text books (Practical) :

Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical)

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingstone.
- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.
- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.

- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

3. Detailed syllabus and lecture wise schedule :
Title of the topic

1. General Pharmacology

- a) Introduction, definitions and scope of pharmacology
- b) Routes of administration of drugs
- c) Pharmacokinetics (absorption, distribution, metabolism and excretion)
- d) Pharmacodynamics
- e) Factors modifying drug effects
- f) Drug toxicity - Acute, sub- acute and chronic toxicity.
- g) Pre-clinical evaluations
- h) Drug interactions

Note: The term Pharmacology used here refers to the classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration.

2. Pharmacology of drugs acting on ANS

- a) Adrenergic and antiadrenergic drugs
- b) Cholinergic and anticholinergic drugs
- c) Neuromuscular blockers
- d) Mydriatics and miotics
- e) Drugs used in myasthenia gravis
- f) Drugs used in Parkinsonism

3. i) Pharmacology of drugs acting on cardiovascular system

- a) Antihypertensives
- b) Anti-anginal drugs
- c) Anti-arrhythmic drugs
- d) Drugs used for therapy of Congestive Heart Failure
- e) Drugs used for hyperlipidaemias

ii) Pharmacology of Drugs acting on Respiratory tract

- a) Bronchodilators
- b) Mucolytics
- c) Expectorants
- d) Antitussives
- e) Nasal Decongestants

4. Pharmacology of drugs acting on Central Nervous System

- a) General anesthetics
- b) Sedatives and hypnotics
- c) Anticonvulsants
- d) Analgesic and anti- inflammatory agents
- e) Psychotropic drugs
- f) Alcohol and methyl alcohol
- g) CNS stimulants and cognition enhancers
- h) Pharmacology of local anaesthetics

5. i) Pharmacology of Hormones and Hormone antagonists

- a) Thyroid and Antithyroid drugs
- b) Insulin, Insulin analogues and oral hypoglycemic agents
- c) Sex hormones and oral contraceptives
- d) Oxytocin and other stimulants and relaxants

ii) Pharmacology of autoids and their antagonists

- a) Histamines and Antihistaminics
- b) 5-Hydroxytryptamine and its antagonists
- c) Lipid derived autoids and platelet activating factor

(17T00205) COMMUNITY PHARMACY (THEORY)

Theory: 3 Hrs. /Week

- 1. Scope:** In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.
- 2. Objectives:** Upon completion of the course, the student shall be able to –
 - a. know pharmaceutical care services;
 - b. know the business and professional practice management skills in community pharmacies;
 - c. do patient counselling & provide health screening services to public in community pharmacy;
 - d. respond to minor ailments and provide appropriate medication;
 - e. show empathy and sympathy to patients; and
 - f. appreciate the concept of Rational drug therapy.

Text Books:

- a. Health Education and Community Pharmacy by N.S.Parmar.
- b. WHO consultative group report.
- c. Drug store & Business management by Mohammed Ali & Jyoti.

Reference books:

- a. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.
- b. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & Wilkins.

Special requirements:

1. Either the college is having model community pharmacy (meeting the schedule N requirement) or sign MoU with at least 4-5 community pharmacies nearby to the college for training the students on dispensing and counselling activities.
2. Special equipments like B.P apparatus, Glucometer, Peak flow meter, and apparatus for cholesterol estimation.

3. Scheme of evaluation (80 Marks)

- | | |
|--|----|
| 1. Synopsis | 10 |
| 2. Major Experiment | 30 |
| (Counselling of patients with specific diseases – emphasis should be given on Counselling introduction, content, process and conclusion) | |
| 3. Minor Experiment (Ability to measure B.P/ CBG / Lung function) | 15 |
| 4. Prescription Analysis (Analyzing the prescriptions for probable drug interaction and ability to tell the management) | 15 |
| 5. Viva – Voce | 10 |

Lecture wise programme:

Topics

- 1 **Definition, scope, of community pharmacy**
Roles and responsibilities of Community pharmacist
Community Pharmacy Management
 - a) Selection of site, Space layout, and design
 - b) Staff, Materials- coding, stocking
 - c) Legal requirements

- d) Maintenance of various registers
- e) Use of Computers: Business and health care soft wares
- 2 **Prescriptions** – parts of prescription, legality& identification of medication related problems like drug interactions.
Inventory control in community pharmacy
 Definition, various methods of Inventory Control
ABC, VED, EOQ, Lead time, safety stock
Pharmaceutical care
 Definition and Principles of Pharmaceutical care.
- 3 **Patient counselling**
 Definition, outcomes, various stages, barriers, Strategies to overcome barriers Patient information leaflets- content, design, & layouts, advisory labels
Patient medication adherence
 Definition, Factors affecting medication adherence, role of pharmacist in improving the adherence.
Health screening services
 Definition, importance, methods for screening
 Blood pressure/ blood sugar/ lung function and Cholesterol testing
- 4 **OTC Medication-** Definition, OTC medication list & Counselling
Health Education
 WHO Definition of health, and health promotion, care for children, pregnant &breast feeding women, and geriatric patients.
 Commonly occurring Communicable Diseases, causative agents,
 Clinical presentations and prevention of communicable diseases – Tuberculosis, Hepatitis, Typhoid, Amoebiasis, Malaria, Leprosy, Syphilis, Gonorrhea and AIDS
 Balance diet, and treatment & prevention of deficiency disorders
 Family planning – role of pharmacist
- 5 **Responding to symptoms of minor ailments**
 Relevant pathophysiology, common drug therapy to,
 Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Pyrexia, Ophthalmic symptoms, worms infestations.
Essential Drugs concept and Rational Drug Therapy Role of community pharmacist
Code of ethics for community pharmacists

(17T00206) PHARMACOTHERAPEUTICS - I (THEORY)

Theory: 3 Hrs. /Week

1. Scope of the Subject: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. Objectives: At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. summarise the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. discuss the controversies in drug therapy;
 - i. discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication.
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange.

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication.
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

3. **Detailed syllabus and lecture wise schedule :**
Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases

Title of the topic

1. **Cardiovascular system:** Hypertension, Congestive cardiac failure,

Angina Pectoris, Myocardial infarction, Hyperlipidaemias , Electrophysiology of heart and Arrhythmias

Respiratory system: Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases

2. **Endocrine system:** Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis
3. General prescribing guidelines for
 - a. Paediatric patients
 - b. Geriatric patients
 - c. Pregnancy and breast feeding
4. Ophthalmology: Glaucoma, Conjunctivitis- viral & bacterial
5. Introduction to rational drug use
Definition, Role of pharmacist Essential drug concept Rational drug formulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - II YEAR

(17T00209) PHARMACOTHERAPEUTICS - I (PRACTICAL)

Practicals: 3 Hrs. /Week

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

(17T00301) PHARMACOLOGY – II (THEORY)

Theory: 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, drugs acting on autacoids, respiratory system, GIT, immune system and hormones, and pharmacology of autacoids and hormones will be concentrated. In addition, pharmacology of chemotherapeutic agents, vitamins, essential minerals and principles of toxicology are also taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject Upon completion of the subject student shall be able to:**
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters,
 - b. carry out the animal experiments confidently,
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics, and
 - d. correlate and apply the knowledge therapeutically.

Text books (Theory)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4th edition, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16th edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. and Dale, M.M. Pharmacology. 4th edition, 1999. Publisher: Churchill Livingstone.

Reference books (Theory)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9th edition, 1996. Publisher: Mc Graw Hill, Pergamon press.
- b. Craig, C.R. and Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher: Little Brown and company.
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, International.
- d. Gupta, P.K. and Salunkhe, D.K. Modern Toxicology. Volume I, II and III. Latest edition. Publisher: B.V. Gupta, Metropolitan Book Co. (p) Ltd, New Delhi.

Text books (Practical)

Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical) :

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingstone.
- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.

- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

2. Detailed syllabus and lecture wise schedule:

Title of the topic

1. i) **Pharmacology of Drugs acting on Blood and blood forming agents**

- a) Anticoagulants
- b) Thrombolytics and antiplatelet agents
- c) Haemopoietics and plasma expanders

ii) **Pharmacology of drugs acting on Renal System**

- a) Diuretics
- b) Antidiuretics

iii) **DRUGS ACTING ON GIT:**

- a) Drugs for peptic ulcer and gastric acidity
- b) Anti emetics
- c) Drugs for constipation, diarrhea, Inflammatory Bowel Disease
- d) Drug for pancreatic disease

2. **Chemotherapy**

- a) Introduction
- b) Sulfonamides and co-trimoxazole
- c) Penicillins and Cephalosporins
- d) Tetracyclins and Chloramphenicol
- e) Macrolides, Aminoglycosides, Polyene & Polypeptide antibiotics
- f) Quinolones and Fluroquinolones
- g) Antifungal antibiotics
- h) Antiviral agents
- i) Chemotherapy of tuberculosis and leprosy
- j) Chemotherapy of Malaria
- k) Chemotherapy of protozoal infections (amoebiasis, Giardiasis)
- l) Pharmacology of Anthelmintic drugs
- m) Chemotherapy of cancer (Neoplasms)

3 i) **Immunopharmacology:** Pharmacology of immunosuppressants and stimulants

ii) **Principles of Animal toxicology:** Acute, sub acute and chronic toxicity

Drug for pancreatic disease

4. **The dynamic cell: The structures and functions of the components of the cell**

- a) Cell and macromolecules: Cellular classification, subcellular organelles, macromolecules, large macromolecular assemblies
- b) Chromosome structure: Pro and eukaryotic chromosome structures, chromatin structure, genome complexity, the flow of genetic information.
- c) DNA replication: General, bacterial and eukaryotic DNA replication.
- d) The cell cycle: Restriction point, cell cycle regulators and modifiers.
- e) Cell signaling: Communication between cells and their environment, ion-channels, signal transduction pathways (MAP kinase, P38 kinase, JNK, Ras and PI3-kinase pathways, biosensors).

5. The Gene: Genome structure and function:

- a) Gene structure: Organization and elucidation of genetic code.
- b) Gene expression: Expression systems (pro and eukaryotic), genetic elements that control gene expression (nucleosomes, histones, acetylation, HDACS, DNA binding protein families).
- c) Transcription and Transcription factors: Basic principles of transcription in pro and eukaryotes. Transcription factors that regulate transcription in pro and eukaryotes.

RNA processing: rRNA, tRNA and mRNA processing.

Protein synthesis: Mechanisms of protein synthesis, initiation in eukaryotes, translation control and post-translation events

Altered gene functions: Mutations, deletions, amplifications, LOH, translocations, trinucleotide repeats and other genetic abnormalities. Oncogenes and tumor suppressor genes.

The gene sequencing, mapping and cloning of human disease genes. Introduction to gene therapy and targeting.

Recombinant DNA technology: principles. Processes (gene transfer technology) and applications

Books:

- 1 Molecular Biology of the Cell by Alberts B., Bray, D., Lewis, J., Raff M., Roberts, K and Watson, JD, 3rd edition.
- 2 Molecular Cell Biology By Lodish, H., Baltimore, D., Berk, A et al., 5th edition.
- 3 Molecular Biology by Turner, PC., McLennan, AG., Bates, AD and White MRH 2nd edition.
- 4 Genes VIII by Lewin, B., (2004)
- 5 Pharmaceutical Biotechnology, by Crommelin, DJA and Sindelar RD (1997)
- 6 Recombinant DNA by Watson, JD., Gilman, M., et al., (1996)
- 7 Biopharmaceutical: Biochemistry and Biotechnology by Walsh, G., (1998)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - III YEAR

(17T00307) PHARMACOLOGY – II (PRACTICAL)

practical: 3 Hrs. /Week

List of Experiments:

1. Study of laboratory animals and their handling (a. Frogs, b. Mice, c. Rats, d. Guinea pigs, e. Rabbits).
2. Study of physiological salt solutions used in experimental pharmacology.
3. Study of laboratory appliances used in experimental pharmacology.
4. Study of use of anesthetics in laboratory animals.
5. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.
6. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.
7. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
8. To record the dose response curve of Histamine using isolated guinea-pig ileum preparation.
9. Study of agonistic and antagonistic effects of drugs using isolated guinea-pig ileum preparation.
10. To carry out bioassay of Histamine using isolated guinea-pig ileum preparation by interpolation method.
11. To carry out bioassay of Histamine using guinea-pig ileum preparation by three point method.
12. To study the routes of administration of drugs in animals (Rats, Mice, Rabbits).
13. Study of theory, principle, procedure involved and interpretation of given results for the following experiments:
 - a) Analgesic property of drug using analgesiometer.
 - b) Antiinflammatory effect of drugs using rat-paw edema method.
 - c) Anticonvulsant activity of drugs using maximal electroshock and pentylenetetrazole methods.
 - d) Antidepressant activity of drugs using pole climbing apparatus and pentobarbitone induced sleeping time methods.
 - e) Locomotor activity evaluation of drugs using actophotometer and rotorod.
 - f) Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.

Scheme of Practical Examination:

	Sessionals	Annual
Identification	02	10
Synopsis	04	10
Major Experiment (Bioassay)	08	30
Minor Experiment (Interpretation of given Graph or simulated experiment)	04	10
Viva	02	10
Max Marks	20	70
Duration	3hrs	4hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

(17T00302) PHARMACEUTICAL ANALYSIS (THEORY)

Theory: 3 Hrs. /Week

1. **Quality Assurance:**

- a. Introduction, sources of quality variation, control of quality variation.
- b. Concept of statistical quality control.
- c. Validation methods- quality of equipment, validation of equipment and validation of analytical instruments and calibration.
- d. GLP, ISO 9000.
- e. Total quality management, quality review and documentation.
- f. ICH- international conference for harmonization-guidelines.
- g. Regulatory control.

2. **Chromatography:**

Introduction, history, classification, separation techniques, choice of methods.

The following techniques be discussed with relevant examples of pharmaceutical products involving principles and techniques of separation of drugs from excipients.

- a. **Column Chromatography:** Adsorption column chromatography, Operational technique, frontal analysis and elution analysis. Factors affecting column efficiency, applications and partition chromatography.
- b. **TLC:** Introduction, principle, techniques, Rf value and applications.
- c. **PC:** Introduction, principle, types of paper chromatography, preparation techniques, development techniques, applications.
- d. **Ion-exchange chromatography :** Introduction, principles, types of ion exchange synthetic resins, physical properties, factors affecting ion exchange, methodology and applications.
- e. **HPLC:** Introduction, theory, instrumentation, and applications.
- f. **HPTLC:** Introduction, theory, instrumentation, and applications.
- g. **Gas Chromatography:** Introduction, theory, instrumentation-carriergases, types of columns, stationary phases in GLC & GSC. Detectors-Flame ionization detectors, electron capture detector, thermal conductivity detector. Typical gas chromatogram, derivatisation techniques, programmed temperature gas chromatography, applications.
- h. **Electrophoresis:** Principles of separation, equipment for paper and gel electrophoresis, and application.
- i. **Gel filtration and affinity chromatography:** Introduction, technique, applications.

3. **Electrometric Methods:**

Theoretical aspects, instrumentation, interpretation of data/spectra and analytical applications be discussed on the following topics.

- a. **Potentiometry:** Electrical potential, electrochemical cell, reference electrodes, indicator electrodes, measurement of potential and pH, construction and working of electrodes, Potentiometric titrations, methods of detecting end point, Karl Fischer titration.
- b. **Conductometry:** Introduction, conductivity cell, conductometric titrations and applications.
- c. **Polarography:** Instrumentation, DME, residual current, diffusion current and limiting current, polarographic wave, Ilkovic's equation, Effect of oxygen on polarographic wave, Polarographic maxima and suppressors and applications.
- d. **Amperometric Titrations:** Introduction, types of electrodes used, reference and indicator electrode, instrumentation, titration procedure, advantages and disadvantages of Amperometry over potentiometry. Pharma applications.

4. Spectroscopy:

Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:

a. Absorption Spectroscopy:

- Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry, Beer-Lambert's Law, application and its deviation, limitation of Beer law, application of the law to single and multiple component analysis, measurement of equilibrium constant and rate constant by spectroscopy. Spectra of isolated chromophores, auxochromes, batho-chromic shift, hypsochromic shift, hyperchromic and hypochromic effect, effect of solvent on absorption spectra, molecular structure and infrared spectra.

Instrumentation – Photometer, U.V.-Visible spectrophotometer – sources of U.V.-Visible radiations, collimating systems, monochromators, sample cells and following detectors-Photocell, Barrier layer cell, Phototube, Diode array, applications of U.V.-Visible spectroscopy in pharmacy and spectrophotometric titrations.

- **Infrared Spectroscopy:** Vibrational transitions, frequency – structure correlations, Infrared absorption bands, Instrumentation-IR spectro-meter – sources of IR, Collimating systems, monochromators, sample cells, sample handling in IR spectroscopy and detectors- Thermocouple, Golay Cells, Thermistor, Bolometer, Pyroelectric detector, Applications of IR in pharmacy.

- **Fluorimetric Analysis:** Theory, luminescence, factors affecting fluorescence, quenching. Instrumentation, Applications, fluorescent indicators, study of pharmaceutically important compounds estimated by fluorimetry.

b. **Flame Photometry:** Theory, nebulisation, flame and flame temperature, interferences, flame spectrometric techniques and instrumentation and pharmaceutical applications.

c. **Atomic Absorption Spectrometry:** Introduction, Theory, types of electrodes, instrumentation and applications.

d. **Atomic Emission Spectroscopy:** Spectroscopic sources, atomic emission spectrometers, photographic and photoelectric detection.

5. a. **NMR& ESR (introduction only):** Introduction, theoretical aspects and applications.

b. **Mass Spectroscopy: (Introduction only)** – Fragmentation, types of ions produced mass spectrum and applications.

c. **Polarimetry: (Introduction only)** – Introduction to optical rotatory dispersion, circular dichroism, polarimeter.

d. **X-RAY Diffraction: (Introduction only)** – Theory, reciprocal lattice concept, diffraction patterns and applications.

e. **Thermal Analysis:** Introduction, instrumentation, applications, and DSC and DTA.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - III YEAR

(17T00308) PHARMACEUTICAL ANALYSIS (PRACTICAL)

practical: 3 Hrs. /Week

List of Experiments:

1. Separation and identification of Amino Acids by Paper Chromatography.
2. Separation and identification of Sulpha drugs by TLC technique.
3. Effect of pH and solvent on the UV spectrum of given compound.
4. Comparison of the UV spectrum of a compound with that of its derivatives.
5. Determination of dissociation constant of indicators using UV-Visible spectroscopy.
6. Conductometric titration of mixture of acids with a strong base.
7. Potentiometric titration of acid with a strong base.
8. Estimation of drugs by Fluorimetric technique.
9. Study of quenching effect in fluorimetry.
10. Colourimetric estimation of Sulpha drugs using BMR reagent.
11. Simultaneous estimation of two drugs present in given formulation.
12. Assay of Salicylic Acid by colourimetry.
13. Determination of Chlorides and Sulphates in Calcium gluconate by Nepheloturbidimetric Method.
14. Determination of Na/K by Flame Photometry.
15. Determination of pKa using pH meter.
16. Determination of specific rotation.
17. Comparison of the IR spectrum of a compound with that of its derivatives.
18. Demonstration of HPLC.
19. Demonstration of HPTLC.
20. Demonstration of GC-MS.
21. Demonstration of DSC.
22. Interpretation of NMR spectra of any one compound.

Reference Books:

1. Text Book of Pharm. Analysis by Higuchi. T and Hasen. E. B., New York Inter Science Publishers.
2. Quantitative Pharma. Analysis by Jenkins, The Blakiston division, New York.
3. Quantitative Drug Analysis, by Garrot. D, Chapman & Hall Ltd., London.
4. Undergraduate Instrumental Analysis by James. E., CBS Publishers.
5. Instrumental Analysis by Willard and Merritt, EWP, East West Press Ltd., Delhi/Madras.
6. Pharm Analysis by Skoog and West, Sounders Manipal College Publishing.
7. Text Book of Chemical Analysis, by A.I.Vogel, ELBS with Macmillan press, Hampshire.
8. Textbook of Pharm. Analysis by K.A.Connors, John Wiley & Sons, New York, Brisbane, Singapore.
9. Textbook of Pharm. Analysis (Practical) by Beckett & Stenlake, CBS Publishers, Delhi.
10. Textbook of Drug Analysis by P.D. Sethi., CBS Publishers, Delhi.
11. Spectroscopy by Silverstein, John & Wiley & Sons. Inc., Canada & Singapore.
12. How to practise GMP-A Plan for total quality control by P.P. Sharma, Vandana Publications, Agra.
13. The Science & Practice of Pharmacy by Remington Vol-I & II, Mack Publishing Co. Pennsylvania.
14. TLC by Stahl, Spring Verlag.
15. Text Book of Pharm. Chemistry by Chatten, CBS Publications.
16. Spectroscopy by William Kemp, ELBS with Macmillan Press, Hampshire.
17. I.P.-1996, The Controller of Publications, New Delhi.
18. BPC- Dept. of Health, U.K. for HMSO.
19. USP - Mack Publishing Co., Easton, PA.

Practicals

Title of the Experiment:

- 1 Study of agonistic and antagonistic effects of drugs using Guinea-pig ileum preparation.**
- 2 To study the effects of drugs on intestinal motility using frog's esophagus model*
- 3 To study the effects of drugs using rat uterus preparation.**
- 4 To study the anticonvulsant property of drugs (any one model).*
- 5 To study antihistaminic property of drug using histamine induced anaphylactic reaction in guinea pigs.
- 6 To study the apomorphine- induced compulsive behaviour (stereotypy) in mice.*
- 7 To study the muscle relaxant property of diazepam in mice using rotarod apparatus.*
- 8 To study the antiinflammatory property of indomethacin against carrageenan- induced paw oedema.**
- 9 To study the anxiolytic effect of diazepam in mice using mirrored-chamber apparatus.**
- 10 To demonstrate the effect of various drugs on the blood pressure and respiration of anaesthetized dog.
- 11 To study the effect of anthelmintics on earthworms.
- 12 To study the taming effect of chlorpromazine.*

- 13 To study the effects of drugs on vas deferense of the male rat.**
- 14 To study the effect of drugs on pesticide toxicity using rats as model.
- 15 To study the effect of drugs on heavy metal toxicity.

**indicate major experiment & * indicate minor experiment

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15 15
Viva	02	15
Max Marks	20	70
Duration	3hrs	4hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

(17T00303) PHARMACOTHERAPEUTICS – II (THEORY)

Theory: 3 Hrs. /Week

1. **Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives of the Subject** Upon completion of the subject student shall be able to –
 - a. know the pathophysiology of selected disease states and the rationale for drug therapy
 - b. know the therapeutic approach to management of these diseases;
 - c. know the controversies in drug therapy;
 - d. know the importance of preparation of individualised therapeutic plans based on diagnosis; and
 - e. appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text books (Theory)

Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication

Reference books (Theory)

- a. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
- b. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- c. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA]

3. **Detailed syllabus and lecture wise schedule :**

Etiopathogenesis and pharmacotherapy of diseases associated with following systems / diseases –

Title of the topic

1. **Infectious disease:** Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis
- 2 **Musculoskeletal disorders**
Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
- 3 **Renal system**
Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders
- 4 **Oncology:** Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis
- 5 **Dermatology:** Psoriasis, Scabies, Eczema, Impetigo

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - III YEAR

(17T00309) PHARMACOTHERAPEUTICS – II (PRACTICAL)

Practicals: 3 Hrs. /Week

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation.

The student shall be trained to understand the principle and practice involved in selection of drug therapy including clinical discussion.

A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment :

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - III YEAR

(17T00304) PHARMACEUTICAL JURISPRUDENCE (THEORY)

Theory: 2 Hrs. /Week

1. **Scope of the Subject:** (4-6 lines): This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.
2. **Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, and appreciate) –
 - a. practice the Professional ethics;
 - b. understand the various concepts of the pharmaceutical legislation in India;
 - c. know the various parameters in the Drug and Cosmetic Act and rules ;
 - d. know the Drug policy, DPCO, Patent and design act;
 - e. understand the labeling requirements and packaging guidelines for drugs and cosmetics;
 - f. be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and
 - g. other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.

Text books (Theory)

Mithal , B M. Textbook of Forensic Pharmacy. Calcutta:National; 1988.

Reference books (Theory)

- a. Singh, KK, editor. Beotra's the Laws of Drugs, Medicines & cosmetics. Allahabad: Law Book House; 1984.
- b. Jain, NK. A Textbook of forensic pharmacy. Delhi: Vallabhprakashan ; 1995.
- c. Reports of the Pharmaceutical enquiry Committee
- d. I.D.M.A., Mumbai. DPCO 1995
- e. Various reports of Amendments.
- f. Deshpande, S.W. The drugs and magic remedies act 1954 and rules 1955. Mumbai: Susmit Publications; 1998.
- g. Eastern Book Company .The narcotic and psychotropic substances act 1985, Lucknow: Eastern; 1987.

3. Detailed syllabus and lecture wise schedule:

Title of the topic

1. **Pharmaceutical Legislations** – A brief review.
Principle and Significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by PCI.
2. **Drugs and Cosmetics Act, 1940, and its rules 1945.**
Objectives, Legal definition, Study of Schedule's with reference to Schedule B, C&C1, D, E1, F&F1, F2, F3, FF, G, H, J, K, M, N, P, R, V, W, X, Y.
Sales, Import, labeling and packaging of Drugs And Cosmetics Provisions Relating to Indigenous Systems.

Constitution and Functions of DTAB,DCC,CDL. Qualification and duties –Govt. analyst and Drugs Inspector.

3. **Pharmacy Act –1948.**

Objectives Legal Definitions, General Study, Constitution and Functions of State & Central Council, Registration & Procedure, ER.

Medicinal and Toilet Preparation Act –1955.

Objectives, Legal Definitions, Licensing, Bonded and Non Bonded Laboratory, Ware Housing, Manufacture of Ayurvedic, Homeopathic, Patent &Proprietary Preparations.

4. **Narcotic Drugs and Psychotropic substances Act-1985 and Rules.** Objectives, Legal Definitions, General Study, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and regulations, Schedules to the Act.

Study of Salient Features of Drugs and magic remedies Act and its rules.

Study of essential Commodities Act Relevant to drugs price control Order.

5. **Drug Price control Order & National Drug Policy (Current).**

Prevention Of Cruelty to animals Act-1960.

Patents & design Act-1970.

Brief study of prescription and Non-prescription Products.

4. **Assignments:**

Format of the assignment

1. Minimum & Maximum number of pages
2. It shall be a computer draft copy
3. Reference(s) shall be included at the end.
4. Name and signature of the student
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min

Case studies relating to

1. Drugs and Cosmetics Act and rules along with its amendments, Dangerous Drugs Act, Medicinal and Toilet preparation Act, New Drug Policy, Professional Ethics, Drugs (Price control) Order, Patent and Design Act.
2. Various prescription and non-prescription products.
3. Medical and surgical accessories.
4. Diagnostic aids and appliances available in the market.

(17T00305) MEDICINAL CHEMISTRY (THEORY)

Theory :3 Hrs. /Week

1. A) Modern concept of rational drug design: A brief introduction to Quantitative Structure Activity Relationship (QSAR), prodrug, combinatorial chemistry and computer aided drug design (CADD) and concept of antisense molecules.

A study of the development of the following classes of drugs including SAR, mechanism of action, synthesis of important compounds, chemical nomenclature, brand names of important marketed products and their side effects.

B) Anti- infective agents

a)Local anti-infective agents:

Alcohols: isopropyl alcohol

Phenols: cresols, hexyl resorcinol

Cationic surfactants: benzalkonium chloride, cetylpyridinium bromide

Nitrofurans: nitrofurazone, furazolidone.

b)Antifungal agents:

Azoles: miconazole, ketoconazole, fluconazole

Miscellaneous: tolnaftate, naftifine

Antifungal Antibiotics: amphotericin, nystatin, griseofulvin.

c)Urinary tract anti-infectives:

SAR of quinolone antibacterial agents, Norfloxacin, ciprofloxacin*, sparfloxacin, ofloxacin,

d) Antitubercular agents:

Management of tuberculosis,

Synthetic anti TB agents: INH*, Pyrizinamide, ethambutol,

Anti TB antibiotics: rifampin, capreomycin

e)Antiviral agents and Anti AIDS agents:

amantadine, acyclovir, trifluridine, zidovudine, stavudine

f)Antiprotozoal agents:

Introduction to protozoal diseases and causative organisms.

Metronidazole, diloxanidefuroate, dehydroemetine, nifurtimox

g) Anthelmintics:

Benzimidazoles: mebendazole, albendazole

Piperazine, diethylcarbamazine, ivermectin

2. A) Antibiotics

- Historical background and classification of antibiotics.
Beta lactam antibiotics: development of acid resistant and extended spectrum Penicillins. Penicillin G, ampicillin, amoxicillin, cloxacillin
Beta lactamase inhibitors: clavulanic acid, thienamycin
Cephalosporins: cephelexin, cefadroxil, cefuroxime
Aminoglycosids: streptomycin, neomycin, amikacin, gentamicin
Tetracyclines: Chemistry and SAR of tetracyclines, chlortetracycline, doxycycline, Minocycline.

Macrolides: erythromycin, azithromycin

Miscellaneous: clindamycin, bacitracin, chloramphenicol*

B) Antineoplastic agents

Historical background and classification of antineoplastic agents

Alkylating agents: cyclophosphamide, mechlorethamine, chlorambucil

Antimetabolites: mercaptopurine, fluorouracil, methotrexate

Antibiotics: dactinomycin, mitomycin, streptozocin

Plant products: etoposide, taxol, vincristine and vinblastine

Miscellaneous: cisplatin, interferons

3. A) Antimalarials

Etiology of malaria, SAR and mechanism of action of quinoline

Antimalarials

Quinine sulphate, Chloroquine phosphate, amodiaquine, pamaquine*, primaquine, Quinacrine

Chloroguanide, cycloguanil, pyrimethamine

B) Sulphonamides and sulphones

History and development of sulfonamides, SAR and mechanism of action of Sulfonamides, pKa of Sulfas and Crystalluria

Sulfamethoxazole, sulfisoxazole, sulfacetamide*, sulfasalazine

Folate reductase inhibitors: trimethoprim*, synergistic action of cotrimoxazole.

Sulfones: dapsone

C) Hypoglycemic agents

History, development and SAR of sulfonylureas: tolbutamide*, chlorpropamide, glipizide

Metaglinides: repaglinide

Thiazolidinediones: rosiglitazone, pioglitazone

Biguanides: metformin, phenformin

Miscellaneous: acarbose, miglitol

4. A) Cardiovascular agents

a) Antianginal agents and vasodilators

Nitrovasodilators: amyl nitrite, isosorbidedinitrate

Calcium channel blockers: verapamil, diltiazem

b) Antiarrhythmic agents:

Class I: quinidine, phenytoin, lidocaine, encainide

Class II: beta blockers- propranolol

Class III: amiodarone

Class IV: Calcium channel blockers: verapamil, diltiazem

c) Antihypertensive agents:

betablockers: propranolol*,

ACE inhibitors: captopril, enalapril

Angiotensin antagonists: losartan

Calcium channel blockers: nifedipine, amlodipine

Adrenergic agents: clonidine, methyl dopa

Adrenergic antagonists: prazosin, reserpine

d)Antihyperlipidemic agents: types of hyperlipoproteinemia
clofibrate, fenofibrate, cholestyramine, lovastatin, simvastatin

e)Anticoagulants: warfarin, dicumarol, anisindione

B) Diuretics

Carbonic anhydrase inhibitors: acetazolamide*

Thiazide diuretics: SAR of thiazide diuretics, chlorthiazide,
benzthiazide, xipamide, chlorthalidone

Loop diuretics: frusemide*, ethacrynic acid

Potassium sparing diuretics: spiranolactone, amiloride

Miscellaneous: mannitol

5. A) Steroidal Hormones and Adrenocorticoids

Estrogens: estradiol, DES

Progestines: progesterone, norethindrone

Testosterone, nandrolone

Betamethasone, prednisolone, beclomethasone

B) Thyroid and Antithyroid agents

L-thyroxine, L-threonine

Propyl thiouracil, methimazole

C) Diagnostic agents

Iodipamide, diatrizoate sodium

Aminohippurate, sulfobromophthalein, fluorescein sodium

(17T00310) MEDICINAL CHEMISTRY (PRACTICAL)

Practical :3 Hrs./Week

I. Assays of important drugs from the course content.

1. Assay of ascorbic acid by cerimetry
2. Assay of metronidazole by NAT
3. Assay of chloroquine phosphate by NAT
4. Assay of dapsone by diazotization
5. Assay of INH by bromometry
6. Assay of benzyl penicillin by iodometry
7. Assay of analgin by iodimetry
8. Assay of diclofenac by alkalimetry

II. Preparation of medicinally important compounds or intermediates required for synthesis of drugs

1. Preparation of 7-hydroxy 4-methyl coumarin
2. Preparation of phenytoin from benzoin
3. Preparation of phenothiazine from diphenyl amine
4. Preparation of benzyl alcohol from benzaldehyde
5. Preparation of chlorbutanol
6. Preparation of eosin from resorcinol
7. Preparation of fluorescein from eosin
8. Preparation of triphenyl imidazole from benzoin
9. Preparation of 2,3 diphenyl quinoxaline from OPDA
10. Preparation of benztriazole from OPDA
11. Preparation of benzimidazoles from OPDA
12. Preparation of sulfanilamide from acetanilide
13. Preparation of INH
14. Preparation of cinnamic acid

III. Monograph analysis of important drugs.

1. Monograph analysis of ibuprofen
2. Monograph analysis of aspirin
3. Monograph analysis of caffeine
4. Monograph analysis of sulfanilamide
5. Monograph analysis of paracetamol

IV. Determination of partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis.

(17T00306) PHARMACEUTICAL FORMULATIONS (THEORY)

Theory :2 Hrs. /Week

1. Scope of the Subject: Scope and objectives of the course: Subject deals with the formulation and evaluation of various pharmaceutical dosage forms.
2. Objectives of the Subject: Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - a. understand the principle involved in formulation of various pharmaceutical dosage forms;
 - b. prepare various pharmaceutical formulation;
 - c. perform evaluation of pharmaceutical dosage forms; and
 - d. understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations.

Text books (Theory)

- a. Pharmaceutical dosage forms, Vol, I,II and III by lachman
- b. Rowlings Text book of Pharmaceutics
- c. Tutorial Pharmacy – Cooper & Gun

Reference books (Theory)

- a. Remington's Pharmaceutical Sciences
- b. USP/BP/IP

3. Detailed syllabus and lecture wise schedule:

Title of the topic

1. Pharmaceutical dosage form- concept and classification
Tablets: Formulation of different types of tablets, tablet excipients, granulation techniques quality control and evaluation of tablets. Tablet coating, Type of coating, quality control tests for coated tablet.
2. **Capsules;** Production and filling of hard gelatin capsules, Raw material for shell, finishing, quality control tests for capsules. Production and filling of soft gelatine capsules, quality control tests for soft gelatin capsules.
3. **Liquid orals:** Formulation and evaluation of suspensions, emulsions and solutions. Stability of these preparations
Parenterals Introduction Containers used for Parenterals (including official tests) Formulation of large and small volume Parenterals Sterilization
4. **Ophthalmic preparations (Semi – Solids):** Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labeling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging
5. Definition and concept of Controlled and novel Drug delivery systems with available examples, viz. parenteral, trans dermal, buccal, rectal, nasal, implants, ocular

(17T00311) PHARMACEUTICAL FORMULATIONS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Manufacture of Tablets
 - a. Ordinary compressed tablet-wet granulation
 - b. Tablets prepared by direct compression.
 - c. Soluble tablet.
 - d. Chewable tablet.
2. Formulation and filling of hard gelatin capsules
3. Manufacture of parenterals
 - a. Ascorbic acid injection
 - b. Calcium gluconate injection
 - c. Sodium chloride infusion.
 - d. Dextrose and Sodium chloride injection/ infusion.
4. Evaluation of Pharmaceutical formulations (QC tests)
 - a. Tablets
 - b. Capsules
 - c. Injections
5. Formulation of two liquid oral preparations and evaluation by assay
 - a. Solution: Paracetamol Syrup
 - b. Antacid suspensions- Aluminum hydroxide gel
6. Formulation of semisolids and evaluation by assay
 - a. Salicylic acid and benzoic acid ointment
 - b. Gel formulation Diclofenac gel
7. Cosmetic preparations
 - a. Lipsticks
 - b. Cold cream and vanishing cream
 - c. Clear liquid shampoo
 - d. Tooth paste and tooth powders.
8. Tablet coating (demonstration)

Scheme of Practical Examination :

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

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(17T00401) PHARMACOTHERAPEUTICS – III (THEORY)

Theory:3 Hrs. /Week

1. **Scope:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives:** At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. to discuss the controversies in drug therapy;
 - i. to discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases:

Title of the topic

- 1 **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders, Pancreatitis.
- 2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.
- 3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,
- 4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders, Alcohol Withdrawal Syndrome.
- 5 Pain management including Pain pathways, neuralgias, and headaches.
Evidence Based Medicine

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication

- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble
MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

(17T00407) PHARMACOTHERAPEUTICS – III (PRACTICAL)

Practical:3 Hrs./Week

Practicals:

Hospital postings for a period of at least 50 hours is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation. Each student should present at least two medical cases they have observed and followed in the wards.

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases:

Title of the topic

- 1 **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders.
- 2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.
- 3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,
- 4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders
- 5 Pain management including Pain pathways, neuralgias, and headaches.
- 6 Evidence Based Medicine

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

(17T00402) HOSPITAL PHARMACY (THEORY)

Theory: 2 Hrs. /Week

1. **Scope:** In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.
2. **Objectives:** Upon completion of the course, the student shall be able to –
 - a. know various drug distribution methods;
 - b. know the professional practice management skills in hospital pharmacies;
 - c. provide unbiased drug information to the doctors;
 - d. know the manufacturing practices of various formulations in hospital set up;
 - e. appreciate the practice based research methods; and
 - f. appreciate the stores management and inventory control.

Text books: (latest editions)

- a. Hospital pharmacy by William .E. Hassan
- b. A text book of Hospital Pharmacy by S.H.Merchant&Dr. J.S. Qadry. Revised by R.K.Goyal& R.K. Parikh

References:

- a. WHO consultative group report.
- b. R.P.S. Vol.2. Part –B; Pharmacy Practice section.
- c. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.

3. Lecture wise programme :

Topics

1 Hospital - its Organisation and functions

Hospital pharmacy-Organisation and management

- a) Organizational structure-Staff, Infrastructure & work load statistics
- b) Management of materials and finance
- c) Roles & responsibilities of hospital pharmacist

2 The Budget – Preparation and implementation

Hospital drug policy

- a) Pharmacy and Therapeutic committee (PTC)
- b) Hospital formulary
- c) Hospital committees
 - Infection committee
 - Research and ethical committee
- d) developing therapeutic guidelines
- e) Hospital pharmacy communication - Newsletter

3.Hospital pharmacy services

- a) Procurement & warehousing of drugs and Pharmaceuticals
- b) Inventory control
 - Definition, various methods of Inventory Control ABC, VED, EOQ, Lead time, safety stock
- c) Drug distribution in the hospital

- i) Individual prescription method
- ii) Floor stock method
- iii) Unit dose drug distribution method
- d) Distribution of Narcotic and other controlled substances
- e) Central sterile supply services – Role of pharmacist

4. Manufacture of Pharmaceutical preparations

- a) Sterile formulations – large and small volume parenterals
- b) Manufacture of Ointments, Liquids, and creams
- c) Manufacturing of Tablets, granules, capsules, and powders
- d) Total parenteral nutrition

5 Continuing professional development programs

Education and training

Radio Pharmaceuticals – Handling and packaging

Professional Relations and practices of hospital pharmacist

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Pharm. D - IV YEAR

(17T00408) HOSPITAL PHARMACY (PRACTICAL)

Practical:3 Hrs./Week

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

List of Assignments:

1. Design and Management of Hospital pharmacy department for a 300 bedded hospital.
2. Pharmacy and Therapeutics committee – Organization, functions, and limitations.
3. Development of a hospital formulary for 300 bedded teaching hospital
4. Preparation of ABC analysis of drugs sold in one month from the pharmacy.
5. Different phases of clinical trials with elements to be evaluated.
6. Various sources of drug information and systematic approach to provide unbiased drug information.
7. Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management.

Special requirements:

1. Each college should sign MoU with nearby local hospital having minimum 150 beds for providing necessary training to the students' on hospital pharmacy activities.
2. Well equipped with various resources of drug information.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva- voce and record maintenance).

(17T00403) CLINICAL PHARMACY (THEORY)

Theory :3 Hrs. /Week

1. Objectives of the Subject :

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- a. monitor drug therapy of patient through medication chart review and clinical review;
- b. obtain medication history interview and counsel the patients;
- c. identify and resolve drug related problems;
- d. detect, assess and monitor adverse drug reaction;
- e. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and
- f. retrieve, analyse, interpret and formulate drug or medicine information.

Text books (Theory)

- a. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
- b. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
- c. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
- d. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathietal, Orient OrientLangramPvt.Ltd. ISSN8125026

References

- a. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
- b. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
- c. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

2. Detailed syllabus and lecture wise schedule:

Title of the topic

1. Definitions, development and scope of clinical pharmacy

Introduction to daily activities of a clinical pharmacist

- a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)
- b. Ward round participation
- c. Adverse drug reaction management
- d. Drug information and poisons information
- e. Medication history
- f. Patient counseling
- g. Drug utilisation evaluation (DUE) and review (DUR)
- h. Quality assurance of clinical pharmacy services

Patient data analysis

The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.

2. Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results

- a. Haematological, Liver function, Renal function, thyroid function tests
- b. Tests associated with cardiac disorders
- c. Fluid and electrolyte balance
- d. Microbiological culture sensitivity tests
- e. Pulmonary Function Tests

3. Drug & Poison information

- a. Introduction to drug information resources available
- b. Systematic approach in answering DI queries
- c. Critical evaluation of drug information and literature
- d. Preparation of written and verbal reports
- e. Establishing a Drug Information Centre
- f. Poisons information- organization & information resources

4. Pharmacovigilance

- a. Scope, definition and aims of pharmacovigilance
- b. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
- c. Reporting, evaluation, monitoring, preventing & management of ADRs
- d. Role of pharmacist in management of ADR.

5. Communication skills, including patient counselling techniques, medication history interview, presentation of cases.

Pharmaceutical care concepts

Critical evaluation of biomedical literature

Medication errors

(17T00409) CLINICAL PHARMACY (PRACTICAL)

Practical:3 Hrs./Week

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

- a. Answering drug information questions (4 Nos)
- b. Patient medication counselling (4 Nos)
- c. Case studies related to laboratory investigations (4 Nos)
- d. Patient medication history interview (3 Nos)

Assignment:

Students are expected to submit THREE written assignments (1500 – 2000 words) on the topics given to them covering the following areas dealt in theory class.

Drug information, Patient medication history interview, Patient medication counselling, Critical appraisal of recently published articles in the biomedical literature which deals with a drug or therapeutic issue.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min

(17T00404) BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)

Theory: 2 Hrs. /Week

1. Detailed syllabus and lecture wise schedule

Research Methodology

- a) Types of clinical study designs:
Case studies, observational studies, interventional studies,
- b) Designing the methodology
- c) Sample size determination and Power of a study
Determination of sample size for simple comparative experiments,
determination of sample size to obtain a confidence interval of specified width,
power of a study
- d) Report writing and presentation of data

2. Biostatistics

2.1 a) Introduction

- b) Types of data distribution
- c) Measures describing the central tendency distributions- average, median, mode
- d) Measurement of the spread of data-range, variation of mean, standard deviation, variance, coefficient of variation, standard error of mean.

2.2 Data graphics

Construction and labeling of graphs, histogram, piecharts, scatter plots, semi logarithmic plots

3. Basics of testing hypothesis

- a) Null hypothesis, level of significance, power of test, P value, statistical estimation of confidence intervals.
- b) Level of significance (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way)
- c) Level of significance (Non-parametric data)- Sign test, Wilcoxon's signed rank test, Wilcoxon rank sum test, Mann Whitney U test, Kruskal-Wallis test (one way ANOVA)
- d) Linear regression and correlation- Introduction, Pearson's and Spearman's correlation and correlation co-efficient.
- e) Introduction to statistical software: SPSS, Epi Info, SAS.

4. Statistical methods in epidemiology

Incidence and prevalence, relative risk, attributable risk

5. Computer applications in pharmacy

Computer System in Hospital Pharmacy: Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics.

Computer In Community Pharmacy

Computerizing the Prescription Dispensing process

Use of Computers for Pharmaceutical Care in community pharmacy Accounting and General ledger system

Drug Information Retrieval & Storage:

Introduction – Advantages of Computerized Literature Retrieval

Use of Computerized Retrieval

Reference books:

- a. Pharmaceutical statistics- practical and clinical applications, Sanford Bolton 3rd edition, publisher Marcel Dekker Inc. NewYork.
- b. Drug Information- A Guide for Pharmacists, Patrick M Malone, Karen L Kier, John E Stanovich , 3rd edition, McGraw Hill Publications 2006

(17T00405) BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

Theory: 3 Hrs. /Week

1. Biopharmaceutics

1. Introduction to Biopharmaceutics

- a. Absorption of drugs from gastrointestinal tract.
- b. Drug Distribution.
- c. Drug Elimination.

2. Pharmacokinetics

2. Introduction to Pharmacokinetics.

- a. Mathematical model
- b. Drug levels in blood.
- c. Pharmacokinetic model
- d. Compartment models
- e. Pharmacokinetic study.

3. One compartment open model.

- a. Intravenous Injection (Bolus)
- b. Intravenous infusion.

Multicompartment models.

- a. Two compartment open model.
- b. IV bolus, IV infusion and oral administration

4. Multiple – Dosage Regimens.

- a. Repetitive Intravenous injections – One Compartment Open Model
- b. Repetitive Extravascular dosing – One Compartment Open model
- c. Multiple Dose Regimen – Two Compartment Open Model

Nonlinear Pharmacokinetics.

- a. Introduction
- b. Factors causing Non-linearity.
- c. Michaelis- menton method of estimating parameters.

5. Noncompartmental Pharmacokinetics.

- a. Statistical Moment Theory.
- b. MRT for various compartment models.
- c. Physiological Pharmacokinetic model.

Bioavailability and Bioequivalence.

- a. Introduction.
- b. Bioavailability study protocol.
- c. Methods of Assessment of Bioavailability

(17T00410) BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)

Practical:3 Hrs./Week

1. Improvement of dissolution characteristics of slightly soluble drugs by some methods.
2. Comparison of dissolution studies of two different marketed products of same drug.
3. Influence of polymorphism on solubility and dissolution.
4. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
5. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time.
6. Bioavailability studies of some commonly used drugs on animal/human model.
7. Calculation of K_a , K_e , $t_{1/2}$, C_{max} , AUC, AUMC, MRT etc. from blood profile data.
8. Calculation of bioavailability from urinary excretion data for two drugs.
9. Calculation of AUC and bioequivalence from the given data for two drugs.
10. In vitro absorption studies.
11. Bioequivalency studies on the different drugs marketed.(eg) Tetracycline, Sulphamethoxazole, Trimethoprim, Aspirin etc., on animals and human volunteers.
12. Absorption studies in animal inverted intestine using various drugs.
13. Effect on contact time on the plasma protein binding of drugs.
14. Studying metabolic pathways for different drugs based on elimination kinetics data.
15. Calculation of elimination half- life for different drugs by using urinary elimination data and blood level data.
16. Determination of renal clearance.

References:

- a. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi
- b. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania.
- c. Pharmacokinetics: By Milo Gibaldi Donald, R. Mercel Dekker Inc.
- d. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
- e. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
- f. Biopharmaceutics; By Swarbrick
- g. Biopharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmkar and Sunil B.Jaiswal, VallabhPrakashanPitampura, Delhi
- h. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febiger, Philadelphia, 1995.
- i. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
- j. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Robert F Notari Marcel Dekker Inc, New York and Basel, 1987.
- k. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James, C. Roylan, Marcel Dekker Inc, New York 1996.

(17T00406) CLINICAL TOXICOLOGY (THEORY)

Theory: 2 Hrs. /Week

1. General principles involved in the management of poisoning
Antidotes and the clinical applications.
Supportive care in clinical Toxicology.
Gut Decontamination.
Elimination Enhancement.
Toxicokinetics.
2. Clinical symptoms and management of acute poisoning with the following agents –
 - a) Pesticide poisoning: organophosphorous compounds, carbamates, organochlorines, pyrethroids.
 - b) Opiates overdose.
 - c) Antidepressants
 - d) Barbiturates and benzodiazepines.
 - e) Alcohol: ethanol, methanol.
 - f) Paracetamol and salicylates.
 - g) Non-steroidal anti- inflammatory drugs.
 - h) Hydrocarbons: Petroleum products and PEG.
 - i) Caustics: inorganic acids and alkali.
 - j) Radiation poisoning
3. Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper
Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.
4. Plants poisoning. Mushrooms, Mycotoxins.
Food poisonings
Envenomations – Arthropod bites and stings.
- 5. Substance abuse:**
Signs and symptoms of substance abuse and treatment of dependence
 - a) CNS stimulants: amphetamine
 - b) Opioids
 - c) CNS depressants
 - d) Hallucinogens: LSD
 - e) Cannabis group
 - f) Tobacco

References:

- a. Matthew J Ellenhorn. ELLENHORNS MEDICAL TOXICOLOGY – DIAGNOSIS AND TREATMENT OF POISONING. Second edition. Williams and Willkins publication, London
- b. V VPillay. HANDBOOK OF FORENSIC MEDICINE AND TOXICOLOGY. Thirteenth edition 2003 Paras Publication, Hyderabad

(17T00411) PHARMACOTHERAPEUTICS I & II (THEORY)

Theory:

3Hrs/week

- **Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases.**

1. **13 hrs**
Cardiovascular system: Hypertension, Congestive cardiac failure, Angina Pectoris, Myocardial infarction, Hyperlipidaemias, Electrophysiology of heart and Arrhythmias
2. **14 hrs**
Respiratory system: Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases
Endocrine system: Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis
3. **13 hrs**
General prescribing guidelines for
 - a. Paediatric patients
 - b. Geriatric patients
 - c. Pregnancy and breast feeding**Ophthalmology:** Glaucoma, Conjunctivitis- viral & bacterial
Introduction to rational drug use Definition, Role of pharmacist Essential drug concept Rational drug formulations
Dermatology: Psoriasis, Scabies, Eczema, Impetigo.
4. **18 hrs**
Infectious disease: Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis
5. **17hrs**
Musculoskeletal disorders: Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
Renal system: Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders
Oncology: Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - IV YEAR

(17T00412) PHARMACOTHERAPEUTICS – I & II (PRACTICAL)

Practicals:

3 Hrs./Week

Practicals:

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Scheme of Practical Examination:

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
Max Marks	20	70
Duration	03 hrs	04 hrs

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

(17T00501) CLINICAL RESEARCH (THEORY)

Theory:3 Hrs. /Week

1. Drug development process:

Introduction

Various Approaches to drug discovery

1. Pharmacological
2. Toxicological
3. IND Application
4. Drug characterization
5. Dosage form

2. Clinical development of drug:

1. Introduction to Clinical trials
2. Various phases of clinical trial.
3. Methods of post marketing surveillance
4. Abbreviated New Drug Application submission.

3.

1. Good Clinical Practice – ICH, GCP, Central drug standard control organisation (CDSCO) guidelines
2. Challenges in the implementation of guidelines
3. Ethical guidelines in Clinical Research
4. Composition, responsibilities, procedures of IRB / IEC

4.

1. Overview of regulatory environment in USA, Europe and India.
2. Role and responsibilities of clinical trial personnel as per ICH GCP
 - a. Sponsor
 - b. Investigators
 - c. Clinical research associate
 - d. Auditors
 - e. Contract research coordinators
 - f. Regulatory authority

5.

1. Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment)
2. Informed consent Process
3. Data management and its components
4. Safety monitoring in clinical trials.

References:

- a. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.
- b. International Conference on Harmonisation of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonised Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.
- c. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.

- d. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
- e. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
- f. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
- g. Goodman & Gilman: JG Hardman, LE Limbard, 10th Edn. McGraw Hill Publications, 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - V YEAR

(17T00502) PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (THEORY)

Theory :3 Hrs. /Week

1. Pharmacoepidemiology:

Definition and scope:

Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications.

Measurement of outcomes in pharmacoepidemiology

Outcome measure and drug use measures

Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement

2. Concept of risk in pharmacoepidemiology

Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio

Pharmacoepidemiological methods

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods

Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case –cohort studies, meta – analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.

3. Sources of data for pharmacoepidemiological studies

Ad Hoc data sources and automated data systems.

Selected special applications of pharmacoepidemiology

Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.

4. Pharmacoeconomics:

Definition, history, needs of pharmacoeconomic evaluations

Role in formulary management decisions

Pharmacoeconomic evaluation

Outcome assessment and types of evaluation

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods: Cost – minimization, cost- benefit, cost – effectiveness, cost utility

5. Applications of Pharmacoeconomics

Software and case studies

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Pharm. D - V YEAR

(17T00503) CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING (THEORY)

Theory :2 Hrs. /Week

1. Introduction to Clinical pharmacokinetics.

Design of dosage regimens:

Nomograms and Tabulations in designing dosage regimen, Conversion from intravenous to oral dosing, Determination of dose and dosing intervals, Drug dosing in the elderly and pediatrics and obese patients.

2. Pharmacokinetics of Drug Interaction:

- Pharmacokinetic drug interactions
- Inhibition and Induction of Drug metabolism
- Inhibition of Biliary Excretion.

3. Therapeutic Drug monitoring:

- Introduction
- Individualization of drug dosage regimen (Variability – Genetic, Age and Weight , disease, Interacting drugs).
- Indications for TDM. Protocol for TDM.
- Pharmacokinetic/Pharmacodynamic Correlation in drug therapy.
- TDM of drugs used in the following disease conditions: cardiovascular disease, Seizure disorders, Psychiatric conditions, and Organ transplantations.

4. Dosage adjustment in Renal and hepatic Disease.

- Renal impairment
- Pharmacokinetic considerations
- General approach for dosage adjustment in Renal disease.
- Measurement of Glomerular Filtration rate and creatinine clearance.
- Dosage adjustment for uremic patients.
- Extracorporeal removal of drugs.
- Effect of Hepatic disease on pharmacokinetics.

5. Population Pharmacokinetics.

- Introduction to Bayesian Theory.
- Adaptive method or Dosing with feed back.
- Analysis of Population pharmacokinetic Data.

Pharmacogenetics

- Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes.
- Genetic Polymorphism in Drug Transport and Drug Targets.
- Pharmacogenetics and Pharmacokinetics/Pharmacodynamic considerations



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU

Academic Calendar

B.Pharm I Year - II Semester (2019-2020)

I Spell of Instructions:	02.03.2020 to 25.04.2020	(08 Weeks)
I Mid-term Examinations: (1 st Objective + 1 st descriptive)	27.04.2020 to 28.04.2020	(02 days)
II Spell of Instructions:	29.04.2020 to 30.06.2020	(09 weeks)
II Mid-term Examinations: (2 nd Objective + 2 nd descriptive)	01.07.2020 to 02.07.2020	(02 days)
Preparation and Practicals:	03.07.2020 to 08.07.2020	(05 days)
End Examinations:	09.07.2020 to 17.07.2020	(09 days)
Commencement of Class Work for II year B.Pharm I semester for AY 2020-2021	27.07.2020 (Monday)	

Note:

- (i) The midterm examinations are to be conducted during both forenoon and afternoon sessions and are to be completed as per the schedule given above.
- (ii) All the midterm examinations shall be of both objective and descriptive type as per the academic regulations.

Date: 20.02.2020

Director of Evaluation





JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU

Academic Calendar

B.Tech/B.Pharm II & III Year - II Semester (2019-2020)

I Spell of Instructions:	30.12.2019 to 28.02.2020	(09 weeks)
I Mid-term Examinations: (1 st Objective + 1 st descriptive)	29.02.2020 to 06.03.2020	(06 days)
II Spell of Instructions:	09.03.2020 to 01.05.2020	(08 weeks)
II Mid-term Examinations: (2 nd Objective + 2 nd descriptive)	02.05.2020 to 08.05.2020	(06 days)
Preparation and Practicals:	11.05.2020 to 16.05.2020	(06 days)
End Examinations:	18.05.2020 to 30.05.2020	(02 weeks)
Commencement of Class Work for III & IV years B.Tech/B.Pharm I semester for AY 2020-2021	25.06.2020 (Thursday)	

Note:

- (i) The Mid-term Examinations should be conducted and completed as per the schedule given.
- (ii) All the midterm examinations shall be of both objective and descriptive type as per the academic regulations.
- (iii) I semester supplementary examinations will be conducted immediately after II semester end examinations

Date: 30.12.2019

Director of Evaluation

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU

Academic Calendar

B.Pharm IV Year II Semester (2019-2020)

I Spell of Instructions:	16.12.2019 to 07.02.2020	(08 weeks)
I Mid-term Examinations: (1 st Objective + 1 st descriptive)	10.02.2020 to 11.02.2020	(02 days)
II Spell of Instructions:	12.02.2020 to 09.04.2020	(08 weeks)
II Mid-term Examinations: (2 nd Objective + 2 nd descriptive)	13.04.2020 to 15.04.2020	(02 days)
End Examinations:	16.04.2020 to 18.04.2020	(03 days)
Project Work Viva Voce Examinations:	20.04.2020 to 30.04.2020	(10 days)

Note:

- (i) The Mid-term Examinations should be conducted and completed as per the schedule given.
- (ii) All the midterm examinations shall be of both subjective and objective type as per the academic regulations.

Date: 17.12.2019

Sd/-
DIRECTOR OF EVALUATION



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU-515002

Academic Calendar
for
First Year Pharm.D (AY 2019 - 20)
(for 2019 - 20 admitted batches only)

Commencement of class work	16/09/2019 (Monday)	
I Spell of Instructions:	16/09/2019 to 07/12/2019	(12 Weeks)
I Mid - term Examinations:	09/12/2019 to 16/12/2019	(06 Days)
II Spell of Instructions:	17/12/2019 to 09/03/2020	(12 Weeks)
II Mid - term Examinations:	11/03/2020 to 18/03/2020	(06 Days)
III Spell of Instructions:	19/03/2020 to 02/05/2020	(06½ Weeks)
Summer Vacation:	04/05/2020 to 23/05/2020	(03 Weeks)
III Spell of Instructions (Continued)::	25/05/2020 to 08/07/2020	(06½ Weeks)
III Mid-term Examinations:	09/07/2020 to 16/07/2020	(06 Days)
Preparation and Practicals:	17/07/2020 to 25/07/2020	(08 Days)
End Examinations:	27/07/2020 to 07/08/2020	(02 Weeks)
Commencement of class work for II year for AY 2020-21:	17/08/2020 (Monday)	

Note:

The mid-term Examinations are to be conducted as per the schedule given.

Date: 13/09/2019

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DIRECTOR OF EVALUATION
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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

Academic Calendar (2019-20)

For

Pharm.D II year (for 2018 admitted batches)

Commencement of class work	19.08.2019 (Monday)	
I Spell of Instructions :	19.08.2019 to 08.11.2019	(12 Weeks)
I Mid - term Examinations :	11.11.2019 to 13.11.2019	(03 Days)
II Spell of Instructions :	14.11.2019 to 05.02.2020	(12 Weeks)
II Mid - term Examinations :	06.02.2020 to 10.02.2020	(03 Days)
III Spell of Instructions :	11.02.2020 to 11.05.2020	(13 Weeks)
III Mid - term Examinations :	12.05.2020 to 14.05.2020	(03 Days)
Preparation and Practical's :	15.05.2020 to 23.05.2020	(08 Days)
End Examinations :	25.05.2020 to 06.06.2020	(02 Weeks)
Summer Vacation:	08.06.2020 to 27.06.2020	(03 Weeks)
Commencement of class work for III year for the AY 2020 - 21	29.06.2020 (Monday)	

Note:

The mid - term examinations are to be conducted as per the schedule given.

Date: 14.08.2019

DIRECTOR OF EVALUATION

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

Academic Calendar (2019-20)

For

Pharm.D III year (for 2017 admitted batches)

Commencement of class work	01.07.2019 (Monday)	
I Spell of Instructions :	01.07.2019 to 21.09.2019	(12 Weeks)
I Mid - term Examinations :	23.09.2019 to 25.09.2019	(03 Days)
II Spell of Instructions :	26.09.2019 to 18.12.2019	(12 Weeks)
II Mid - term Examinations :	19.12.2019 to 21.12.2019	(03 Days)
III Spell of Instructions :	23.11.2019 to 21.03.2020	(13 Weeks)
III Mid - term Examinations :	23.03.2020 to 26.03.2020	(03 Days)
Preparation and Practicals :	27.03.2020 to 04.04.2020	(07 Days)
End Examinations :	06.04.2020 to 22.04.2020	(11 Days)
Commencement of class work for IV year for the AY 2020 - 21	21.05.2020 (Thursday)	

Note:

The mid-term Examinations are to be conducted both in the morning and afternoon sessions as per the schedule given.

Date: 08.07.2019

**Sd/-
DIRECTOR OF EVALUATION**



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

Academic Calendar (2019-20)

For

Pharm.D IV year (for 2016 admitted batch)

Commencement of class work	08.04.2019 (Monday)	
I Spell of Instructions :	08.04.2019 to 04.05.2019	(04 Weeks)
Summer Vacation:	06.05.2019 to 25.05.2019	(03 Weeks)
I Spell of Instructions (Continued):	27.05.2019 to 20.07.2019	(08 Weeks)
I Mid - term Examinations :	22.07.2019 to 27.07.2019	(06 Days)
II Spell of Instructions :	29.07.2019 to 19.10.2019	(12 Weeks)
II Mid - term Examinations :	21.10.2019 to 26.10.2019	(06 Days)
III Spell of Instructions :	28.10.2019 to 25.01.2020	(13 Weeks)
III Mid - term Examinations :	27.01.2020 to 01.02.2020	(06 Days)
Preparation and Practicals :	03.02.2020 to 07.02.2020	(05 Days)
End Examinations :	10.02.2020 to 22.02.2020	(02 Weeks)
Commencement of class work for V year for the AY 2020 - 21	02.03.2020 (Monday)	

Note:

The mid - term examinations are to be conducted as per the schedule given.

Date: 26.03.2019


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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

Academic Calendar (2019-20)

For



Pharm.D V Year (for 2015 admitted batch)

Commencement of class work	11.02.2019 (Monday)	
I Spell of Instructions :	11.02.2019 to 16.03.2019	(05 Weeks)
I Mid - term Examinations :	18.03.2019 to 21.03.2019	(03 Days)
II Spell of Instructions :	22.03.2019 to 20.04.2019	(04 Weeks)
II Mid - term Examinations :	22.04.2019 to 24.04.2019	(03 Days)
III Spell of Instructions :	25.04.2019 to 08.05.2019	(02 Weeks)
Summer Vacation:	09.05.2019 to 01.06.2019	(03 $\frac{1}{2}$ Weeks)
III Spell of Instructions (Continued):	03.06.2019 to 15.06.2019	(02 Weeks)
III Mid - term Examinations :	17.06.2019 to 19.06.2019	(03 Days)
Project Work	20.05.2019 to 04.12.2019	(24 Weeks)
Preparation and Project Viva Voce Examinations:	05.12.2019 to 13.12.2019	(08 Days)
End Examinations :	16.12.2019 to 21.12.2019	(06 Days)
Commencement of class work for final year for the AY 2020 - 21	20.01.2020 (Monday)	

Note:

The mid - term examinations are to be conducted as per the schedule given.

Date: 16.02.2019


DIRECTOR OF EVALUATION




JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU-515002

Academic Calendar
for
First Year Pharm.D (P.B) (AY 2019 - 20)
(for 2019 - 20 admitted batch only)

Commencement of class work	16/09/2019 (Monday)	
I Spell of Instructions:	16/09/2019 to 07/12/2019	(12 Weeks)
I Mid - term Examinations:	09/12/2019 to 17/12/2019	(07 Days)
II Spell of Instructions:	18/12/2019 to 09/03/2020	(12 Weeks)
II Mid - term Examinations:	11/03/2020 to 19/03/2020	(07 Days)
III Spell of Instructions:	20/03/2020 to 02/05/2020	(06½ Weeks)
Summer Vacation:	04/05/2020 to 23/05/2020	(03 Weeks)
III Spell of Instructions (Continued)::	25/05/2020 to 08/07/2020	(06½ Weeks)
III Mid-term Examinations:	09/07/2020 to 17/07/2020	(07 Days)
Preparation and Practicals:	18/07/2020 to 25/07/2020	(07 Days)
End Examinations:	27/07/2020 to 07/08/2020	(02 Weeks)
Commencement of class work for II year for AY 2020-21:	17/08/2020 (Monday)	

Note:

The mid-term Examinations are to be conducted as per the schedule given.

Date: 13/09/2019

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DIRECTOR OF EVALUATION

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

Academic Calendar (2019-20)

For

Pharm.D (P.B) II year (for 2018 admitted batch)

Commencement of class work	19.08.2019 (Monday)	
I Spell of Instructions :	19.08.2019 to 21.09.2019	(05 Weeks)
I Mid - term Examinations :	23.09.2019 to 25.09.2019	(03 Days)
II Spell of Instructions :	26.09.2019 to 23.10.2019	(04 Weeks)
II Mid - term Examinations :	24.10.2019 to 26.10.2019	(03 Days)
III Spell of Instructions :	28.10.2019 to 23.11.2019	(04 Weeks)
III Mid - term Examinations :	25.11.2019 to 27.11.2019	(03 Days)
Project Work	28.11.2019 to 13.05.2020	(24 Weeks)
Preparation and Practicals :	14.05.2020 to 23.05.2020	(09 Days)
End Examinations :	25.05.2020 to 30.05.2020	(06 Days)
Summer Vacation:	01.06.2020 to 27.06.2020	(04 Weeks)
Commencement of class work for final year for the AY 2020 - 21	29.06.2020 (Monday)	

Note:

The mid - term examinations are to be conducted as per the schedule given.

Date: 14.08.2019

DIRECTOR OF EVALUATION

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**ANNAMACHARYA COLLEGE OF PHARMACY**

Sponsored by ANNAMACHARYA EDUCATIONAL TRUST (Regd. 135/IV/97)

Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,

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I B PHARMACY II SEM SECTION A (AY 2019-2020)

TIME /DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	PRACTICAL (1.45PM to 5.00PM)	
						BATCH A	BATCH B
MON	POC – I	BIOCHEM	PATHO	CAP	LUNCH BREAK	HAP – II	BIOCHEM
TUE	BIOCHEM	POC – I	CAP	HAP – II		BIOCHEM	HAP – II
WED	BIOCHEM	HAP – II	POC – I	PATHO		POC – I	COMPUTER
THU	CAP	ES	BIOCHEM	HAP – II		COMPUTER	POC – I
FRI	POC – I	PATHO	LIB	ES		CAP	LIBRARY
SAT	ES	EXAM	HAP – II	PATHO		LIBRARY	CAP
SUBJECT					HANDLING STAFF		
Human Anatomy & Physiology - II					Mr. S.Mohanaraghupathy / Mrs.S. Sravana Jyothi		
Pharmaceutical Organic Chemistry - I					Ms. Shaik Heena		
Biochemistry					Dr. K. Adinarayana / Mrs. A. Chandana		
Pathophysiology					Mrs. A. Udaya / Dr. A. N. Anusha Reddy		
Computer Applications in Pharmacy					Mrs. S.Raja Rajeswari / Mr.M. Chakrapani		
Environmental Sciences					Ms. T. Jyotshna		
CLASS INCHARGE					Mr. S.Mohanaraghupathy		

I B PHARMACY II SEM SECTION B (AY 2019-2020)

TIME /DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	PRACTICAL (1.45PM to 5.00PM)	
						BATCH C	BATCH D
MON	ES	HAP – II	POC – I	PATHO	LUNCH BREAK	POC – I	COMPUTER
TUE	POC – I	HAP – II	BIOCHEM	ES		COMPUTER	POC – I
WED	PATHO	POC – I	BIOCHEM	HAP – II		LIBRARY	CAP
THU	BIOCHEM	HAP – II	CAP	ES		CAP	LIBRARY
FRI	PATHO	CAP	BIOCHEM	EXAM		BIOCHEM	HAP – II
SAT	CAP	LIB	PATHO	POC – I		HAP – II	BIOCHEM
SUBJECT					HANDLING STAFF		
Human Anatomy & Physiology - II					Mr. M. Nagendra / Mrs.S. Sravana Jyothi		
Pharmaceutical Organic Chemistry - I					Mr. Y. Pradeep Kumar		
Biochemistry					Dr. K. Adinarayana + Ms. Shaik Heena / Ms. A. Chandana		
Pathophysiology					Ms. T. Jyotshna / Dr. A. N. Anusha Reddy		
Computer Applications in Pharmacy					Mrs. S.Raja Rajeswari / Mr.M. Chakrapani		
Environmental Sciences					Mrs. A. Udaya		
CLASS INCHARGE					Mrs. A. Udaya		


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TIME /DAY	PRACTICAL (9.30 AM – 12.45 PM)		12.45 – 1.45	1.45	2.35	3.25	4.15
	BATCH A	BATCH B	LUNCH BREAK				
MON	PA – I	LIBRARY		PA – I	COG – II	LIB	PATHO
TUE	LIBRARY	COG – II		PT – I	PP – II	COG – II	EXAM
WED	PP – II	PA – I		PA – I	PATHO	PT – I	COG – II
THU	LIBRARY	PP – II		COG – II	PP – II	PA – I	PT – I
FRI	COG – II	PT – I		PP – II	PA – I	LIB	PT – I
SAT	PT – I	LIBRARY		PP – II	EXAM	PATHO	EXAM
SUBJECT			HANDLING STAFF				
Pharmaceutical Analysis - I			Mr. M. Chanti Naik / Dr. S. Sravana Kumari				
Pharmacognosy - II			Mrs. B. Nirmala Devi / Mrs. B. Gowthami				
Pharmaceutical Technology - I			Mr. N. Ravi Naik / Ms. D.S. Priyanka				
Physical Pharmacy - II			Mr. M. Praveen Kumar / Mr. N Jakeer Hussain				
Pathophysiology			Mr. M. Nagendra				
CLASS INCHARGE			Mr. M. Nagendra				

II YR B. PHARMACY II SEM SECTION B (AY 2019-2020)

TIME /DAY	PRACTICAL (9.30 AM – 12.45 PM)		12.45 – 1.45	1.45	2.35	3.25	4.15
	BATCH C	BATCH D	LUNCH BREAK				
MON	PP – II	LIBRARY		PATHO	EXAM	PT – I	LIB
TUE	PT – I	PP – II		PA – I	EXAM	PP – II	PATHO
WED	LIBRARY	COG – II		COG – II	PA – I	LIB	PT – I
THU	COG – II	PT – I		PP – II	PATHO	COG – II	PA – I
FRI	LIBRARY	PA – I		EXAM	PP – II	COG – II	PT – I
SAT	PA – I	LIBRARY		PT – I	PP – II	PA – I	COG – II
SUBJECT			HANDLING STAFF				
Pharmaceutical Analysis - I			Mr. U. Narasimhulu / Dr. S. Sravana Kumari				
Pharmacognosy - II			Mrs. B. Nirmala Devi + Ms. T. Vamsi Gayathri / Mrs. B. Gowthami				
Pharmaceutical Technology - I			Mr. C. A. Nagabhuvaneswar Reddy / Ms. D.S. Priyanka				
Physical Pharmacy - II			Mr. V. Sarovar Reddy / Mr. N. Jakeer Hussain				
Pathophysiology			Mr. M. Nagendra				
CLASS INCHARGE			Mr. V. Sarovar Reddy				


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III YR B. PHARMACY II SEM SECTION A (AY 2019-2020)

TIME /DAY	PRACTICAL (9.30 AM – 12.45 PM)		12.45 – 1.45	1.45	2.35	3.25	4.15
	BATCH A	BATCH B	LUNCH BREAK				
MON	COL – II	BPPK		COL – II	CT	PA – II	BPPK
TUE	LIBRARY	COL – II		PA – II	COL – II	CT	PJ
WED	AELCS	PA – II		BPPK	EXAM	PJ	COL – II
THU	LIBRARY	AELCS		EXAM	PA – II	BPPK	CT
FRI	PA – II	LIBRARY		CT	PJ	LIB	PA – II
SAT	BPPK	LIBRARY		PJ	BPPK	COL – II	LIB
SUBJECT			HANDLING STAFF				
Pharmacology - II			Mr. S. Sudhakar / Mr. R. Pradeep Kumar				
Pharmaceutical Analysis - II			Mrs. C. Prasanthi / Mr. B. Ashok Kumar				
Biopharmaceutics & Pharmacokinetics			Mrs. U. Katyayani / Ms. K. Harika				
Pharmaceutical Jurisprudence			Mrs. A. Sushmitha				
CBCC (CT)			Mrs. A. Udaya				
AELCS			Mrs. S. Raja Rajeswari / Mr. A. Suryaprakash				
CLASS INCHARGE			Mr. S. Sudhakar				

III YR B. PHARMACY II SEM SECTION B (AY 2019-2020)

TIME /DAY	PRACTICAL (9.30 AM – 12.45 PM)		12.45 – 1.45	1.45	2.35	3.25	4.15
	BATCH C	BATCH D	LUNCH BREAK				
MON	PA – II	AELCS		PA – II	EXAM	PJ	CT
TUE	AELCS	LIBRARY		PJ	BPPK	PA – II	CT
WED	BPPK	LIBRARY		BPPK	PA – II	LIB	COL – II
THU	COL – II	PA – II		COL – II	PJ	BPPK	EXAM
FRI	LIBRARY	BPPK		PA – II	COL – II	CT	PJ
SAT	LIBRARY	COL – II		LIB	CT	COL – II	BPPK
SUBJECT			HANDLING STAFF				
Pharmacology - II			Mr. V. Chinni Krishnaiah / Mr. R. Pradeep Kumar				
Pharmaceutical Analysis - II			Mr. M. Madhu / Mr. B. Ashok Kumar				
Biopharmaceutics & Pharmacokinetics			Mrs. P. Anitha / Ms. K. Harika				
Pharmaceutical Jurisprudence			Mrs. A. Sushmitha				
CBCC (CT)			Ms. T. Jyotshna				
AELCS			Mrs. S. Raja Rajeswari / Mr. A. Suryaprakash				
CLASS INCHARGE			Mrs. P. Anitha				

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IV B PHARMACY II SEM SECTION A & B (AY 2019-2020)

TIME /DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	PRACTICAL (1.45 to 5.00PM)	
						BATCH A	BATCH B
MON	MOOC - II	PROJECT		MOOC - III	LUNCH BREAK	PROJECT WORK	
TUE	Technical Seminar		MOOC - III	MOOC - II		PROJECT WORK	
WED	PROJECT WORK					PROJECT WORK	
THU	MOOC - III	MOOC - II	PROJECT WORK			PROJECT WORK	
FRI	Comprehensive Viva Voce		MOOC - II	PROJECT		PROJECT WORK	
SAT	PROJECT	MOOC - III	Technical Seminar			PROJECT WORK	
SUBJECT				HANDLING STAFF			
MOOC – II (Biostatistics and Design of Experiments)				Mr. Y. Pradeep Kumar /Ms. G. Uma Devi			
MOOC – III (Intellectual Property Rights)				Mr. E. Gireesh Kumar / Ms. G. Uma Devi			
CLASS INCHARGES				Mr. Y. Pradeep Kumar (Sec – A)			
				Mr. E. Gireesh Kumar (Sec – B)			

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Pharm. D I Year TIME TABLE 2019-2020						
TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45 – 5.00
MON	RM	MBC	POC	CEU	LUNCH BREAK	MBC
TUE	POC	PIOC	MBC	PIOC		PIOC
WED	MBC	HAP	POC	LIB		HAP
THU	RM	HAP	PIOC	EXAM		CEU
FRI	RM	CEU	POC	HAP		COMPUTERS
SAT	RM	HAP	MBC	CEU		POC
SUBJECT				HANDLING STAFF		
Human Anatomy and Physiology				Mrs. A. Udaya		
Pharmaceutics				Dr. N. Raghavendra Naveen		
Medical Biochemistry				Mr. U. Narasimhulu / Mr. M. Mahendra		
Pharmaceutical Organic Chemistry				Dr. M. Deepa		
Pharmaceutical Inorganic Chemistry				Mr. M. Chanti Naik / Mr. M. Mahendra		
Remedial Biology				Dr. B. Vinuthna		
Remedial Mathematics				Mr. M. Chakrapani		
CLASS INCHARGE				Dr. N. Raghavendra Naveen		

Pharm. D II Year TIME TABLE 2019-2020							
TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45 – 5.00	
MON	PATHO	PHYTO	COL-I	LIB	LUNCH BREAK	PATHO	
TUE	PT-I	COL-I	PHYTO	PATHO		PT-I	PT-I LAB
WED	MICRO	COMPH	PHYTO	PT-I		PHYTO	
THU	PT-I	MICRO	PHYTO	LIB		MICRO	
FRI	PATHO	COMPH	MICRO	COL-I		SPORTS	
SAT	COL-I	LIB	MICRO	COMPH		COMPUTER	
SUBJECT					HANDLING STAFF		
Pathophysiology					Dr. B. Niveditha		
Pharmaceutical Microbiology					Ms. Shaik Heena/ Mrs. A Sushmitha		
Pharmacognosy & Phytopharmaceuticals					Dr. D. Swarnalatha / Ms. T. Jyotshna		
Pharmacology – I					Mr. S.Mohanaraghupathy		
Community Pharmacy					Dr. M. Pramod Kumar		
Pharmacotherapeutics – I					Dr. K. Haneefa		
CLASS INCHARGE					Mrs. B. Nirmaladevi		


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Pharm. D III Year TIME TABLE 2019-2020

Pharm. D III Year TIME TABLE 2019-2020						
TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45 – 5.00
MON	COL-II	PA	MC	PT-II	LUNCH BREAK	PT-II
TUE	MC	COL-II	LIB	PF		MC
WED	PT-II	EXAM	COL-II	PA		PA
THU	PJ	PF	PA	COL-II		SPORTS
FRI	PJ	EXAM	PT-II	MC		PF
SAT	PF	MC	PT-II	PA		COL-II
SUBJECT			HANDLING STAFF			
Pharmacology – II			Ms. T. Jyotshna / Mr. M. Nagendra			
Pharmaceutical Analysis			Mr. E Gireesh Kumar / Mr. M. Mahendra			
Pharmacotherapeutics - II			Dr. T. Anusha Reddy / Dr. K. Haneefa			
Pharmaceutical Jurisprudence			Mr. S.Mohanaraghupathy			
Medicinal chemistry			Ms. T.Vamsi Gayathri / Ms. A. Chandana			
Pharmaceutical Formulations			Dr.N. Raghavendra Naveen			
CLASS INCHARGE			Ms. A. Chandana			

Pharm. D IV Year TIME TABLE 2019-2020

Pharm. D IV Year TIME TABLE 2019-2020						
TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45 – 5.00
MON	BPPK	BSIRM	CP	HP	LUNCH BREAK	BPPK LAB
TUE	CP	LIB	PT-III	BPPK		CP LAB
WED	BPPK	PT-III	CT	LIB		PT-III
THU	PT-III	BPPK	CP	PT-III		HP
FRI	HP	BSIRM	CP	HP		COMPUTER
SAT	CT	BSIRM	HP	CT		SPORTS
Subject				FACULTY		
Pharmacotherapeutics – III				Dr. D. Girirajashekar / Dr. A. N. Anusha Reddy		
Hospital Pharmacy				Dr. S. Sravana Kumari		
Clinical Pharmacy				Dr. B. Niveditha		
Biostatistics & Research Methodology				Mr. Y. Pradeep Kumar		
Biopharmaceutics & Pharmacokinetics				Dr. N. Kishore		
Clinical Toxicology				Dr. M. Sireesha		
CLASS INCHARGE				Dr. M. Sireesha		


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V Pharm. D TIME TABLE 2019-2020

TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45	2.35	3.25	4.15
MON	PROJECT				LUNCH BREAK	CP/JP	CP/JP	CP/JP	CP/JP
TUE	CR	PROJECT				CR	PEPE	CP/JP	CPPDM
	8.00 TO 09.00	9.00 TO 10.50	10.50 TO 11.00	11.00 TO 12.00			2.35	3.25	4.15
WED	TRAVEL	WARD ROUND S WITH PRECEPTORS	B R E A K	DIC Student documentat ion & Verificatio n by faculty	Travel & Break		CPPDM	PEPE	CP/JP
THU							CP/JP	PEPE	PEPE
FRI							CP/JP	CR	CP/JP
SAT							CPPDM	CR	CP/JP
SUBJECT						HANDLING STAFF			
Clinical research						Dr. M. Sireesha			
Pharmaco Epidemiology & Pharmacoeconomics						Dr. M. Pramod Kumar			
Clinical Pharmacokinetics & Pharamacotherapeutics Drug Monitoring						Dr. D. Girirajashekar			
CLASS INCHARGE						Dr. D. Girirajashekar			

II PHARM. D (PB) TIME TABLE 2019-2020

TIME DAY	9.30	10.20	11.10	12.00	12.45 – 1.45	1.45	2.35	3.25	4.15
MON	CR	PEPE	PROJECT		LUNCH BREAK	PROJECT			
TUE	CR	PROJECT				CP/JP	PEPE	CR	CP/JP
	8.00 TO 09.00	9.00 TO 10.50	10.50 TO 11.00	11.00 TO 12.00			2.35	3.25	4.15
WED	TRAVEL	WARD	B	DIC Student	Travel & Break		CPPDM	PEPE	CP/JP
THU		ROUND	R	documentati			CR	CP/JP	CP/JP
FRI		S WITH	E	on &			CPPDM	CR	CP/JP
SAT		PRECEP	A	Verification			CPPDM	PEPE	CP/JP
		TORS	K	by faculty					
SUBJECT						HANDLING STAFF			
Clinical research						Dr. B. Vinuthna			
Pharmaco Epidemiology & Pharmacoeconomics						Dr. S. Sravana Kumari			
Clinical Pharmacokinetics & Pharamacotherapeutics Drug Monitoring						Dr. T. Anusha Reddy			
CLASS INCHARGE						Dr. T. Anusha Reddy			


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M. Pharmacy I Year II Sem (Pharmaceutics) TIME TABLE (AY 2019-2020)

DAY/ TIME	9.30	10.20	11.10	12.00	12.45 to 1.45	1.45	2.35	3.25	4.15
MON	SEMINAR/ ASSIGNMENT	C & C	ABPPK	JD	LUNCH BREAK	JD	CADD	NTDDS	SEMINAR/ ASSIGNMENT
TUE	SEMINAR/ ASSIGNMENT	C & C	ABPPK	JD		JD	SEMINAR/ ASSIGNMENT	CADD	NTDDS
WED	CADD	SEMINAR/ ASSIGNMENT	NTDDS	JD		SEMINAR/ ASSIGNMENT	JD	C & C	ABPPK
THU	JD	ABPPK	NTDDS	CADD		JD	JD	SEMINAR/ ASSIGNMENT	C & C
FRI	I M. PHARM II SEM					ABPPK LAB			
SAT	I M. PHARM II SEM					NTDDS LAB			

HANDLING STAFF

SUBJECT	NAME OF THE FACULTY
Molecular Pharmaceutics(Nano Tech and Targeted DDS)	Dr. P. Dwarakanadha Reddy
Advanced Biopharmaceutics & Pharmacokinetics	Dr. C. Suryaprakash Reddy
Computer Aided Drug Delivery System	Dr. N. Raghavendra Naveen
Cosmetic and Cosmeceuticals	Mr. M. Praveen Kumar
Nano Tech and Targeted DDS (NTDS) Practical	Dr. P. Dwarakanadha Reddy
Advanced Biopharmaceutics & Pharmacokinetics Practical	Dr. C. Suryaprakash Reddy

M. Pharmacy I Year II Sem (Pharmaceutical Analysis & Quality Assurance) (AY 2019-2020)

DAY/ TIME	9.30	10.20	11.10	12.00	12.45 to 1.45	1.45	2.35	3.25	4.15
MON	HSM	SEMINAR/ ASSIGNMENT	APA	JD	LUNCH BREAK	JD	PV	MBT	SEMINAR/ ASSIGNMENT
TUE	APA	JD	MBT	SEMINAR/ ASSIGNMENT		JD	PV	HSM	SEMINAR/ ASSIGNMENT
WED	PV	SEMINAR/ ASSIGNMENT	APA	JD		HSM	JD	SEMINAR/ ASSIGNMENT	MBT
THU	JD	APA	JD	HSM		SEMINAR/ ASSIGNMENT	MBT	PV	JD
FRI	I M. PHARM II SEM					PV LAB			
SAT	I M. PHARM II SEM					HSM LAB			

HANDLING STAFF

SUBJECT	NAME OF THE FACULTY
Hazards and safety management	Mrs. C. Prasanthi
Pharmaceutical Validation	Mr. E. Gireesh Kumar
Advanced Pharmaceutical Analysis	Mrs. A. Sushmitha
Modern Bio analytical Techniques	Mr. M. Madhu
Hazards and safety management Practical	Mrs. C. Prasanthi / Mr. M. Chanti Naik
Pharmaceutical Validation Practical	Mr. E. Gireesh Kumar / Mr. U. Narasimhulu


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M. Pharmacy I Year II Sem (Pharmacology) TIME TABLE (AY 2019-2020)

DAY/ TIME	9.30	10.20	11.10	12.00	12.45 to 1.45	1.45	2.35	3.25	4.15
MON	P&TSM	SEMINAR/ ASSIGNMENT	AP – II	JD	LUNCH BREAK	JD	SEMINAR/ ASSIGNMENT	CRP	JD
TUE	SEMINAR/ ASSIGNMENT	JD	CRP	JD		PDD	AP – II	P&TSM	SEMINAR/ ASSIGNMEN
WED	PDD	AP - II	SEMINAR/ ASSIGNMENT	P&TSM		AP – II	CRP	SEMINAR/ ASSIGNMENT	
THU	CRP	JD	SEMINAR/ ASSIGNMENT	JD		JD	JD	P&TSM	PDD
FRI	I M. PHARM II SEM			PDD		Pharmacology Practical – II LAB			
SAT	I M. PHARM II SEM					Pharmacology Practical – III LAB			

HANDLING STAFF

SUBJECT	NAME OF THE FACULTY
Advanced Pharmacology II	Mr. V. Chinni Krishnaiah
Pharmacological and Toxicological Screening Methods-II	Mr. S. Mohanraghupathy
Principles of Drug Discovery	Mr. M. Nagendra
Clinical Research and Pharmacovigilance	Mr. S. Sudhakar
Pharmacology Practical - II	Mr. V. Chinni Krishnaiah
Pharmacology Practical - III	Mr. S. Sudhakar

M. Pharmacy I Year II Sem (Pharmaceutical Chemistry) TIME TABLE (AY 2019-2020)

DAY/ TIME	9.30	10.20	11.10	12.00	12.45 to 1.45	1.45	2.35	3.25	4.15
MON	SEMINAR/ ASSIGNMENT	AOC – II	JD	JD	LUNCH BREAK	ASA	SEMINAR/ ASSIGNMENT	CADD	JD
TUE	JD	CADD	ASA	SEMINAR/ ASSIGNMENT		JD	AOC – II	SEMINAR/ ASSIGNMENT	
WED	AOC – II	SEMINAR/ ASSIGNMENT	JD	JD		PPC	ASA	CADD	PPC
THU	SEMINAR/ ASSIGNMENT	ASA	CADD	PPC		AOC – II	SEMINAR/ ASSIGNMENT	PPC	
FRI	I M. PHARM II SEM					Pharmaceutical Chemistry Practical – II LAB			
SAT	I M. PHARM II SEM					Pharmaceutical Chemistry Practical – III LAB			

HANDLING STAFF

SUBJECT	NAME OF THE FACULTY
Advanced Spectral Analysis	Dr. M. Deepa
Advanced Organic Chemistry –II	Mr. S. Chand Basha
Computer Aided Drug Design	Mr. S. Chand Basha
Pharmaceutical Process Chemistry	Mr. Y. Pradeep Kumar
Pharmaceutical Chemistry Practical - II	Mr. S. Chand Basha
Pharmaceutical Chemistry Practical - III	Dr. M. Deepa


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TEACHING STAFF WORK LOAD (AY 2019 - 20) II SEMESTER

DEPARTMENT OF PHARMACEUTICS

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Dr. P. Dwarakanadha Reddy				NTDDS	04	06				04	06	10
2	Dr. N. Kishore							BPPK	04	04	04	04	08
3	Dr. C. Suryaprakash Reddy				ABPPK	04	06				04	06	10
4	Dr. N. Raghavendra Naveen.				CADD	04	--	CEU PF	03 03	04 04	10	08	18
5	Mr. M. Praveen Kumar	PP – II	04	08	C & C	04	--				08	08	16
6	Mr. V. Sarovar Reddy	PP - II	04	08							04	08	12
7	Mrs. P. Anitha	BPPK	04	08							04	08	12
8	Mrs. B. Gowthami	COG – II	--	16							--	16	16
9	Mr. N. Jakeer Hussaian	PP – II	--	16							--	16	16
10	Mr. A. Suryaprakash	AELCS	--	16							--	16	16
11	Ms. N.Harika	BPPK	--	16							--	16	16
12	Mrs. U. Katyayani	BPPK	04	08							04	08	12
13	Mr. N.Ravi Naik	PT – I	04	08							04	08	12
14	Mr. C. A. Nagabhuvaneswar Reddy	PT – I	04	08							04	08	12

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Mr.Y.Pradeep Kumar	MOOC – II POC - I	02 04	-- 08	PPC	04	--				10	08	18
2	Mr.S.Chand Basha				AOC – II CADD PCP - II	04 04 --	-- -- 06				08	06	14



ANNAMACHARYA COLLEGE OF PHARMACY

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Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,

Accredited by NAAC with 'A' Grade, Bangalore, Accredited by NBA (UG Programme), New Delhi

Recognized u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognized Research Center, JNTUA, Ananthapuramu,

3	Dr. M.Deepa				ASA	04	06	POC	4	4	08	10	18
4	Ms. Heena Shaik	POC – I BIOCHEM	04 --	08 08				MICRO	04	--	08	16	24
5	Ms. T. Vamsi Gayathri	COG – II	--	08				MC	4	4	04	12	16
6	Ms. A. Chandana	BIOCHEM	--	08				MC	--	04	--	12	12

DEPARTMENT OF PHARMACEUTICAL BIOTECHNOLOGY

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Dr. K.Adinarayana	BIOCHEM	08	08							08	08	16

DEPARTMENT OF PHARMACOLOGY

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Dr. T.S.M.Saleem	--	--	--	--	--	--	--	--	--	--	--	--
2	Mr.V.Chinnikrishniah	COL - II	04	08	AP – II Practical-II	04	--				08	14	22
3	Mr. R. Pradeep Kumar	COL – II	--	16							--	16	16
4	Mr. S. Mohan Raghupathy	HAP – II	04	08	P & TSM – II	04	--	PJ COL-I	2 4	-- --	14	08	22
5	Mr. S. Sudhakar	COL – II	04	08	CRP Practical-III	04	--				08	14	22
6	Mr. M. Nagendra	PATHO HAP – II	06 04	-- 08	PDD	04	--	COL – II	--	04	14	12	26
7	Mrs. A. Udaya	ES PATHO CT	03 04 04	-- -- --				HAP	04	04	15	04	21
8	Ms. T. Jyotshna	CT ES PATHO	04 03 04	-- -- --				COL-II PHYTO	04 --	04 04	15	08	23
9	Ms. D. S. Priyanka	PT – I	--	16							--	16	16

DEPARTMENT OF PHARMACOGNOSY

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Dr.D.Swarna Latha							PHYTO	4	4	04	04	08
2	Mrs.B.Nirmala Devi	COG – II	08	08							08	08	16

DEPARTMENT OF PHARMACEUTICAL ANALYSIS

S.N O	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Mr.M.Madhu	PA – II	04	08	MBT	04	--				08	08	16
2	Mr. E. Gireesh Kumar	MOOC - III	02	--	PV	04	06	PA	4	4	10	10	20
3	Mrs. A. Sushmitha	PJ	08	--	APA	04	--	MICRO	-	4	12	04	16
4	Mr. M. Chanti Naik	PA – I	04	08	HSM	--	06	PIOC	4	4	08	18	26
5	Mr. U. Narasimhulu	PA – I	04	08	PV	--	06	MBC	4	4	08	18	26



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Recognized u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognized Research Center, JNTUA, Ananthapuramu,

6	Mrs. Prasanthi. C	PA - II	04	08	HSM	04	06				08	14	22
7	Mrs. S. Sravana Jyothi	HAP – II	--	16							--	16	16
8	Ms. Uma Devi. G	MOOC – III MOOC-II	02 02	-- --							04	--	04
9	Mr. S. Ashok Kumar	PA – II	--	16							--	16	16
10	Mr. M. Mahendra							PIOC MBC PA	- - -	04 04 04	--	12	12

DEPARTMENT OF HUMANITY & SCIENCES

S.NO	FACULTY NAME	B. PHARM			M. PHARM			PHARM. D			TOTAL		TOTAL WORK LOAD
		SUB	T	L	SUB	T	L	SUB	T	L	T	L	
1	Mr.M. Chakrapani	CAP	--	16				RM	4	--	04	16	20
2	Mrs. S. RajaRajeswari	AELCS CAP	-- 04	16 --							04	16	20

DEPARTMENT OF PHARMACY PRACTICE

S.NO	FACULTY NAME	PHARM. D			TOTAL		TOTAL WORK LOAD	HOSPITAL
		SUB	T	L	T	L		
1	Dr. D.Giri Rajasekhar	CPPDM	03	--	03	--	03	16 (4)
2	Dr. B. Niveditha	PATHO	04	--	04	--	04	8(2)
3	Dr. M. Siresha	CR	03	--	03	--	03	8(2)
4	Dr. B. Vinuthna	CR* RB	03 04	-- 04	07	04	11	8(2)
5	Dr. T. Anusha Reddy	CPPDM* PT-II	03 04	-- 04	07	04	11	8(2)
6	Dr. M. Pramod Kumar	COM.PH PEPE	04 04	-- --	08	--	08	8(2)
7	Dr. A. N. Anusha Reddy	PT - III	--	04	--	04	04	8(2)
8	Dr. K. Haneefa	PT – I PT - II	04 --	04 04	04	08	12	8(2)
9	Dr. S. Sravana Kumari	PEPE* HP	04 04	-- 04	08	04	12	8(2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and Syllabi for M.Pharm-Pharmaceutics
(JNTUA-Affiliated Pharmacy Colleges 2017-18)

I YEAR - I Semester

S. No	Course Code	Subjects	L	T	P	C
1	17S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2	17S03101	Drug Delivery System	4	-	-	4
3	17S03102	Modern Pharmaceutics	4	-	-	4
4	17S03103	Regulatory Affair	4	-	-	4
5	17S03104	Pharmaceutical Analysis Practical for Pharmaceutics	-	-	6	3
6	17S03105	Drug Delivery Systems Practical	-	-	6	3
7	17S03106	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

I YEAR II Semester

S. No	Course Code	Subject	L	T	P	C
1	17S03201	Molecular Pharmaceutics(Nano Tech and Targeted DDS)	4	-	-	4
2	17S03202	Advanced Biopharmaceutics & Pharmacokinetics	4	-	-	4
3	17S03203	Computer Aided Drug Delivery System	4	-	-	4
4	17S03204	Cosmetic and Cosmeceuticals	4	-	-	4
5	17S03205	Nano Technology & Targeted Dds (Ntds) Practical	-	-	6	3
6	17S03206	Advanced Biopharmaceutics & Pharmacokinetics Practical	-	-	6	3
7	17S03207	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

III SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S01301	Research Methodology and Biostatistics	4	-	-	4
2.	17S03301	Journal Club	1	-	-	1
3.	17S03302	Teaching Assignment	10	-	-	2
4.	17S03303	Comprehensive viva voce	-	-	-	2
5.	17S03304	Discussion / Presentation (Proposal presentation)	-	-	2	2
6.	17S03305	Research Work	-	-	28	14
Total			15	-	30	25

IV SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S03401	Journal Club	1	-	-	1
2.	17S03402	Research work	31	-	-	16
3.	17S03403	Discussion/ Final Presentation	3	-	-	3
Total			35	-	-	20

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S01101) MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY

60 HOURS

1. 11 hrs
 - a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV Visible spectroscopy.
 - b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy
 - c. Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
 - d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.
2. 11 hrs

NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and ¹³C NMR. Applications of NMR spectroscopy.
3. 11 hrs

Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

4. 11hrs
Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography

5 11hrs

a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis
d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, Xray powder technique, Types of crystals and applications of Xray diffraction.

c. Immunological assays: RIA (Radio immuno assay), ELISA, Bioluminescence assays. 5hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03101) DRUG DELIVERY SYSTEMS

SCOPE

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

OBJECTIVES

Upon completion of the course, student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of delivering system
- The formulation and evaluation of Novel drug delivery systems..

THEORY

60 Hrs

1.

10 hrs

Sustained Release (SR) and Controlled Release (CR) formulations: Introduction & basic concepts, advantages/disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.

2

10hrs

Rate Controlled Drug Delivery Systems: Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems; Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles & Fundamentals.

3

10hrs

Gastro-Retentive Drug Delivery Systems: Principle, concepts advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit. Buccal Drug Delivery Systems: Principle of muco adhesion, advantages and disadvantages, Mechanism of drug permeation, Methods of formulation and its evaluations.

4

6hrs

a) Ocular Drug Delivery Systems: Barriers of drug permeation, Methods to overcome barriers.

10hrs

b) Transdermal Drug Delivery Systems: Structure of skin and barriers, Penetration enhancers, Transdermal Drug Delivery Systems, Formulation and evaluation.

5

8 hrs

a) Protein and Peptide Delivery: Barriers for protein delivery. Formulation and Evaluation of delivery systems of proteins and other macromolecules.

6 hrs

b) Vaccine delivery systems: Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines.

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York/Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002

JOURNALS

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian drugs (IDMA)
3. Journal of controlled release (Elsevier Sciences) desirable
4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03102) MODERN PHARMACEUTICS

SCOPE

Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries

Objectives

Upon completion of the course, student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

THEORY

60 HRS

1.10 HRS

a. Preformation Concepts – Drug Excipient interactions -different methods, kinetics of stability, Stability testing. Theories of dispersion and pharmaceutical Dispersion (Emulsion and Suspension, SMEDDS) preparation and stability Large and small volume parental –physiological and formulation consideration, Manufacturing and evaluation.

b. Optimization techniques in Pharmaceutical Formulation: Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation

2 10 HRS

Validation : Introduction to Pharmaceutical Validation, Scope & merits of Validation, Validation and calibration of Master plan, ICH & WHO guidelines for calibration and validation of equipments, Validation of specific dosage form, Types of validation. Government regulation, Manufacturing Process Model, URS, DQ, IQ, OQ & P.Q. of facilities.

3

10 HRS

cGMP & Industrial Management: Objectives and policies of current good manufacturing practices, layout of buildings, services, equipments and their maintenance Production management: Production organization, , materials management, handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.

4

10 HRS

Compression and compaction: Physics of tablet compression, compression, consolidation, effect of friction, distribution of forces, compaction profiles. Solubility.

5

10 HRS

Study of consolidation parameters; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f_2 and f_1 , Higuchi and Peppas plots, Linearity Concept of significance, Standard deviation, Chi square test, students T-test, ANOVA test.

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett.
8. Physical Pharmacy; By Alfred Martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.
11. Quality Assurance Guide; By Organization of Pharmaceutical producers of India.
12. Drug formulation manual; By D.P.S. Kohli and D.H. Shah. Eastern publishers, New Delhi.
13. How to practice GMPs; By P.P. Sharma. Vandhana Publications, Agra.
14. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash.
15. Pharmaceutical Preformulations; By J.J. Wells.
16. Applied production and operations management; By Evans, Anderson, Sweeney and Williams.
17. Encyclopaedia of Pharmaceutical technology, Vol I – III.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03103) REGULATORY AFFAIRS

SCOPE

Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory documents : filing process of IND, NDA and ANDA

- To know the approval process of
- To know the chemistry, manufacturing controls and their regulatory importance
- To learn the documentation requirements for
- To learn the importance

Objectives:

Upon completion of the course, it is expected that the students will be able to understand

- The Concepts of innovator and generic drugs, drug development process
- The Regulatory guidance's and guidelines for filing and approval process
- Preparation of Dossiers and their submission to regulatory agencies in different countries
- Post approval regulatory requirements for actives and drug products
- Submission of global documents in CTD/ eCTD formats
- Clinical trials requirements for approvals for conducting clinical trials
- Pharmacovigilance and process of monitoring in clinical trials.

THEORY

60 Hrs

1.

12 hrs

Documentation in Pharmaceutical industry: Master formula record, DMF (Drug Master File), distribution records. Generic drugs product development Introduction , Hatch-Waxman act and amendments, CFR (CODE OF FEDERAL REGULATION) , drug product performance, in-vitro, ANDA regulatory approval process, NDA approval process, BE and drug product assessment, in –vivo, scale up process approval changes, post marketing surveillance, outsourcing BA and BE to CRO.

2.

Regulatory requirement for product approval: API, biologics, novel, therapies obtaining NDA, ANDA for generic drugs ways and means of US registration for foreign drugs

3

12 hrs

CMC, post approval regulatory affairs. Regulation for combination products and medical devices. CTD and ECTD format, industry and FDA liaison. ICH - Guidelines of ICH-Q, S, E, M. Regulatory requirements of EU, MHRA, TGA and ROW countries.

4

12 hrs

Non clinical drug development: Global submission of IND, NDA, ANDA. Investigation of medicinal products dossier, dossier (IMPd) and investigator brochure (IB).

5

12 hrs

Clinical trials: Developing clinical trial protocols. Institutional review board/ independent ethics committee. Formulation and working procedures informed Consent process and procedures. HIPAA- new, requirement to clinical study process, pharmacovigilance safety monitoring in clinical trials.

REFERENCES

1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185, Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A. Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons, Inc.
5. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics/edited By Douglas J. Pisano, David Mantus.
6. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
7. www.ich.org/
8. www.fda.gov/
9. europa.eu/index_en.htm
10. <https://www.tga.gov.au/tga-basics>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
0	0	6	3

(17S03104) PHARMACEUTICAL ANALYSIS PRACTICAL FOR PHARMACEUTICS

1. Analysis of pharmacopoeial compounds and their formulations by UV Visspectrophotometer
2. Simultaneous estimation of multi component containing formulations by UVspectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutics)

L	T	P	C
0	0	6	3

(17S03105) DRUG DELIVERY SYSTEMS PRACTICAL

1. To perform In-vitro dissolution profile of CR/ SR marketed formulation
2. Formulation and evaluation of sustained release matrix tablets
3. Formulation and evaluation osmotically controlled DDS
4. Preparation and evaluation of Floating DDS- hydro dynamically balancedDDS
5. Formulation and evaluation of Muco adhesive tablets.
6. Formulation and evaluation of transdermal patches.
7. To carry out preformulation studies of tablets.
8. To study the effect of compressional force on tablets disintegration time.
9. To study Micromeritic properties of powders and granulation.
10. To study the effect of particle size on dissolution of a tablet.
11. To study the effect of binders on dissolution of a tablet.
12. To plot Heckal plot, Higuchi and peppas plot and determine similarity factors.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

**(17S03201) MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS)
(NTDS)**

Scope

This course is designed to impart knowledge on the area of advances in novel drug delivery systems.

Objectives

Upon completion of the course student shall be able to understand

- The various approaches for development of novel drug delivery systems.
- The criteria for selection of drugs and polymers for the development of NTDS
- The formulation and evaluation of novel drug delivery systems.

THEORY

60 Hrs

1. 12 hrs

Targeted Drug Delivery Systems: Concepts, Events and biological process involved in drug targeting. Tumor targeting and Brain specific delivery.

2 12 hrs

Targeting Methods: introduction preparation and evaluation. Nano Particles & Liposomes: Types, preparation and evaluation.

3 12 hrs

Micro Capsules / Micro Spheres: Types, preparation and evaluation, Monoclonal Antibodies; preparation and application, preparation and application of Niosomes, Aquasomes, Phytosomes, Electrosomes.

4 12 hrs

Pulmonary Drug Delivery Systems: Aerosols, propellents, Containers Types, preparation and evaluation, Intra Nasal Route Delivery systems; Types, preparation and evaluation.

5 12 hrs

Nucleic acid based therapeutic delivery system : Gene therapy, introduction (ex-vivo & in-vivo gene therapy). Potential target diseases for gene therapy (inherited disorder and cancer). Gene expression systems (viral and nonviral gene transfer). Liposomal gene delivery systems. Biodistribution and Pharmacokinetics. knowledge of therapeutic antisense molecules and aptamers as drugs of future.

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. S.P.Vyas and R.K.Khar, Controlled Drug Delivery- concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.
3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03202) ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS

Scope

This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able to understand,

- The basic concepts in biopharmaceutics and pharmacokinetics.
- The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- The critical evaluation of biopharmaceutic studies involving drug product equivalency.
- The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

THEORY

60 Hrs

1.

12 hrs

Drug Absorption from the Gastrointestinal Tract: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, pH-partition theory of drug absorption. Formulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes-Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form, Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form, Dissolution methods, Formulation and processing factors, Correlation of in vivo data with in vitro dissolution data. Transport model: Permeability-Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex.

2

12 hrs

Biopharmaceutic considerations in drug product design and In Vitro Drug Product Performance: Introduction, biopharmaceutic factors affecting drug bioavailability, rate-limiting steps in drug absorption, physicochemical nature of the drug formulation factors affecting drug product performance, in vitro: dissolution and drug release testing, compendial methods of dissolution, alternative methods of dissolution testing, meeting dissolution requirements, problems of variable control in

dissolution Testing performance of drug products. In vitro–in vivo correlation, dissolution profile comparisons, drug product stability, considerations in the design of a drug product.

3

12 hrs

Pharmacokinetics: Basic considerations, pharmacokinetic models, compartment modeling: one compartment model- IV bolus, IV infusion, extra-vascular. Multi compartment model: two compartment - model in brief, non-linear pharmacokinetics: cause of non-linearity, Michaelis – Menten equation, estimation of k_{max} and v_{max} . Drug interactions: introduction, the effect of protein binding interactions, the effect of tissue-binding interactions, cytochrome p450-based drug interactions, drug interactions linked to transporters.

4

12 hrs

Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: drug product performance, purpose of bioavailability studies, relative and absolute availability. Methods for assessing bioavailability, bioequivalence studies, design and evaluation of bioequivalence studies, study designs, crossover study designs, evaluation of the data, bioequivalence example, study submission and drug review process. Biopharmaceutics classification system, methods. Permeability: In-vitro, in-situ and In-vivo methods. generic biologics (biosimilar drug products), clinical significance of bioequivalence studies, special concerns in bioavailability and bioequivalence studies, generic substitution.

5

12 hrs

Application of Pharmacokinetics: Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic, drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs. Introduction, Proteins and peptides, Monoclonal antibodies,

REFERENCES

1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition, Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmkar and Sunil B. Jaiswal., Vallab Prakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land Yu ABC, 2nd edition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath, Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc., New York, 1982

6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Lea and Febiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by Malcolm Rowland and Thomas N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack Publishing Company, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition, revised and expanded by Robert. E. Notari, Marcel Dekker Inc, New York and Basel, 1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M. P. Pamarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics, 1st edition, Sunil S Jambhekar and Philip J Breen, pharmaceutical press, RPS Publishing, 2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc, 2003.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03203) COMPUTER AIDED DRUG DELIVERY SYSTEM

Scope

This course is designed to impart knowledge and skills necessary for computer Applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the drug development process are provided to help the students to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able to understand,

- History of Computers in Pharmaceutical Research and Development
- Computational Modeling of Drug Disposition
- Computers in Preclinical Development
- Optimization Techniques in Pharmaceutical Formulation
- Computers in Market Analysis
- Computers in Clinical Development
- Artificial Intelligence (AI) and Robotics
- Computational fluid dynamics(CFD)

THEORY

60 Hrs

1.12 hrs

a. Computers in Pharmaceutical Research and Development: A General Overview: History of Computers in Pharmaceutical Research and Development. Statistical modeling in Pharmaceutical research and development: Descriptive versus Mechanistic Modeling, Statistical Parameters, Estimation, Confidence Regions, Nonlinearity at the Optimum, Sensitivity Analysis, Optimal Design, Population Modeling

b. Quality-by-Design In Pharmaceutical Development: Introduction, ICH Q8 guideline, Regulatory and industry views on QbD, Scientifically based QbD - examples of application.

2

12 hrs

Computational Modeling Of Drug Disposition: Introduction, Modeling Techniques: Drug Absorption, Solubility, Intestinal Permeation, Drug Distribution, Drug Excretion, Active Transport; P-gp, BCRP, Nucleoside Transporters, hPEPT1, ASBT, OCT, OATP, BBB-Choline Transporter.

3

12 hrs

Computer-aided formulation development:: Concept of optimization, Optimization parameters, Factorial design, Optimization technology & Screening design. Computers in Pharmaceutical Formulation: Development of pharmaceutical emulsions, microemulsion drug carriers Legal Protection of Innovative Uses of Computers in R&D, The Ethics of Computing in Pharmaceutical Research, Computers in Market analysis

4

12 hrs

- a. Computer-aided biopharmaceutical characterization: Gastrointestinal absorption simulation. Introduction, Theoretical background, Model construction, Parameter sensitivity analysis, Virtual trial, Fed vs. fasted state, In vitro dissolution and in vitro/in vivo correlation, Biowaiver considerations
- b. Computer Simulations in Pharmacokinetics and Pharmacodynamics: Introduction, Computer Simulation: Whole Organism, Isolated Tissues, Organs, Cell, Proteins and Genes.
- c. Computers in Clinical Development: Clinical Data Collection and Management, Regulation of Computer Systems

5

12 hrs

Artificial Intelligence (AI), Robotics and Computational fluid dynamics: General overview, Pharmaceutical Automation, Pharmaceutical applications, Advantages and Disadvantages. Current Challenges and Future Directions.

REFERENCES

1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons.
2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing
3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S03204) COSMETICS AND COSMECEUTICALS

Scope

This course is designed to impart knowledge and skills necessary For the fundamental need for cosmetic and cosmeceutical products.

Objectives

Upon completion of the course, the students shall be able to understand

- Key ingredients used in cosmetics and cosmeceuticals.
- Key building blocks for various formulations.
- Current technologies in the market
- Various key ingredients and basic science to develop cosmetics andcosmeceuticals
- Scientific knowledge to develop cosmetics and cosmeceuticals withdesired Safety, stability, and efficacy.

THEORY

60 Hrs

1.

12 hrs

Cosmetics – Regulatory: Definition of cosmetic products as per Indian regulation. Indian regulatory requirements for labeling of cosmetics Regulatory provisions relating to import of cosmetics., Misbranded and spurious cosmetics. Regulatory provisions relating to manufacture of cosmetics – Conditions for obtaining license, prohibition of manufacture and sale of certain cosmetics, loan license, offences and penalties.

2

12 hrs

Cosmetics - Biological aspects : Structure of skin relating to problems like dry skin, acne, pigmentation, prickly heat, wrinkles and body odor. Structure of hair and hair growth cycle. Common problems associated with oral cavity. Cleansing and care needs for face, eye lids, lips, hands, feet, nail, scalp, neck, body and under-arm.

3

12 hrs

Formulation Building blocks: Building blocks for different product formulations of cosmetics/cosmeceuticals. Surfactants – Classification and application. Emollients, rheological additives: classification and application. Antimicrobial used as preservatives, their merits and demerits. Factors affecting microbial preservative efficacy. Building blocks for formulation of a moisturizing cream, vanishing cream, cold cream, shampoo and toothpaste. Soaps and syndet bars. Perfumes;

Classification of perfumes. Perfume ingredients listed as allergens in EU regulation. Controversial ingredients: Parabens, formaldehyde liberators, dioxane.

4

12 hrs

Design of cosmeceutical products: Sun protection, sunscreen classification and regulatory aspects. Addressing dry skin, acne, sun-protection, pigmentation, prickly heat, wrinkles, body odor, dandruff, dental cavities, bleeding gums, mouth odor and sensitive teeth through cosmeceutical formulations.

5

12 hrs

Herbal Cosmetics : Herbal ingredients used in Hair care, skincare and oral care. Review of guidelines for herbal cosmetics by private bodies like Cosmos with respect to preservatives, emollients, foaming agents, emulsifiers and rheology modifiers. Challenges in formulating herbal cosmetics.

REFERENCES

1. Harry's Cosmeticology. 8th edition.
2. Poucher's perfume cosmetics and Soaps, 10th edition.
3. Cosmetics - Formulation, Manufacture and quality control, P.P. Sharma, 4th edition
4. Handbook of cosmetic science and Technology A.O. Barel, M. Paye and H.I. Maibach. 3rd edition
5. Cosmetic and Toiletries recent suppliers' catalogue.
6. CTFA directory.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
0	0	6	3

(17S03205) NANO TECHNOLOGY & TARGETED Dds (Ntds) PRACTICAL

1. To study the effect of temperature change , non solvent addition, incompatible polymer addition in microcapsules preparation
2. Preparation and evaluation of Alginate beads
3. Formulation and evaluation of gelatin /albumin microspheres
4. Formulation and evaluation of liposomes/niosomes
5. Formulation and evaluation of spherules
6. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.
7. Comparison of dissolution of two different marketed products /brands
8. Protein binding studies of a highly protein bound drug & poorly protein bound drug

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutics)

L	T	P	C
0	0	6	3

(17S03206) ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS

PRACTICAL

1. Bioavailability studies of Paracetamol in animals.
2. Pharmacokinetic and IVIVC data analysis by WinnolineR software
3. In vitro cell studies for permeability and metabolism
4. DoE Using Design Expert® Software
5. Formulation data analysis Using Design Expert® Software
6. Quality-by-Design in Pharmaceutical Development
7. Computer Simulations in Pharmacokinetics and Pharmacodynamics
8. Computational Modeling Of Drug Disposition
9. To develop Clinical Data Collection manual
10. To carry out Sensitivity Analysis, and Population Modeling.
11. Development and evaluation of Creams
12. Development and evaluation of Shampoo and Toothpaste base
13. To incorporate herbal and chemical actives to develop products
14. To address Dry skin, acne, blemish, Wrinkles, bleeding gums and dandruff

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – III Sem. (Pharmaceutics)

L	T	P	C
4	0	0	4

(17S01301) RESEARCH METHODOLOGY & BIOSTATISTICS

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests (students “t” test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and Syllabi for M.Pharm-Pharmaceutical Chemistry
(JNTUA-Affiliated Pharmacy Colleges 2017-18)

I YEAR - I Semester

S. No	Course Code	Subjects	L	T	P	C
1	17S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2	17S02101	Advanced Organic Chemistry -I	4	-	-	4
3	17S02102	Advanced Medicinal chemistry	4	-	-	4
4	17S02103	Chemistry of Natural Products	4	-	-	4
5	17S02104	Pharmaceutical Analysis Practical for Pharmaceutical Chemistry	-	-	6	3
6	17S02105	Pharmaceutical Chemistry Practical I	-	-	6	3
7	17S02106	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

I YEAR II Semester

S. No	Course Code	Subject	L	T	P	C
1	17S02201	Advanced Spectral Analysis	4	-	-	4
2	17S02202	Advanced Organic Chemistry -II	4	-	-	4
3	17S02203	Computer Aided Drug Design	4	-	-	4
4	17S02204	Pharmaceutical Process Chemistry	4	-	-	4
5	17S02205	Pharmaceutical Chemistry Practical II	-	-	6	3
6	17S02206	Pharmaceutical Chemistry Practical III	-	-	6	3
7	17S02207	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

III SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S01301	Research Methodology and Biostatistics	4	-	-	4
2.	17S02301	Journal Club	1	-	-	1
3.	17S02302	Teaching Assignment	10	-	-	2
4.	17S02303	Comprehensive viva voce	-	-	-	2
5.	17S02304	Discussion / Presentation (Proposal presentation)	-	-	2	2
6.	17S02305	Research Work	-	-	28	14
Total			15	-	30	25

IV SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S02401	Journal Club	1	-	-	1
2.	17S02402	Research work	31	-	-	16
3.	17S02403	Discussion/ Final Presentation	3	-	-	3
Total			35	-	-	20

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S01101) MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals and excipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY

60 HOURS

1. 11 hrs
a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV Visible spectroscopy.
b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy
c. Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.
2. 11 hrs
NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and ¹³C NMR. Applications of NMR spectroscopy.
3. 11 hrs
Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers

of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

4. 11hrs
Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography

5 11hrs

a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis

d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X ray diffraction.

c. Immunological assays: RIA (Radio immuno assay), ELISA, Bioluminescence assays. 5hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02101) ADVANCED ORGANIC CHEMISTRY - I

SCOPE

The subject is designed to provide in-depth knowledge about advances inorganic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall be to understand

- The principles and applications of retrosynthesis
- The mechanism & applications of various named reactions
- The concept of disconnection to develop synthetic routes for small target molecule.
- The various catalysts used in organic reactions
- The chemistry of heterocyclic compounds

THEORY

60 Hrs

1.

12Hrs

Basic Aspects of Organic Chemistry:

1. Organic intermediates: Carbocations, carbanions, free radicals, carbenes and nitrenes. Their method of formation, stability and synthetic applications.
2. Types of reaction mechanisms and methods of determining them,
3. Detailed knowledge regarding the reactions, mechanisms and their relative reactivity and orientations.

Addition reactions

- a) Nucleophilic uni- and bimolecular reactions (S_N1 and S_N2)
- b) Elimination reactions (E1 & E2; Hoffman & Saytzeff's rule)
- c) Rearrangement reaction

2

12Hrs

Study of mechanism and synthetic applications of following named Reactions:

Ugi reaction, Brook rearrangement, Ullmann coupling reactions, Dieckmann Reaction, Doebner-Miller Reaction, Sandmeyer Reaction, Mitsunobu reaction, Mannich reaction, Vilsmeier-Haack Reaction, Sharpless asymmetric epoxidation, Baeyer-Villiger oxidation, Shapiro & Suzuki reaction, Ozonolysis and Michael addition reaction

3

12Hrs

Synthetic Reagents & Applications:

Aluminiumisopropoxide, N-bromosuccinamide, diazomethane, dicyclohexylcarbodiimide, Wilkinson reagent, Wittig reagent, Osmium tetroxide, titanium chloride, diazopropane, diethylazodicarboxylate, Triphenylphosphine, Benzotriazol-1-yloxy tris(dimethylamino) phosphoniumhexafluoro-phosphate (BOP).

Protecting groups

- a. Role of protection in organic synthesis
- b. Protection for the hydroxyl group, including 1,2- and 1,3-diols: ethers, esters, carbonates, cyclic acetals & ketals
- c. Protection for the Carbonyl Group: Acetals and Ketals
- d. Protection for the Carboxyl Group: amides and hydrazides, esters
- e. Protection for the Amino Group and Amino acids: carbamates and amides

4

12Hrs

Heterocyclic Chemistry:

Organic Name reactions with their respective mechanism and application involved in synthesis of drugs containing five, six-membered and fused heterocyclics such as Debus-Radziszewski imidazole synthesis, Knorr Pyrazole Synthesis, Pinner Pyrimidine Synthesis, Combes Quinoline Synthesis, Berntsen Acridine Synthesis, Smiles rearrangement and Traube purine synthesis.

Synthesis of few representative drugs containing these heterocyclic nucleus such as Ketoconazole, Metronidazole, Miconazole, celecoxib, antipyrin, Metamizole sodium, Terconazole, Alprazolam, Triamterene, Sulfamerazine, Trimethoprim, Hydroxychloroquine, Quinine, Chloroquine, Quinacrine, Amsacrine, Prochlorperazine, Promazine, Chlorpromazine, Theophylline, Mercaptopurine and Thioguanine.

5

12Hrs

Synthon approach and retrosynthesis applications

- i. Basic principles, terminologies and advantages of retrosynthesis; guidelines for dissection of molecules. Functional group interconversion and addition (FGI and FGA)
- ii. C-X disconnections; C-C disconnections – alcohols and carbonyl compounds; 1,2-, 1,3-, 1,4-, 1,5-, 1,6-difunctionalized compounds
- iii. Strategies for synthesis of three, four, five and six-membered ring.

REFERENCES

1. "Advanced Organic chemistry, Reaction, Mechanisms and Structure", JMarch, John Wiley and Sons, New York.
2. "Mechanism and Structure in Organic Chemistry", ES Gould, Hold Rinchartand Winston, New York.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers.,OxfordUniversity Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Pearson Education Lts,Dorling Kindersley 9India) Pvt. Ltd.,.
5. A guide to mechanisms in Organic Chemistry, Peter Skyes (OrientLongman, New Delhi).
6. Reactive Intermediates in Organic Chemistry, Tandom and Gowel, Oxford& IBH Publishers.
7. Combinational Chemistry – Synthesis and applications – Stephen RWilson& Anthony W Czarnik, Wiley – Blackwell.
8. Carey, Organic Chemistry, 5th Edition (Viva Books Pvt. Ltd.)
9. Organic Synthesis - The Disconnection Approach, S. Warren, Wily India
10. Principles of Organic Synthesis, ROC Norman and JM Coxan, NelsonThorns.
11. Organic Synthesis - Special Techniques. VK Ahluwalia and R Agarwal,Narosa Publishers.
12. Organic Reaction Mechanisms IVthEdtn, VK Ahluwalia and RK Parashar,Narosa Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02102) ADVANCED MEDICINAL CHEMISTRY

SCOPE

The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.

Objectives

At completion of this course it is expected that students will be able to understand

- Different stages of drug discovery
- Role of medicinal chemistry in drug research
- Different techniques for drug discovery
- Various strategies to design and develop new drug like molecules for biological targets
- Peptidomimetics

THEORY

60 Hrs

1.

12Hrs

Drug discovery: Stages of drug discovery, lead discovery; identification, validation and diversity of drug targets. Biological drug targets: Receptors, types, binding and activation, theories of drug receptor interaction, drug receptor interactions, agonists vs antagonists, artificial enzymes.

2

12Hrs

Prodrug Design and Analog design:

a) Prodrug design: Basic concept, Carrier linked prodrugs/Bioprecursors, Prodrugs of functional group, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

b) Combating drug resistance: Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, Genetic principles of drug resistance.

c) Analog Design: Introduction, Classical & Non classical, Bioisosteric replacement strategies, rigid analogs, alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance.

3

12Hrs

Medicinal chemistry aspects of the following class of drugs Systematic study, SAR, Mechanism of action and synthesis of new generation molecules of following class of drugs:

a) Anti-hypertensive drugs, Psychoactive drugs, Anticonvulsant drugs, H₁ & H₂ receptor antagonist, COX1 & COX2 inhibitors, Adrenergic & Cholinergic agents, Antineoplastic and Antiviral agents.

b) Stereochemistry and Drug action: Realization that stereoselectivity is a pre-requisite for evolution. Role of chirality in selective and specific therapeutic agents. Case studies, Enantio selectivity in drug adsorption, metabolism, distribution and elimination.

4

12Hrs

Rational Design of Enzyme Inhibitors Enzyme kinetics & Principles of Enzyme inhibitors, Enzyme inhibitors in medicine, Enzyme inhibitors in basic research, rational design of non-covalently and covalently binding enzyme inhibitors.

5

12Hrs

Peptidomimetics Therapeutic values of Peptidomimetics, design of peptidomimetics by manipulation of the amino acids, modification of the peptide backbone, incorporating conformational constraints locally or globally. Chemistry of prostaglandins, leukotrienes and thromboxanes.

REFERENCES

1. Medicinal Chemistry by Burger, Vol I – VI.
2. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, Lippincott Williams & Wilkins, Wolters Kluwer (India) Pvt. Ltd, New Delhi.
3. Comprehensive Medicinal Chemistry – Corwin and Hansch.
4. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore
5. Introduction to Quantitative Drug Design by Y.C. Martin.
6. Principles of Medicinal Chemistry by William Foye, 7th Edition, Lippincott Williams & Wilkins, Wolters Kluwer (India) Pvt. Ltd, New Delhi.
7. Drug Design Volumes by Arienes, Academic Press, Elsevier Publishers, Noida, Uttar Pradesh..
8. Principles of Drug Design by Smith.
9. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, II Edition, Elsevier Publishers, New Delhi.
10. An Introduction to Medicinal Chemistry, Graham L. Patrick, III Edition, Oxford University Press, USA.

11. Biopharmaceutics and pharmacokinetics, DM.Brahmankar, Sunil B.Jaiswal II Edition, 2014, VallabhPrakashan, New Delhi.

12. Peptidomimetics in Organic and Medicinal Chemistry by Antonio Guarnaand Andrea Trabocchi, First edition, Wiley publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02103) CHEMISTRY OF NATURAL PRODUCTS

SCOPE

The subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin.

Objectives

At completion of this course it is expected that students will be able to understand-

- Different types of natural compounds and their chemistry and medicinal importance
- The importance of natural compounds as lead molecules for new drug discovery
- The concept of rDNA technology tool for new drug discovery
- General methods of structural elucidation of compounds of natural origin
- Isolation, purification and characterization of simple chemical constituents from natural source

THEORY

60 Hrs

1.

12Hrs

Study of Natural products as leads for new pharmaceuticals for the following class of drugs

- a) Drugs Affecting the Central Nervous System: Morphine Alkaloids
- b) Anticancer Drugs: Paclitaxel and Docetaxel, Etoposide, and Teniposide
- c) Cardiovascular Drugs: Lovastatin, Teprotide and Dicoumarol
- d) Neuromuscular Blocking Drugs: Curare alkaloids
- e) Anti-malarial drugs and Analogues
- f) Chemistry of macrolid antibiotics (Erythromycin, Azithromycin, Roxithromycin, and Clarithromycin) and - Lactam antibiotics (Cephalosporins and Carbapenem)

2

12Hrs

a) Alkaloids

General introduction, classification, isolation, purification, molecular modification and biological activity of alkaloids, general methods of structural determination of alkaloids, structural elucidation and stereochemistry of ephedrine, morphine, ergot, emetine and reserpine.

b) Flavonoids

Introduction, isolation and purification of flavonoids, General methods of structural determination of flavonoids; Structural elucidation of quercetin.

c) Steroids

General introduction, chemistry of sterols, sapogenin and cardiac glycosides. Stereochemistry and nomenclature of steroids, chemistry of contraceptive agents male & female sex hormones (Testosterone, Estradiol, Progesterone), adrenocorticoids (Cortisone), contraceptive agents and steroids (Vit – D).

3

12Hrs

a) Terpenoids

Classification, isolation, isoprene rule and general methods of structural elucidation of Terpenoids; Structural elucidation of drugs belonging to mono (citral, menthol, camphor), di (retinol, Phytol, taxol) and tri terpenoids (Squalene, Ginsenoside) carotenoids (carotene).

b) Vitamins

Chemistry and Physiological significance of Vitamin A, B1, B2, B12, C, E, Folic acid and Niacin.

4

12Hrs

a). Recombinant DNA technology and drug discovery rDNA technology, hybridoma technology, New pharmaceuticals derived from biotechnology; Oligonucleotide therapy. Gene therapy: Introduction, Clinical application and recent advances in gene therapy, principles of RNA & DNA estimation

b). Active constituent of certain crude drugs used in Indigenous system Diabetic therapy – Gymnema sylvestre, Salacia reticulata, Pterocarpus marsupium, Swertia chirata, Trigonella foenum-graecum; Liver dysfunction – Phyllanthus niruri; Antitumor – Curcuma longa Linn.

5

12Hrs

Structural Characterization of natural compounds Structural characterization of natural compounds using IR, ¹H NMR, ¹³C NMR and MS Spectroscopy of specific drugs e.g., Penicillin, Morphine, Camphor, Vit-D, Quercetin and Digitalis glycosides.

REFERENCES

1. Modern Methods of Plant Analysis, Peech and M.V. Tracey, Springer – Verlag, Berlin, Heidelberg.
2. Phytochemistry Vol. I and II by Miller, Jan Nostrand Rein Hld.
3. Recent advances in Phytochemistry Vol. I to IV – Scigel Runeckles, Springer Science & Business Media.

4. Chemistry of natural products Vol I onwards IWPAC.
5. Natural Product Chemistry Nakanishi Gggolo, University Science Books, California.
6. Natural Product Chemistry "A laboratory guide" – Rapheal Khan.
7. The Alkaloid Chemistry and Physiology by RHF Manske, Academic Press.
8. Introduction to molecular Phytochemistry – CHJ Wells, Chapmanstall.
9. Organic Chemistry of Natural Products Vol I and II by GurdeepandChatwall, Himalaya Publishing House.
10. Organic Chemistry of Natural Products Vol I and II by O.P. Agarwal, KrishanPrakashan.
11. Organic Chemistry Vol I and II by I.L. Finar, Pearson education.
12. Elements of Biotechnology by P.K. Gupta, Rastogi Publishers.
13. Pharmaceutical Biotechnology by S.P.Vyas and V.K.Dixit, CBS Publishers.
14. Biotechnology by Purohit and Mathur, Agro-Bios, 13th edition.
15. Phytochemical methods of Harborne, Springer, Netherlands.
16. Burger's Medicinal Chemistry.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
0	0	6	3

(17S02104) PHARMACEUTICAL ANALYSIS PRACTICAL FOR PHARMACEUTICAL CHEMISTRY

1. Analysis of Pharmacopoeial compounds and their formulations by UV Visspectrophotometer, RNA & DNA estimation
2. Simultaneous estimation of multi component containing formulations by UVspectrophotometry
3. Experiments based on Column chromatography
4. Experiments based on HPLC
5. Experiments based on Gas Chromatography
6. Estimation of riboflavin/quinine sulphate by fluorimetry
7. Estimation of sodium/potassium by flame photometry

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M. Pharm – I year I Sem. (Pharmaceutical Chemistry)

L	T	P	C
0	0	6	3

(17S02105) PHARMACEUTICAL CHEMISTRY PRACTICAL - I

To perform the following reactions of synthetic importance

1. Purification of organic solvents, column chromatography
2. Claisen-schmidt reaction.
3. Benzyllic acid rearrangement.
4. Beckmann rearrangement.
5. Hoffmann rearrangement
6. Mannich reaction
7. Synthesis of medicinally important compounds involving more than one step along with purification and Characterization using TLC, melting point and IR spectroscopy (4 experiments)
8. Estimation of elements and functional groups in organic natural compounds
9. Isolation, characterization like melting point, mixed melting point, molecular weight determination, functional group analysis, co-chromatographic technique for identification of isolated compounds and interpretation of UV and IR data.
10. Some typical degradation reactions to be carried on selected plant constituents
11. Oxidation and free radical coupling
12. Fries rearrangement
13. Perkins reaction

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M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02201) ADVANCED SPECTRAL ANALYSIS

Scope

This subject deals with various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are LC-MS, GC-MS, ATR-IR, DSC etc.

Objectives

At completion of this course it is expected that students will be able to understand-

- Interpretation of the NMR, Mass and IR spectra of various organic compounds
- Theoretical and practical skills of the hyphenated instruments
- Identification of organic compounds

THEORY

60Hrs

1.

12Hrs

UV and IR spectroscopy:

Woodward – Fieser rule for 1,3-butadienes, cyclic dienes and α,β -unsaturated carbonyl compounds and interpretation of enones. ATR-IR, IR Interpretation of organic compounds.

2

12Hrs

NMR spectroscopy: 1-D and 2-D NMR, NOESY and COSY, HECTOR, INADEQUATE techniques, Interpretation of organic compounds.

3

12Hrs

Mass Spectroscopy

Mass fragmentation and its rules, Fragmentation of important functional groups like alcohols, amines, carbonyl groups and alkanes, Meta stable ions, McLafferty rearrangement, Ring rule, Isotopic peaks, Interpretation of organic compounds.

4

12Hrs

Chromatography:

Principle, Instrumentation and Applications of the following :

a) GC-MS b) GC-AAS c) LC-MS d) LC-FTIR e) LC-NMR f) CEMSg) High Performance Thin Layer chromatography h) Supercritical fluid chromatography i) Ion Chromatography j) I-EC (Ion-Exclusion Chromatography) k) Flash chromatography

5

12Hrs

a). Thermal methods of analysis Introduction, principle, instrumentation and application of DSC, DTA and TGA.

b). Raman Spectroscopy Introduction, Principle, Instrumentation and Applications.

c). Radio immunoassay Biological standardization , bioassay, ELISA, Radioimmunoassay of digitalis and insulin.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
5. Quantitative analysis of Pharmaceutical formulations by HPTLC - P D Sethi, CBS Publishers, New Delhi.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

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M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02202) ADVANCED ORGANIC CHEMISTRY - II

Scope

The subject is designed to provide in-depth knowledge about advances inorganic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall able to understand

- The principles and applications of Green chemistry
- The concept of peptide chemistry.
- The various catalysts used in organic reactions
- The concept of stereochemistry and asymmetric synthesis.

THEORY

60 Hrs

1.

12Hrs

Green Chemistry:

a. Introduction, principles of green chemistry

b. Microwave assisted reactions: Merit and demerits of its use, increased reaction rates, mechanism, superheating effects of microwave, effects of solvents in microwave assisted synthesis, microwave technology in process optimization, its applications in various organic reactions and heterocyclic synthesis

c. Ultrasound assisted reactions: Types of sonochemical reactions, homogenous, heterogeneous liquid-liquid and liquid-solid reactions, synthetic applications

d. Continuous flow reactors: Working principle, advantages and synthetic applications.

2

12Hrs

Chemistry of peptides

a. Coupling reactions in peptide synthesis

b. Principles of solid phase peptide synthesis, t-BOC and FMOC protocols, various solid supports and linkers: Activation procedures, peptide bond formation, deprotection and cleavage from resin, low and high

HF cleavage protocols, formation of free peptides and peptide amides, purification and case studies, site-specific chemical modifications of peptides

c. Segment and sequential strategies for solution phase peptide synthesis with any two case studies

d. Side reactions in peptide synthesis: Deletion peptides, side reactions initiated by proton abstraction, protonation, overactivation and side reactions of individual amino acids.

3

12Hrs

Photochemical Reactions

Basic principles of photochemical reactions. Photo-oxidation, photo-addition and photo-fragmentation. Pericyclic reactions Mechanism, Types of pericyclic reactions such as cycloaddition, electrocyclic reaction and sigmatropic rearrangement reactions with examples

4

12Hrs

Catalysis:

a. Types of catalysis, heterogeneous and homogeneous catalysis, advantages and disadvantages

b. Heterogeneous catalysis – preparation, characterization, kinetics, supported catalysts, catalyst deactivation and regeneration, some examples of heterogeneous catalysis used in synthesis of drugs.

c. Homogeneous catalysis, hydrogenation, hydroformylation, hydrocyanation, Wilkinson catalysts, chiral ligands and chiral induction, Ziegler-Natta catalysts, some examples of homogeneous catalysis used in synthesis of drugs

d. Transition-metal and Organo-catalysis in organic synthesis: Metal-catalyzed reactions

e. Biocatalysis: Use of enzymes in organic synthesis, immobilized enzymes/cells in organic reaction.

f. Phase transfer catalysis - theory and applications

5

12Hrs

Stereochemistry & Asymmetric Synthesis

a. Basic concepts in stereochemistry – optical activity, specific rotation, racemates and resolution of racemates, the Cahn, Ingold, Prelog (CIP) sequence rule, meso compounds, pseudoasymmetric centres, axes of symmetry, Fischer's D and L notation, cis-trans isomerism, E and Z notation.

b. Methods of asymmetric synthesis using chiral pool, chiral auxiliaries and catalytic asymmetric synthesis, enantiopure separation and Stereo selective synthesis with examples.

REFERENCES

1. "Advanced Organic chemistry, Reaction, mechanisms and structure", JMarch, John Wiley and sons, New York.
2. "Mechanism and structure in organic chemistry", ES Gould, Hold RinchartandWinston,NewYork.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers.,OxfordUniversity Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Sixth ed., 1995.
5. Carey, Organic chemistry, 5th edition (Viva Books Pvt. Ltd.)
6. Organic synthesis-the disconnection approach, S. Warren, Wily India
7. Principles of organic synthesis, ROCNorman and JMCoxan, Nelson thorns
8. Organic synthesis- Special techniques VK Ahluwalia and R Aggarwal,Narosa Publishers.
9. Organic reaction mechanisms IV edtn, VK Ahluwalia and RK Parashar,Narosa Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02203) COMPUTER AIDED DRUG DESIGN

Scope

The subject is designed to impart knowledge on the current state of the art techniques involved in computer assisted drug design.

Objectives

At completion of this course it is expected that students will be able to understand

- Role of CADD in drug discovery
- Different CADD techniques and their applications
- Various strategies to design and develop new drug like molecules.
- Working with molecular modeling softwares to design new drug molecules
- The in silico virtual screening protocols

Theory

60 Hrs

1.

12Hrs

Introduction to Computer Aided Drug Design (CADD) History, different techniques and applications. Quantitative Structure Activity Relationships: Basics History and development of QSAR: Physicochemical parameters and methods to calculate physicochemical parameters: Hammett equation and electronic parameters (σ), lipophilicity effects and parameters ($\log P$, π -substituent constant), steric effects (Taft steric and MR parameters) Experimental and theoretical approaches for the determination of these physicochemical parameters.

2

12Hrs

Quantitative Structure Activity Relationships: Applications Hansch analysis, Free Wilson analysis and relationship between them, Advantages and disadvantages; Deriving 2D-QSAR equations. 3D-QSAR approaches and contour map analysis. Statistical methods used in QSAR analysis and importance of statistical parameters.

3

12Hrs

Molecular Modeling and Docking

a) Molecular and Quantum Mechanics in drug design.

b) Energy Minimization Methods: comparison between global minimum conformation and bioactive conformation

c) Molecular docking and drug receptor interactions: Rigid docking, flexible docking and extra-precision docking. Agents acting on enzymes such as DHFR, HMG-CoA reductase and HIV protease, choline esterase (AChE & BChE)

4

12Hrs

Molecular Properties and Drug Design

a) Prediction and analysis of ADMET properties of new molecules and its importance in drug design.

b) De novo drug design: Receptor/enzyme interaction and its analysis, Receptor/enzyme cavity size prediction, predicting the functional components of cavities, Fragment based drug design.

c) Homology modeling and generation of 3D-structure of protein.

5

12Hrs

Pharmacophore Mapping and Virtual Screening Concept of pharmacophore, pharmacophore mapping, identification of Pharmacophore features and Pharmacophore modeling; Conformational search used in pharmacophore mapping. In Silico Drug Design and Virtual Screening Techniques Similarity based methods and Pharmacophore based screening, structure based In-silico virtual screening protocols.

REFERENCES

1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet. F Moore, RCS Publishers.
2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press, Taylor & Francis group..
3. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, Elsevier Publishers.
4. Principles of Drug Design by Smith and Williams, CRC Press, Taylor & Francis.
5. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, Elsevier Publishers.
6. Medicinal Chemistry by Burger, Wiley Publishing Co.
7. An Introduction to Medicinal Chemistry – Graham L. Patrick, Oxford University Press.
8. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ippincott Williams & Wilkins.
9. Comprehensive Medicinal Chemistry – Corwin and Hansch, Pergamon Publishers.

10. Computational and structural approaches to drug design edited by RobertM Stroud and Janet. F Moore

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M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S02204) PHARMACEUTICAL PROCESS CHEMISTRY

Scope

Process chemistry is often described as scale up reactions, taking them from small quantities created in the research lab to the larger quantities that are needed for further testing and then to even larger quantities required for commercial production. The goal of a process chemist is to develop synthetic routes that are safe, cost-effective, environmentally friendly, and efficient. The subject is designed to impart knowledge on the development and optimization of a synthetic route/s and the pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients (APIs) and new chemical entities (NCEs) for the drug development phase.

Objectives

At completion of this course it is expected that students will be able to understand

- The strategies of scale up process of APIs and intermediates
- The various unit operations and various reactions in process chemistry

THEORY

60 Hrs

1.

12Hrs

Process chemistry

Introduction, Synthetic strategy Stages of scale up process: Bench, pilot and large scale process.

In-process control and validation of large scale process. Case studies of some scale up process of APIs. Impurities in API, types and their sources including genotoxic impurities

2

12Hrs

Unit operations

a) Extraction: Liquid equilibria, extraction with reflux, extraction with agitation, counter current extraction.

b) Filtration: Theory of filtration, pressure and vacuum filtration, centrifugal filtration,

c) Distillation: azeotropic and steam distillation

d) Evaporation: Types of evaporators, factors affecting evaporation.

e) Crystallization: Crystallization from aqueous, nonaqueous solutions factors affecting crystallization, nucleation. Principle and general methods of Preparation of polymorphs, hydrates, solvates and amorphous APIs.

3

12Hrs

Unit Processes - I

a) Nitration: Nitrating agents, Aromatic nitration, kinetics and mechanism of aromatic nitration, process equipment for technical nitration, mixed acid for nitration,

b) Halogenation: Kinetics of halogenations, types of halogenations, catalytic halogenations. Case study on industrial halogenation process.

c) Oxidation: Introduction, types of oxidative reactions, Liquid phase oxidation with oxidizing agents. Nonmetallic Oxidizing agents such as H_2O_2 , sodium hypochlorite, Oxygen gas, ozonolysis.

4

12Hrs

Unit Processes - II

a) Reduction: Catalytic hydrogenation, Heterogeneous and homogeneous catalyst; Hydrogen transfer reactions, Metal hydrides. Case study on industrial reduction process.

b) Fermentation: Aerobic and anaerobic fermentation. Production of

i. Antibiotics; Penicillin and Streptomycin,

ii. Vitamins: B2 and B12

iii. Statins: Lovastatin, Simvastatin

c) Reaction progress kinetic analysis

i. Streamlining reaction steps, route selection,

ii. Characteristics of expedient routes, characteristics of cost-effective routes, reagent selection, families of reagents useful for scale-up.

5

12Hrs

Industrial Safety

a) MSDS (Material Safety Data Sheet), hazard labels of chemicals and Personal Protection Equipment (PPE)

b) Fire hazards, types of fire & fire extinguishers

c) Occupational Health & Safety Assessment Series 1800 (OHSAS-1800) and ISO-14001 (Environmental Management System), Effluents and its management

REFERENCES

1. Process Chemistry in the Pharmaceutical Industry: Challenges in an Ever-Changing Climate-An Overview; K. Gadamasetti, CRC Press.
2. Pharmaceutical Manufacturing Encyclopedia, 3rd edition, Volume 2.
3. Medicinal Chemistry by Burger, 6th edition, Volume 1-8.
4. W.L. McCabe, J.C Smith, Peter Harriott. Unit operations of chemicalengineering, 7th edition, McGraw Hill
5. Polymorphism in Pharmaceutical Solids .Dekker Series Volume 95 Ed: HG Brittain (1999)
6. Regina M. Murphy: Introduction to Chemical Processes: Principles,Analysis, Synthesis
7. Peter J. Harrington: Pharmaceutical Process Chemistry for Synthesis:Rethinking the Routes to Scale-Up
8. P.H.Groggins: Unit processes in organic synthesis (MGH)
9. F.A.Henglein: Chemical Technology (Pergamon)
10. M.Gopal: Dryden's Outlines of Chemical Technology, WEP East-WestPress
11. Clausen,Mattson: Principle of Industrial Chemistry, Wiley Publishing Co.,
12. Lowenheim& M.K. Moran: Industrial Chemicals
13. S.D. Shukla & G.N. Pandey: A text book of Chemical Technology Vol. II,Vikas Publishing House
14. J.K. Stille: Industrial Organic Chemistry (PH)
15. Shreve: Chemical Process, Mc Grawhill.
16. B.K.Sharma: Industrial Chemistry, Goel Publishing House
17. ICH Guidelines
18. United States Food and Drug Administration official website www.fda.gov

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
0	0	6	3

(17S02205) PHARMACEUTICAL CHEMISTRY PRACTICALS – II

1. Synthesis of organic compounds by adapting different approaches involving (3 experiments)
 - a) Oxidation
 - b) Reduction/hydrogenation
 - c) Nitration
2. Comparative study of synthesis of APIs/intermediates by different synthetic routes (2 experiments)
3. Assignments on regulatory requirements in API (2 experiments)
4. Comparison of absorption spectra by UV and Woodward – Fieser rule
5. Interpretation of organic compounds by FT-IR
6. Interpretation of organic compounds by NMR
7. Interpretation of organic compounds by MS
8. Determination of purity by DSC in pharmaceuticals
9. Identification of organic compounds using FT-IR, NMR, CNMR and Mass spectra
10. To carry out the preparation of following organic compounds

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmaceutical Chemistry)

L	T	P	C
0	0	6	3

(17S02206) PHARMACEUTICAL CHEMISTRY PRACTICALS – III

1. Preparation of 4-chlorobenzhydrylpiperazine. (an intermediate for cetirizineHCl).
2. Preparation of 4-iodotoluene from p-toluidine.
3. NaBH₄ reduction of vanillin to vanillyl alcohol
4. Preparation of umbelliferone by Pechhman reaction
5. Preparation of triphenyl imidazole
6. To perform the Microwave irradiated reactions of synthetic importance(Any two)
7. Determination of log P, MR, hydrogen bond donors and acceptors of selected drugs using softwares
8. Calculation of ADMET properties of drug molecules and its analysis using softwares
Pharmacophore modeling
9. 2D-QSAR based experiments
10. 3D-QSAR based experiments
11. Docking study based experiment
12. Virtual screening based experiment
13. Synthesis purification and identification of the following compounds employing some medicinal compounds.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – III Sem. (Pharmaceutical Chemistry)

L	T	P	C
4	0	0	4

(17S01301) RESEARCH METHODOLOGY & BIOSTATISTICS

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, types of significance tests, parametric tests (students “t” test, ANOVA, Correlation coefficient, regression), non-parametric tests (Wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and Syllabi for M.Pharm-Pharmaceutical Analysis & Quality Assurance
(JNTUA-Affiliated Pharmacy Colleges 2017-18)

I YEAR - I Semester

S. No	Course Code	Subjects	L	T	P	C
1	17S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2	17S04101	Quality Management System	4	-	-	4
3	17S04102	Quality control and Quality Assurance	4	-	-	4
4	17S04103	Audit and Regulatory Compliance	4	-	-	4
5	17S07104	Modern Pharmaceutical Analytical Techniques Practical	-	-	6	3
6	17S04104	Quality Control And Quality Assurance Practical	-	-	6	3
7	17S04105	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

I YEAR II Semester

S. No	Course Code	Subject	L	T	P	C
1	17S04201	Hazards and safety management	4	-	-	4
2	17S04202	Pharmaceutical Validation	4	-	-	4
3	17S04203	Advanced Pharmaceutical Analysis	4	-	-	4
4	17S04204	Modern Bio analytical Techniques	4	-	-	4
5	17S04205	Hazards And Safety Management Practical	-	-	6	3
6	17S04208	Pharmaceutical Validation-Practical	-	-	6	3
7	17S04207	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

III SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S01301	Research Methodology and Biostatistics	4	-	-	4
2.	17S04301	Journal Club	1	-	-	1
3.	17S04302	Teaching Assignment	10	-	-	2
4.	17S04303	Comprehensive viva voce	-	-	-	2
5.	17S04304	Discussion / Presentation (Proposal presentation)	-	-	2	2
6.	17S04305	Research Work	-	-	28	14
Total			15	-	30	25

IV SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S04401	Journal Club	1	-	-	1
2.	17S04402	Research work	31	-	-	16
3.	17S04403	Discussion/ Final Presentation	3	-	-	3
Total			35	-	-	20

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S01101) MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY

60 HOURS

1. 11 hrs
 - a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV Visible spectroscopy.
 - b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy
 - c. Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
 - d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.
2. 11 hrs

NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and ¹³C NMR. Applications of NMR spectroscopy.
3. 11 hrs

Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

4. 11hrs
Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography

5 11hrs

a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis
d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, Xray powder technique, Types of crystals and applications of Xray diffraction.

c. Immunological assays: RIA (Radio immuno assay), ELISA, Bioluminescence assays. 5hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04101) QUALITY MANAGEMENT SYSTEMS

Scope

This course is designed to impart fundamental knowledge and concepts about various quality management principles and systems utilized in the manufacturing industry. It also aids in understanding the quality evaluation in the pharmaceutical industries.

Objectives

At completion of this course it is expected that students will be able to understand-

- The importance of quality
- ISO management systems
- Tools for quality improvement
- Analysis of issues in quality
- Quality evaluation of pharmaceuticals
- Stability testing of drug and drug substances
- Statistical approaches for quality

THEORY

60 Hrs

1.

12Hrs

Introduction to Quality: Evolution of Quality, Definition of Quality, Dimensions of Quality, Quality as a Strategic Decision: Meaning of strategy and strategic quality management, mission and vision statements, quality policy, Quality objectives, strategic planning and implementation, McKinsey 7s model, Competitive analysis, Management commitment to quality Customer Focus: Meaning of customer and customer focus, Classification of customers, Customer focus, Customer perception of quality, Factors affecting customer perception, Customer requirements, Meeting customer needs and expectations, Customer satisfaction and Customer delight, Handling customer complaints, Understanding customer behavior, concept of internal and external customers. Case studies.

Cost of Quality: Cost of quality, Categories of cost of Quality, Models of cost of quality, Optimising costs, Preventing cost of quality.

2

12Hrs

Pharmaceutical quality Management: Basics of Quality Management, Total Quality Management (TQM), Principles of Sixsigma, ISO 9001:2008, 9001:2015, ISO 14001:2004, Pharmaceutical

Quality Management – ICH Q10, Knowledge management, Quality Metrics, Operational Excellence and Quality Management Review. OSHAS guidelines, NABL certification and accreditation, CFR-21 part 11, WHO-GMP requirements.

3

12Hrs

Six System Inspection model: Quality Management system, Production system, Facility and Equipment system, Laboratory control system, Materials system, Packaging and labeling system. Concept of self-inspection.

Quality systems: Change Management/ Change control. Deviations, Out of Specifications (OOS), Out of Trend (OOT), Complaints - evaluation and handling, Investigation and determination of root cause, Corrective & Preventive Actions (CAPA), Returns and Recalls, Vendor Qualification, Annual Product Reviews, Batch Review and Batch Release. Concept of IPQC, area clearance/ Line clearance.

4

16Hrs

- a. Drug Stability: ICH guidelines for stability testing of drug substances and drug products. Study of ICH Q8, Quality by Design and Process development report
- b. Quality risk management: Introduction, risk assessment, risk control, risk review, risk management tools, HACCP, risk ranking and filtering according to ICH Q9 guidelines.
- c. Statistical Process control (SPC): Definition and Importance of SPC, Quality measurement in manufacturing, Statistical control charts - concepts and general aspects, Advantages of statistical control, Process capability, Estimating Inherent or potential capability from a control chart analysis, Measuring process control and quality improvement, Pursuit of decreased process variability.

5

8Hrs

Regulatory Compliance through Quality Management and development of Quality Culture Benchmarking: Definition of benchmarking, Reasons for benchmarking, Types of Benchmarking, Benchmarking process, Advantages of benchmarking, Limitations of benchmarking.

REFERENCES

1. Implementing Juran's Road Map for Quality Leadership: Benchmarks and Results, By Al Endres, Wiley, 2000
2. Understanding, Managing and Implementing Quality: Frameworks, Techniques and Cases, By Jiju Antony; David Preece, Routledge, 2002

3. Organizing for High Performance: Employee Involvement, TQM, Reengineering, and Knowledge Management in the Fortune 1000: The CEO Report By Edward E. Lawler; Susan Albers Mohrman; George Benson, Jossey-Bass, 2001
4. Corporate Culture and the Quality Organization By James W. Fairfield-Sonn, Quorum Books, 2001
5. The Quality Management Sourcebook: An International Guide to Materials and Resources By Christine Avery; Diane Zabel, Routledge, 1997
6. The Quality Toolbox, Second Edition, Nancy R. Tague, ASQ Publications
7. Juran's Quality Handbook, Sixth Edition, Joseph M. Juran and Joseph A. DeFeo, ASQ Publications
8. Root Cause Analysis, The Core of Problem Solving and Corrective Action, Duke Okes, 2009, ASQ Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04102) QUALITY CONTROL AND QUALITY ASSURANCE

Scope

This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications, GLP and regulatory affairs.

Objectives

Upon completion of this course the student should be able to

- Understand the cGMP aspects in a pharmaceutical industry
- To appreciate the importance of documentation
- To understand the scope of quality certifications applicable to Pharmaceutical industries
- To understand the responsibilities of QA & QC departments.

THEORY

60 Hrs

1.

12Hrs

Introduction: Concept and evolution and scopes of Quality Control and Quality Assurance, Good Laboratory Practice, GMP, Overview of ICH Guidelines - QSEM, with special emphasis on Q series guidelines.

Good Laboratory Practices: Scope of GLP, Definitions, Quality assurance unit, protocol for conduct of non clinical testing, control on animal house, report preparation and documentation. CPCSEA guidelines.

2.

12Hrs

cGMP guidelines according to schedule M, USFDA (inclusive of CDER and CBER) Pharmaceutical Inspection Convention (PIC), WHO and EMEA covering: Organization and personnel responsibilities, training, hygiene and personal records, drug industry location, design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination and Good Warehousing Practice. CPCSEA guidelines.

3.

12Hrs

Analysis of raw materials, finished products, packaging materials, in process quality control (IPQC), Developing specification (ICH Q6 and Q3) Purchase specifications and maintenance of

stores for raw materials. In process quality control and finished products quality control for following formulation in Pharma industry according to Indian, US and British pharmacopoeias: tablets, capsules, ointments, suppositories, creams, parenterals, ophthalmic and surgical products (How to refer pharmacopoeias), Quality control test for containers, closures and secondary packing materials.

4.

12Hrs

Documentation in pharmaceutical industry: Three tier documentation, Policy, Procedures and Work instructions, and records (Formats), Basic principles- How to maintain, retention and retrieval etc. Standard operating procedures (How to write), Master Formula Record, Batch Formula Record, Quality audit plan and reports. Specification and test procedures, Protocols and reports. Distribution records. Electronic data.

5.

12Hrs

Manufacturing operations and controls: Sanitation of manufacturing premises, mix-ups and cross contamination, processing of intermediates and bulk products, packaging operations, IPQC, release of finished product, process deviations, charge-in of components, time limitations on production, drug product inspection, expiry date calculation, calculation of yields, production record review, change control, sterile products, aseptic process control, packaging.

REFERENCES

1. Quality Assurance Guide by organization of Pharmaceutical Procedures of India, 3rd revised edition, Volume I & II, Mumbai, 1996.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol.69, Marcel Dekker Series, 1995.
3. Quality Assurance of Pharmaceuticals- A compedium of Guide lines and Related materials Vol I & II, 2nd edition, WHO Publications, 1999.
4. How to Practice GMP's – P P Sharma, Vandana Publications, Agra, 1991.
5. The International Pharmacopoeia – vol I, II, III, IV & V - General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms, 3rd edition, WHO, Geneva, 2005.
6. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.

7. ICH guidelines
8. ISO 9000 and total quality management
9. The drugs and cosmetics act 1940 – Deshpande, Nilesh Gandhi, 4th edition, Susmit Publishers, 2006.
10. QA Manual – D.H. Shah, 1st edition, Business Horizons, 2000.
11. Good Manufacturing Practices for Pharmaceuticals a plan for total quality control – Sidney H. Willig, Vol. 52, 3rd edition, Marcel Dekker Series.
12. Steinborn L. GMP/ISO Quality Audit Manual for Healthcare Manufacturers and Their Suppliers, Sixth Edition, (Volume 1 - With Checklists and Software Package). Taylor & Francis; 2003.
13. Sarker DK. Quality Systems and Controls for Pharmaceuticals. John Wiley & Sons; 2008.
14. Packaging of Pharmaceuticals.
15. Schedule M and Schedule N.

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M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04103) AUDITS AND REGULATORY COMPLIANCE

Scope

This course deals with the understanding and process for auditing in pharmaceutical industries. This subject covers the methodology involved in the auditing process of different in pharmaceutical industries.

Objectives

Upon completion of this course the student should be able to

- To understand the importance of auditing
- To understand the methodology of auditing
- To carry out the audit process
- To prepare the auditing report
- To prepare the check list for auditing

THEORY

60 Hrs

1.

12Hrs

Introduction: Objectives, Management of audit, Responsibilities, Planning process, information gathering, administration, Classifications of deficiencies

2

12Hrs

Role of quality systems and audits in pharmaceutical manufacturing environment: cGMP Regulations, Quality assurance functions, Quality systems approach, Management responsibilities, Resource, Manufacturing operations, Evaluation activities, Transitioning to quality system approach, Audit checklist for drug industries.

3

12Hrs

Auditing of vendors and production department: Bulk Pharmaceutical Chemicals and packaging material Vendor audit, Warehouse and weighing, Dry Production: Granulation, tableting, coating, capsules, sterile production and packaging.

4

12Hrs

Auditing of Microbiological laboratory: Auditing the manufacturing process, Product and process information, General areas of interest in the building raw materials, Water, Packaging materials.

Auditing of Quality Assurance and engineering department: Quality Assurance Maintenance, Critical systems: HVAC, Water, Water for Injection systems, ETP.

REFERENCES

1. Compliance auditing for Pharmaceutical Manufacturers. Karen Ginsbury and Gil Bismuth, Interpharm/CRC, Boca Raton, London New York, Washington D.C.
2. Pharmaceutical Manufacturing Handbook, Regulations and Quality by Shayne Cox Gad. Wiley-Interscience, A John Wiley and sons, Inc., Publications.
3. Handbook of microbiological Quality control. Rosamund M. Baird, Norman A. Hodges, Stephen P. Denyar. CRC Press. 2000.
4. Laboratory auditing for quality and regulatory compliance. Donald C. Singer, Raluca-Ioana Stefan, Jacobus F. Van Staden. Taylor and Francis (2005).

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M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S07104) MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES PRACTICAL

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis Spectrophotometer.
2. Simultaneous estimation of multi component containing formulations by UV Spectrophotometry
3. Effect of pH and solvent on UV –Spectrum
4. Determination of Molar absorption coefficient
5. Estimation of riboflavin/ quinine sulphate by fluorimetry
6. Study of quenching effect by fluorimetry
7. Estimation of sodium or potassium by flame photometry
8. Colorimetric determination of drugs by using different reagents
9. Quantitative determination of functional groups
10. Experiments based on Column chromatography
11. Experiments based on HPLC
12. Experiments based on Gas Chromatography
13. Calibration of UV – Visible Spectrophotometer/ HPLC/ GC/ FTIR
14. Cleaning validation of any one analytical equipment

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M. Pharm – I year I Sem. (PA & QA)

L	T	P	C
0	0	6	3

(17S04104) QUALITY CONTROL AND QUALITY ASSURANCE PRACTICAL

1. Case studies on

- Total Quality Management
- Six Sigma
- Change Management/ Change control. Deviations,
- Out of Specifications (OOS)
- Out of Trend (OOT)
- Corrective & Preventive Actions (CAPA)
- Deviations

2. Development of Stability study protocol

3. Estimation of process capability

4. In process and finished product quality control tests for tablets, capsules, parenterals and semisolid dosage forms.

5. Assay of raw materials as per official monographs

6. Testing of related and foreign substances in drugs and raw materials

7. To carry out pre formulation study for tablets, parenterals (2 experiments).

8. To study the effect of pH on the solubility of drugs, (1 experiment)

9. Quality control tests for Primary and secondary packaging materials

10. Accelerated stability studies (1 experiment)

11. Improved solubility of drugs using surfactant systems (1 experiment)

12. Improved solubility of drugs using co-solvency method (1 experiment)

14. Determination of Pka and Log p of drugs.

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M. Pharm – I year II Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04201) HAZARDS AND SAFETY MANAGEMENT

Scope

This course is designed to convey the knowledge necessary to understand issues related to different kinds of hazard and their management. Basic theoretical and practical discussions integrate the proficiency to handle the emergency situation in the pharmaceutical product development process and provides the principle based approach to solve the complex tribulations.

Objectives

At completion of this course it is expected that students will be able to

- Understand about environmental problems among learners.
- Impart basic knowledge about the environment and its allied problems.
- Develop an attitude of concern for the industry environment.
- Ensure safety standards in pharmaceutical industry
- Provide comprehensive knowledge on the safety management
- Empower an ideas to clear mechanism and management in different kinds of hazard management system
- Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.

THEORY 60Hrs

1. 12Hrs

Multidisciplinary nature of environmental studies: Natural Resources, Renewable and non-renewable resources, Natural resources and associated problems,

a) Forest resources; b) Water resources; c) Mineral resources; d) Energy resources; e) Land resources

Ecosystems: Concept of an ecosystem and Structure and function of an ecosystem.
Environmental hazards: Hazards based on Air, Water, Soil and Radioisotopes.

2 12Hrs

Air based hazards: Sources, Types of Hazards, Air circulation maintenance industry for sterile area and non sterile area, Preliminary Hazard Analysis (PHA) Fire protection system: Fire prevention, types of fire extinguishers and critical Hazard management system.

3 12Hrs

Chemical based hazards: Sources of chemical hazards, Hazards of Organic synthesis, sulphonating hazard, Organic solvent hazard, Control measures for chemical hazards, Management of combustible gases, Toxic gases and Oxygen displacing gases

management, Regulations for chemical hazard, Management of over-Exposure to chemicals and TLV concept.

4

12Hrs

Fire and Explosion: Introduction, Industrial processes and hazards potential, mechanical electrical, thermal and process hazards. Safety and hazards regulations, Fire protection system: Fire prevention, types of fire extinguishers and critical Hazard management system mechanical and chemical explosion, multiphase reactions, transport effects and global rates. Preventive and protective management from fires and explosion electricity passivation, ventilation, and sprinkling, proofing, relief systems - relief valves, flares, scrubbers.

5

12Hrs

Hazard and risk management: Self-protective measures against workplace hazards. Critical training for risk management, Process of hazard management, ICH guidelines on risk assessment and Risk management methods and Tools Factory act and rules, fundamentals of accident prevention, elements of safety programme and safety management, Physicochemical measurements of effluents, BOD, COD, Determination of some contaminants, Effluent treatment procedure, Role of emergency services.

REFERENCES

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. "Quantitative Risk Assessment in Chemical Process Industries" American Institute of Chemical Industries, Centre for Chemical Process safety.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Hazardous Chemicals: Safety Management and Global Regulations, T.S.S. Dikshith, CRC press

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M. Pharm – I year II Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04202) PHARMACEUTICAL VALIDATION

Scope

The main purpose of the subject is to understand about validation and how it can be applied to industry and thus improve the quality of the products. The subject covers the complete information about validation, types, methodology and application.

Objectives

At completion of this course, it is expected that students will be able to understand

- The concepts of calibration, qualification and validation
- The qualification of various equipments and instruments
- Process validation of different dosage forms
- Validation of analytical method for estimation of drugs
- Cleaning validation of equipments employed in the manufacture of pharmaceuticals

THEORY

60 Hrs

1.

10Hrs

Introduction to validation: Definition of Calibration, Qualification and Validation, Scope, frequency and importance. Difference between calibration and validation. Calibration of weights and measures. Advantages of Validation, scope of Validation, Organization for Validation, Validation Master plan, Types of Validation, Streamlining of qualification & Validation process and Validation Master Plan.

Qualification: User requirement specification, Design qualification, Factory Acceptance Test (FAT)/Site Acceptance Test (SAT), Installation qualification, Operational qualification, Performance qualification, Re-Qualification (Maintaining status-Calibration Preventive Maintenance, Change management).

2

16Hrs

- a. Qualification of manufacturing equipment: Dry Powder Mixers, Fluid Bed and Tray dryers, Tablet Compression (Machine), Dry heat sterilization/Tunnels, Autoclaves, Membrane filtration, Capsule filling machine.
- b. Qualification of analytical instruments: UV-Visible spectrophotometer, FTIR, DSC, GC, HPLC, HPTLC, LC-MS.
- c. Qualification of laboratory equipments: Hardness tester, Friability test apparatus, tap density tester, Disintegration tester, Dissolution test apparatus

Validation of Utility systems: Pharmaceutical water system & pure steam, HVAC system, Compressed air and nitrogen.

3

12Hrs

Process Validation: Concept, Process and documentation of Process Validation. Prospective, Concurrent & Retrospective Validation, Re validation criteria, Process Validation of various formulations (Coated tablets, Capsules, Ointment/Creams, Liquid Orals and aerosols.), Aseptic filling: Media fill validation, USFDA guidelines on Process Validation- A life cycle approach.

Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP.

4

10Hrs

Cleaning Validation: Cleaning Method development, Validation of analytical method used in cleaning, Cleaning of Equipment, Cleaning of Facilities. Cleaning in place (CIP). Validation of facilities in sterile and non-sterile plant.

Computerized system validation: Electronic records and digital signature - 21 CFR Part 11 and GAMP

5

12Hrs

General Principles of Intellectual Property: Concepts of Intellectual Property (IP), Intellectual Property Protection (IPP), Intellectual Property Rights (IPR); Economic importance, mechanism for protection of Intellectual Property – patents, Copyright, Trademark; Factors affecting choice of IP protection; Penalties for violation; Role of IP in pharmaceutical industry; Global ramifications and financial implications. Filing a patent applications; patent application forms and guidelines. Types of patent applications-provisional and non provisional, PCT and convention patent applications; International patenting requirements, procedures and costs; Rights and responsibilities of a patentee; Practical aspects regarding maintaining of a Patent file; Patent infringement meaning and scope. Significance of transfer of technology (TOT), IP and ethics-positive and negative aspects of IPP; Societal responsibility, avoiding unethical practices.

REFERENCES

1. B. T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol. 129, 3rd Ed., Marcel Dekker Inc., N.Y.
2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman, Joseph L. Karig, Varghese Publishing House, Bombay.
3. Validation Master plan by Terveer or Deeks, Davis Harwood International publishing.

4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton&Agalloco,
5. (Marcel Dekker).
6. Michael Levin, Pharmaceutical Process Scale-Up”, Drugs and Pharm. Sci.Series, Vol. 157,2nd Ed., Marcel Dekker Inc., N.Y.
7. Validation Standard Operating Procedures: A Step by Step Guide forAchieving Compliance in the Pharmaceutical, Medical Device, and BiotechIndustries, Syed ImtiazHaider
8. Pharmaceutical Equipment Validation: The Ultimate QualificationHandbook, Phillip A. Cloud, Interpharm Press
9. Validation of Pharmaceutical Processes: Sterile Products, Frederick J.Carlton (Ed.) and James Agalloco (Ed.), Marcel Dekker
10. Analytical Method validation and Instrument Performance Verification byChurg Chan, Heiman Lam, Y.C. Lee, Yue. Zhang, Wiley Interscience.
11. Huber L. Validation and Qualification in Analytical Laboratories. InformaHealthcare
12. Wingate G. Validating Corporate Computer Systems: Good IT Practice forPharmaceutical Manufacturers. Interpharm Press
13. LeBlanc DA. Validated Cleaning Technologies for PharmaceuticalManufacturing. Interpharm Press

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M. Pharm – I year II Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S04203) ADVANCED PHARMACEUTICAL ANALYSIS

Scope

This subject deals with the various aspects of Impurity, Impurities in new drug products, in residual solvents, Elemental impurities, Impurity profiling and characterization of degradants, Stability testing of pharmaceuticals and their protocol preparation. It also covers the biological testing of various vaccines and their principle and procedure.

Objective

After completion of the course students shall be able to know,

- Appropriate analytical skills required for the analytical method development.
- Principles of various reagents used in functional group analysis that renders necessary support in research methodology and demonstrates its application in the practical related problems.
- Analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products

THEORY

60 Hrs

1.

12Hrs

Impurity and stability studies:

Definition, classification of impurities in drug Substance or Active Pharmaceutical Ingredients and quantification of impurities as per ICH guidelines
Impurities in new drug products: Rationale for the reporting and control of degradation products, reporting degradation products content of batches, listing of degradation products in specifications, qualification of degradation products

Impurities in residual solvents: General principles, classification of residual solvents, Analytical procedures, limits of residual solvents, reporting levels of residual solvents

2

12Hrs

Elemental impurities:

Element classification, control of elemental impurities, Potential Sources of elemental Impurities, Identification of Potential Elemental Impurities, analytical procedures, instrumentation & C, H, N and S analysis

Stability testing protocols:

Selection of batches, container orientation, test parameters, sampling frequency, specification, storage conditions, recording of results, concept of stability, commitment etc. Important mechanistic and stability related information provided by results of study of factors like

temperature, pH, buffering species ionic strength and dielectric constant etc. on the reaction rates. With practical considerations.

3

12Hrs

Impurity profiling and degradant characterization: Method development, Stability studies and concepts of validation accelerated stability testing & shelf life calculation, WHO and ICH stability testing guidelines, Stability zones, steps in development, practical considerations. Basics of impurity profiling and degradant characterization with special emphasis. Photostability testing guidelines, ICH stability guidelines for biological products

4

14Hrs

a) Stability testing of phytopharmaceuticals: Regulatory requirements, protocols, HPTLC/HPLC fingerprinting, interactions and complexity.

b) Biological tests and assays of the following:

a. Adsorbed Tetanus vaccine b. Adsorbed Diphtheria vaccine c. Human anti haemophilic vaccine d. Rabies vaccine e. Tetanus Anti toxin f. Tetanus Anti serum g. Oxytocin h. Heparin sodium IP i. Antivenom. PCR, PCR studies for gene regulation, instrumentation (Principle and Procedures)

5

10Hrs

Immunoassays (IA)

Basic principles, Production of antibodies, Separation of bound and unbound drug, Radioimmunoassay, Optical IA, Enzyme IA, Fluoro IA, Luminiscence IA, Quantification and applications of IA.

REFERENCES

1. Vogel's textbook of quantitative chemical analysis - Jeffery J Bassett, J. Mendham, R. C. Denney, 5th edition, ELBS, 1991.

2. Practical Pharmaceutical Chemistry - Beckett and Stenlake, Vol II, 4th Edition, CBS publishers, New Delhi, 1997.

3. Textbook of Pharmaceutical Analysis - K A Connors, 3rd Edition, John Wiley & Sons, 1982.

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4. Pharmaceutical Analysis - Higuchi, Brochman and Hassen, 2nd Edition, Wiley – Interscience Publication, 1961.

5. Quantitative Analysis of Drugs in Pharmaceutical formulation – P D Sethi, 3rd Edition, CBS Publishers New Delhi, 1997.
6. Pharmaceutical Analysis- Modern methods - J W Munson – Part B, Volume 11, Marcel Dekker Series.
7. The Quantitative analysis of Drugs - D C Carratt, 3rd edition, CBS Publishers, New Delhi, 1964.
8. Indian Pharmacopoeia Vol I, II & III 2007, 2010, 2014.
9. Methods of sampling and microbiological examination of water, first revision, BIS
10. Practical HPLC method development – Snyder, Kirkland, Glajch, 2nd edition, John Wiley & Sons.
11. Analytical Profiles of drug substances – Klaus Florey, Volume 1 – 20, Elsevier, 2005
12. Analytical Profiles of drug substances and Excipients – Harry G Brittan, Volume 21 – 30, Elsevier, 2005.
13. The analysis of drugs in biological fluids - Joseph Chamberlain, 2nd edition, CRC press, London.
14. ICH Guidelines for impurity profiles and stability studies.

M. Pharm – I year II Sem. (PA & QA)

L T P C
4 0 0 4

(17S04204) MODERN BIO-ANALYTICAL TECHNIQUES

Scope

This subject is designed to provide detailed knowledge about the importance of analysis of drugs in biological matrices.

Objectives

Upon completion of the course, the student shall be able to understand

- Extraction of drugs from biological samples
- Separation of drugs from biological samples using different techniques
- Guidelines for BA/BE studies.

THEORY

60 Hrs

1.

12Hrs

Extraction of drugs and metabolites from biological matrices:General need, principle and procedure involved in theBioanalytical methods such as Protein precipitation, Liquid -Liquid extraction and Solid phase extraction and other novelsample preparation approach.

Bioanalytical method validation: USFDA and EMEA guidelines.

2

12Hrs

Biopharmaceutical Consideration:Introduction, Biopharmaceutical Factors Affecting DrugBioavailability, In Vitro: Dissolution and Drug Release Testing,Alternative Methods of Dissolution Testing Transport models,Biopharmaceutics Classification System. Solubility: Experimentalmethods. Permeability: In-vitro, in-situ and In-vivo methods.

3

12Hrs

Pharmacokinetics and Toxicokinetics:Basic consideration, Drug interaction (PK-PD interactions), Theeffect of protein-binding interactions, The effect of tissue-bindinginteractions, Cytochrome P450-based drug interactions, Druginteractions linked to transporters. Microsomal assaysToxicokinetics-Toxicokinetic evaluation in preclinical studies,Importance and applications of toxicokinetic studies. LC-MS inbioactivity screening and proteomics.

4

12Hrs

Cell culture techniquesBasic equipments used in cell culture lab. Cell culture media,various types of cell culture, general procedure for cell cultures;isolation of cells, subculture,

cryopreservation, characterization of cells and their applications. Principles and applications of cell viability assays (MTT assays), Principles and applications of flow cytometry.

5

12Hrs

Metabolite identification: In-vitro / in-vivo approaches, protocols and sample preparation. Microsomal approaches (Rat liver microsomes (RLM) and Human liver microsomes (HLM) in Met-ID. Regulatory perspectives. In-vitro assay of drug metabolites & drug metabolizing enzymes. Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: Drug Product Performance, Purpose of Bioavailability Studies, Relative and Absolute Availability. Methods for Assessing Bioavailability, Bioequivalence Studies, Design and Evaluation of Bioequivalence Studies, Study Designs, Crossover Study Designs, Generic Biologics (Biosimilar Drug Products), Clinical Significance of Bioequivalence Studies.

REFERENCES

1. Analysis of drugs in Biological fluids - Joseph Chamberlain, 2nd Edition. CRC Press, New York. 1995.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Pharmaceutical Analysis - Higuchi, Brochman and Hassen, 2nd Edition, Wiley – Interscience Publications, 1961.
4. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series
5. Practical HPLC method Development – Snyder, Kirkland, Glaich, 2nd Edition, John Wiley & Sons, New Jersey. USA.
6. Chromatographic Analysis of Pharmaceuticals – John A Adamovics, 2nd Edition, Marcel Dekker, New York, USA. 1997.
7. Chromatographic methods in clinical chemistry & Toxicology – Roger L Bertholf, Ruth E Winecker, John Wiley & Sons, New Jersey, USA. 2007.
8. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol.69, Marcel Dekker Series, 1995.
9. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series, 1989.
10. ICH, USFDA & CDSCO Guidelines.

11. Palmer

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (PA & QA)

L	T	P	C
0	0	6	3

(17S04205) HAZARDS AND SAFETY MANAGEMENT PRACTICAL

1. Organic contaminants residue analysis by HPLC
2. Estimation of Metallic contaminants by Flame photometer
3. Identification of antibiotic residue by TLC
4. Estimation of Hydrogen Sulphide in Air.
5. Estimation of Chlorine in Work Environment.
6. Sampling and analysis of SO₂ using Colorimetric method
7. Check list for Bulk Pharmaceutical Chemicals vendors
8. Check list for tableting production.
9. Check list for sterile production area
10. Check list for Water for injection.

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M. Pharm – I year II Sem. (PA & QA)

L	T	P	C
0	0	6	3

(17S04208) PHARMACEUTICAL VALIDATION-PRACTICAL

1. Qualification of Following Analytical Instruments

- a) UV-Visible Spectrophotometer
- b) FTIR
- c) HPLC
- d) LC-MS

2. Qualification of following Pharma Equipment

- a) Autoclave
- b) Hot Air Oven
- c) Powder Mixer
- d) Tablet compression Machine

3. Qualification of Pharmaceutical Testing Equipment

- a) Dissolution Testing apparatus
- b) Friability Apparatus
- c) Disintegration tester

4. Validation of an analytical method of any two drugs

5. Validation of processing area

6. Cleaning validation of one equipment

7. Design of plant layout –sterile and nonsterile area

8. Process validation of various formulations –Protocol preparation

9. Case study on application of QbD (Quality by Design)

10. Case study on application of PAT (Process Analytical technology)

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M. Pharm – III Sem. (PA & QA)

L	T	P	C
4	0	0	4

(17S01301) RESEARCH METHODOLOGY & BIostatISTICS

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests (students "t" test, ANOVA, Correlation coefficient, regression), non-parametric tests (Wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and Syllabi for M.Pharm-Pharmacology
(JNTUA-Affiliated Pharmacy Colleges 2017-18)

I YEAR - I Semester

S. No	Course Code	Subjects	L	T	P	C
1	17S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2	17S01102	Advanced Pharmacology-I	4	-	-	4
3	17S01103	Pharmacological and Toxicological Screening Methods-I	4	-	-	4
4	17S01104	Cellular and Molecular Pharmacology	4	-	-	4
5	17S01105	Pharmaceutical Analysis Practical for Pharmacology	-	-	6	3
6	17S01106	Pharmacology Practical I	-	-	6	3
7	17S01107	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

I YEAR II Semester

S. No	Course Code	Subject	L	T	P	C
1	17S01201	Advanced Pharmacology II	4	-	-	4
2	17S01202	Pharmacological and Toxicological Screening Methods-II	4	-	-	4
3	17S01203	Principles of Drug Discovery	4	-	-	4
4	17S01204	Clinical Research and Pharmacovigilance	4	-	-	4
5	17S01205	Pharmacology Practical II	-	-	6	3
6	17S01206	Pharmacology Practical III	-	-	6	3
7	17S01207	Seminar/Assignment	-	-	7	4
Total			16	-	19	26

III SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S01301	Research Methodology and Biostatistics	4	-	-	4
2.	17S01302	Journal Club	1	-	-	1
3.	17S01303	Teaching Assignment	10	-	-	2
4.	17S01304	Comprehensive viva voce	-	-	-	2
5.	17S01305	Discussion / Presentation (Proposal presentation)	-	-	2	2
6.	17S01306	Research Work	-	-	28	14
Total			15	-	30	25

IV SEMESTER

S.No	Subject Code	Subject	L	T	P	C
1.	17S01401	Journal Club	1	-	-	1
2.	17S01402	Research work	31	-	-	16
3.	17S01403	Discussion/ Final Presentation	3	-	-	3
Total			35	-	-	20

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01101) MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY

60 HOURS

1. 11 hrs
 - a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV Visible spectroscopy.
 - b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy
 - c. Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
 - d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.
2. 11 hrs

NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and ¹³C NMR. Applications of NMR spectroscopy.
3. 11 hrs

Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

4. 11hrs
Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following: a) Paper chromatography b) Thin Layer chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Affinity chromatography

5 11hrs

a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis
d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, Xray powder technique, Types of crystals and applications of Xray diffraction.

c. Immunological assays: RIA (Radio immuno assay), ELISA, Bioluminescence assays. 5hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

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M. Pharm – I year I Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01102) ADVANCED PHARMACOLOGY - I

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved

Objectives

Upon completion of the course the student shall be able to :

- Discuss the pathophysiology and pharmacotherapy of certain diseases
- Explain the mechanism of drug actions at cellular and molecular level
- Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

THEORY	60 Hrs
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1.	12Hrs
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General Pharmacology

a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Proteinbinding.

b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors, quantitation of drug receptors interaction and elicited effects.

2	12Hrs
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Neurotransmission

a. General aspects and steps involved in neurotransmission.

b. Neurohumoral transmission in autonomic nervous system(Detailed study about neurotransmitters- Adrenaline and Acetylcholine).

c. Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters- histamine, serotonin, dopamine, GABA, glutamate and glycine].

d. Non adrenergic non cholinergic transmission (NANC). Co-transmission

Systemic Pharmacology

A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems

Autonomic Pharmacology

Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting neuromuscular junction

3

12Hrs

Central nervous system Pharmacology

General and local anesthetics, Sedatives and hypnotics, drugs used to treat anxiety.

Depression, psychosis, mania, epilepsy, neurodegenerative diseases.

Narcotic and non-narcotic analgesics.

4

12Hrs

Cardiovascular Pharmacology

Diuretics, antihypertensives, antiischemics, anti-arrhythmics, drugs for heart failure and hyperlipidemia.

Hematinics, coagulants, anticoagulants, fibrinolytics and antiplatelet drugs

5

12Hrs

Autocoid Pharmacology

The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autocoids.

Pharmacology of antihistamines, 5HT antagonists.

REFERENCES

1. The Pharmacological Basis of Therapeutics, Goodman and Gillman's

2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapyby David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W,Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers.
3. Basic and Clinical Pharmacology by B.G Katzung
4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel andAndrew B.C.Yu.
6. Graham Smith. Oxford textbook of Clinical Pharmacology.
7. Avery Drug Treatment
8. Dipiro Pharmacology, Pathophysiological approach.
9. Green Pathophysiology for Pharmacists.
10. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (Robbins Pathology)
11. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastava published by APC Avichal Publishing Company
12. KD. Tripathi. Essentials of Medical Pharmacology.
13. Modern Pharmacology with Clinical Applications, Craig Charles R. & Stitzel Robert E., Lippincott Publishers.
14. Clinical Pharmacokinetics & Pharmacodynamics: Concepts andApplications – Malcolm Rowland and Thomas N.Tozer, Wolters Kluwer, Lippincott Williams & Wilkins Publishers.
15. Applied bio-pharmaceutics and Pharmacokinetics, Pharmacodynamics and Drug metabolism for industrial scientists.
16. Modern Pharmacology, Craig CR. & Stitzel RE, Little Brown & Company.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01103) PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS - I

Scope

This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes

Objectives

Upon completion of the course the student shall be able to,

- Appraise the regulations and ethical requirement for the usage of experimental animals.
- Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals
- Describe the various newer screening methods involved in the drug discovery process
- Appreciate and correlate the preclinical data to humans

THEORY

60 Hrs

1.

12Hrs

Laboratory Animals

Common laboratory animals: Description, handling and applications of different species and strains of animals.

Transgenic animals: Production, maintenance and applications Anaesthesia and euthanasia of experimental animals.

Maintenance and breeding of laboratory animals.

CPCSEA guidelines to conduct experiments on animals and Good laboratory practice.

Bioassay-Principle, scope and limitations and methods

2

12Hrs

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

General principles of preclinical screening. CNS Pharmacology: behavioral and muscle coordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System.

3

12Hrs

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, antiinflammatory and antipyretic agents.

Gastrointestinal drugs: anti ulcer, anti -emetic, antidiarrheal and laxatives.

4

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Cardiovascular Pharmacology: antihypertensives, antiarrhythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods.

5

12Hrs

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

Immunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin

Limitations of animal experimentation and alternate animal experiments.

Extrapolation of in vitro data to preclinical and preclinical to humans

REFERENCES

1. Biological standardization by J.H. Burn D.J. Finney and I.G. Goodwin
2. Screening methods in Pharmacology by Robert Turner. A

3. Evaluation of drugs activities by Laurence and Bachrach
4. Methods in Pharmacology by Arnold Schwartz.
5. Fundamentals of experimental Pharmacology by M.N.Ghosh
6. Pharmacological experiment on intact preparations by Churchill Livingstone
7. Drug discovery and Evaluation by Vogel H.G.
8. Experimental Pharmacology by R.K.Goyal.
9. Preclinical evaluation of new drugs by S.K. Guta
10. Handbook of Experimental Pharmacology, SK.Kulkarni
11. Practical Pharmacology and Clinical Pharmacy, SK.Kulkarni, 3rd Edition.
12. David R.Gross. Animal Models in Cardiovascular Research, 2nd Edition, Kluwer Academic Publishers, London, UK.
13. Screening Methods in Pharmacology, Robert A.Turner.
14. Rodents for Pharmacological Experiments, Dr.Tapan Kumar chatterjee.
15. Practical Manual of Experimental and Clinical Pharmacology by BikashMedhi (Author), Ajay Prakash (Author)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01104) CELLULAR AND MOLECULAR PHARMACOLOGY

Scope:

The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the receptor signal transduction processes.
- Explain the molecular pathways affected by drugs.
- Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process.
- Demonstrate molecular biology techniques as applicable for pharmacology

THEORY 60 Hrs

1. 12Hrs

Cell biology

Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing

Cell cycles and its regulation.

Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis.

Necrosis and autophagy.

2 12Hrs

Cell signaling

Intercellular and intracellular signaling pathways.

Classification of receptor family and molecular structure ligandgated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors.

Secondary messengers: cyclic AMP, cyclic GMP, calcium ion,inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol.

Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway.

3

12Hrs

Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy. Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinant DNA technology.

Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy.

4

12Hrs

Pharmacogenomics

Gene mapping and cloning of disease gene.

Genetic variation and its role in health/ pharmacology

Polymorphisms affecting drug metabolism

Genetic variation in drug transporters

Genetic variation in G protein coupled receptors

Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics.

Immunotherapeutics

Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice

5

12Hrs

a. Cell culture techniques

Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application.

Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays

Principles and applications of flow cytometry

b. Biosimilars

REFERENCES:

1. The Cell, A Molecular Approach. Geoffrey M Cooper.
2. Pharmacogenomics: The Search for Individualized Therapies. Edited by J.Licinio and M -L. Wong
3. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al
4. Molecular Pharmacology: From DNA to Drug Discovery. John Dickenson et.al
5. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller
6. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
7. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
8. Current protocols in molecular biology vol I to VI edited by Frederick M.Ausubel et al.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmacology)

L T P C
0 0 6 3

(17S01105) PHARMACEUTICAL ANALYSIS PRACTICAL FOR PHARMACOLOGY

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis-spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. Estimation of proteins by Braford/Lowry's in biological samples.
8. Estimation of RNA/DNA by UV Spectroscopy
9. Protein quantification Western Blotting.
10. Pharmacokinetic studies and data analysis of drugs given by different routes of administration using soft wares
11. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (UV)
12. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (HPLC)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year I Sem. (Pharmacology)

L	T	P	C
0	0	6	3

(17S01106) PHARMACOLOGY PRACTICAL - I

1. Handling of laboratory animals.
1. Various routes of drug administration.
2. Techniques of blood sampling, anesthesia and euthanasia of experimental animals.
3. Functional observation battery tests (modified Irwin test)
4. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.
5. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic and miotic activity.
6. Evaluation of diuretic activity.
7. Evaluation of antiulcer activity by pylorus ligation method.
8. Oral glucose tolerance test.
9. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
10. Isolation of RNA from yeast
11. Gene amplification by PCR.
12. Enzyme based in-vitro assays (MPO, AChEs, amylase, glucosidase).
13. Cell viability assays (MTT/Trypan blue/SRB).
14. DNA fragmentation assay by agarose gel electrophoresis.
15. DNA damage study by Comet assay.
16. Apoptosis determination by fluorescent imaging studies.
17. Enzyme inhibition and induction activity

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01201) ADVANCED PHARMACOLOGY - II

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved

Objectives

Upon completion of the course the student shall be able to:

- Explain the mechanism of drug actions at cellular and molecular level
- Discuss the Pathophysiology and pharmacotherapy of certain diseases
- Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

THEORY	60 Hrs
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1.	12Hrs
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Endocrine Pharmacology

Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones

Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids.

Drugs affecting calcium regulation

2	12Hrs
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Chemotherapy

Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as β -lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs.

3	12Hrs
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Chemotherapy

Drugs used in Protozoal Infections

Drugs used in the treatment of Helminthiasis

Chemotherapy of cancer

Immunopharmacology

Cellular and biochemical mediators of inflammation and immuneresponse. Allergic or hypersensitivity reactions. Pharmacotherapy of asthma and COPD.

Immunosuppressants and Immunostimulants

4

12Hrs

GIT Pharmacology

Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals and drugs for constipation and irritable bowel syndrome.

Chronopharmacology

Biological and circadian rhythms, applications of chronotherapy in various diseases like cardiovascular disease, diabetes, asthma and peptic ulcer

5

12Hrs

Free radicals Pharmacology

Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer.

Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus

REFERENCES

1. The Pharmacological basis of therapeutics- Goodman and Gilman's
2. Principles of Pharmacology. The Pathophysiologic basis of drug therapy by David E Golan et al.
3. Basic and Clinical Pharmacology by B.G -Katzung
4. Pharmacology by H.P. Rang and M.M. Dale.
5. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.

6. Text book of Therapeutics, drug and disease management by E T.Herfindal and Gourley.
7. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
8. Handbook of Essential Pharmacokinetics, Pharmacodynamics and DrugMetabolism for Industrial Scientists
9. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (RobbinsPathology)
10. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastavapublished by APC Avichal Publishing Company.
11. KD.Tripathi. Essentials of Medical Pharmacology
12. Principles of Pharmacology. The Pathophysiologic basis of drug Therapyby David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W,Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01202) PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS-II

Scope:

This subject imparts knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity. This knowledge will make the student competent in regulatory toxicological evaluation.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various types of toxicity studies.
- Appreciate the importance of ethical and regulatory requirements for toxicity studies.
- Demonstrate the practical skills required to conduct the preclinical toxicity studies.

THEORY 60 Hrs

1. 12Hrs

Basic definition and types of toxicology (general, mechanistic, regulatory and descriptive) Regulatory guidelines for conducting toxicity studies OECD, ICH, EPA and Schedule Y OECD principles of Good laboratory practice (GLP). History, concept and its importance in drug development.

2 12Hrs

Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines. Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies.

Test item characterization- importance and methods in regulatory toxicology studies

3 12Hrs

Reproductive toxicology studies, Male reproductive toxicity studies, female reproductive studies (segment I and segment III), teratogenicity studies (segment II) Genotoxicity studies (Ames Test, in vitro and in vivo Micronucleus and Chromosomal aberrations studies) In vivo carcinogenicity studies

4 12Hrs

IND enabling studies (IND studies)- Definition of IND, importance of IND, industry perspective, list of studies needed for IND submission.

Safety pharmacology studies- origin, concepts and importance of safety pharmacology.

Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2- GI, renal and other studies

5

12Hrs

Toxicokinetics- Toxicokinetic evaluation in preclinical studies, saturation kinetics Importance and applications of toxicokinetic studies. Alternative methods to animal toxicity testing.

REFERENCES

1. Hand book on GLP, Quality practices for regulated non-clinical research and development (<http://www.who.int/tdr/publications/documents/glphandbook.pdf>).
2. Schedule Y Guideline: drugs and cosmetics (second amendment) rules, 2005, ministry of health and family welfare (department of health) New Delhi
3. Drugs from discovery to approval by Rick NG.
4. Animal Models in Toxicology, 3rd Edition, Lower and Bryan
5. OECD test guidelines.
6. Principles of toxicology by Karen E. Stine, Thomas M. Brown.
7. Guidance for Industry M3(R2) Nonclinical Safety Studies for the Conduct of Human Clinical Trials and Marketing Authorization for Pharmaceuticals (<http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm073246.pdf>)

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M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01203) PRINCIPLES OF DRUG DISCOVERY

Scope:

The subject imparts basic knowledge of drug discovery process. This information will make the student competent in drug discovery process

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various stages of drug discovery.
- Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery
- Explain various targets for drug discovery.
- Explain various lead seeking method and lead optimization
- Appreciate the importance of the role of computer aided drug design in drug discovery

THEORY 60 Hrs

1. 12Hrs

An overview of modern drug discovery process: Target identification, target validation, lead identification and lead Optimization. Economics of drug discovery. Target Discovery and validation-Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Proteinmicro-arrays, Antisense technologies, siRNAs, antisenseoligo nucleotides, Zinc finger proteins. Role of transgenic animals in target validation.

2 12Hrs

Lead Identification- combinatorial chemistry & high throughput screening, in silico lead discovery techniques, Assay development for hit identification.

Protein structure

Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction

3 12Hrs

Rational Drug Design

Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

4

12Hrs

Molecular docking: Rigid docking, flexible docking, manual docking; Docking based screening. De novo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis and relationship between them.

5

12Hrs

QSAR Statistical methods – regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

REFERENCES

1. Mouldy Sioud. Target Discovery and Validation Reviews and Protocols: Volume 2 Emerging Molecular Targets and Treatment Options. 2007 Humana Press Inc.
2. Darryl León. Scott Markel. In. Silico Technologies in Drug Target Identification and Validation. 2006 by Taylor and Francis Group, LLC.
3. Johanna K. DiStefano. Disease Gene Identification. Methods and Protocols. Springer New York Dordrecht Heidelberg London.
4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
6. Abby L. Parrill. M. Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999.
7. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons, Inc., New Jersey.

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M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01204) CLINICAL RESEARCH AND PHARMACOVIGILANCE

Scope:

This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This subject also focuses on global scenario of Pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development and post market surveillance.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the regulatory requirements for conducting clinical trial
- Demonstrate the types of clinical trial designs
- Explain the responsibilities of key players involved in clinical trials
- Execute safety monitoring, reporting and close-out activities
- Explain the principles of Pharmacovigilance
- Detect new adverse drug reactions and their assessment
- Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance

THEORY	60 Hrs
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1.	12Hrs
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Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant-Schedule Y, ICMR Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process

2	12Hrs
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Clinical Trials: Types and Design Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management

3

12Hrs

Clinical Trial Documentation- Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring-Safety Monitoring in CT

Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment. Predictability and preventability assessment, Management of adverse drug reactions; Terminologies of ADR.

4

12Hrs

Basic aspects, terminologies and establishment of Pharmacovigilance History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance

5

12Hrs

a. Methods, ADR reporting and tools used in Pharmacovigilance International classification of diseases, International Nonproprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, Vigi Flow, Statistical methods for evaluating medication safety data.

b . Pharmacoepidemiology, pharmacoeconomics, safetypharmacology

REFERENCES

1. Central Drugs Standard Control Organization- Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.
2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice. E6; May 1996.
3. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
4. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
5. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
6. Handbook of clinical Research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone.
7. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
0	0	6	3

(17S01205) PHARMACOLOGICAL PRACTICAL - II

1. To record the DRC of agonist using suitable isolated tissues preparation.
2. To study the effects of antagonist/potentiating agents on DRC of agonist using suitable isolated tissue preparation.
3. To determine the strength of unknown sample by matching bioassay by using suitable tissue preparation.
4. To determine the strength of unknown sample by interpolation bioassay by using suitable tissue preparation.
5. To determine the strength of unknown sample by bracketing bioassay by using suitable tissue preparation.
6. To determine the strength of unknown sample by multiple point bioassay by using suitable tissue preparation.
7. Estimation of PA_{50} values of various antagonists using suitable isolated tissue preparations.
8. Drug absorption studies by averted rat ileum preparation.
9. ADR reporting

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – I year II Sem. (Pharmacology)

L	T	P	C
0	0	6	3

(17S01206) PHARMACOLOGY PRACTICALS-III

1. To study the effects of various drugs on isolated heart preparations
2. Recording of rat BP, heart rate and ECG.
- 3.. Recording of rat ECG
4. Acute oral toxicity studies as per OECD guidelines.
5. Acute dermal toxicity studies as per OECD guidelines.
6. Repeated dose toxicity studies- Serum biochemical, haematological, urineanalysis, functional observation tests and histological studies.
7. Drug mutagenicity study using mice bone-marrow chromosomal aberrationtest.
- 8.. Protocol design for clinical trial.(3 Nos.)
9. Design of ADR monitoring protocol.
10. In-silico docking studies. (2 Nos.)
11. In-silico pharmacophore based screening.
12. In-silico QSAR studies.

REFERENCES

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. Text book of in-vitro practical Pharmacology by Ian Kitchen
4. Bioassay Techniques for Drug Development by Atta-ur-Rahman, Iqbalchoudhary and William Thomsen
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel andAndrew B.C.Yu.
6. Handbook of Essential Pharmacokinetics, Pharmacodynamics and DrugMetabolism for Industrial Scientists.,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M. Pharm – III Sem. (Pharmacology)

L	T	P	C
4	0	0	4

(17S01301) RESEARCH METHODOLOGY & BIostatISTICS

UNIT – I

General Research Methodology: Research, objective, requirements ,practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students “t” test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)



ACADEMIC CALENDAR
for
Academic Year 2019-20

M.Tech / M.Pharm

Second Semester
(For 2019-20 admitted batches)

First Unit of Instructions	24.02.2020 to 18.04.2020	(08 Weeks)
First Mid Examinations	20.04.2020 to 25.04.2020	(06 Days)
Second Unit of Instructions	27.04.2020 to 08.05.2020	(02 Weeks)
Summer Vacation	11.05.2020 to 30.05.2020	(03 Weeks)
Second Unit of Instructions (Continued)	01.06.2020 to 10.07.2020	(06 Weeks)
Second Mid Examinations	13.07.2020 to 18.07.2020	(06 Days)
Preparation and Practicals	20.07.2020 to 25.07.2020	(06 Days)
End Examinations	27.07.2020 to 12.08.2020	(02½ Weeks)
Commencement of class work for III Semester: (Academic Year 2020-21)	24.08.2020 (Monday)	

Notification Date: 20-02-2020

Director of Evaluation



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

ACADEMIC CALENDAR

for

M.Tech & M.Pharm (AY 2019-20)

Third Semester

(For 2018 admitted batch)

Third Semester		
First Unit of Instructions	26.08.2019 to 19.10.2019	(08 Weeks)
First Mid Examinations	21.10.2019 to 23.10.2019	(03 Days)
Second Unit of Instructions	24.10.2019 to 24.12.2019	(09 Weeks)
Second Mid Examinations	26.12.2019 to 28.12.2019	(03 Days)
Preparation and Practicals	30.12.2019 to 04.01.2020	(05 Days)
End Examinations	06.01.2020 to 10.01.2020	(05 Days)
Commencement of class work for IV Semester:	20.01.2020 (Monday)	

Date: 22-08-2019

DIRECTOR OF EVALUATION

[Signature]

[Signature]



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU - 515002, A.P (INDIA)

ACADEMIC CALENDAR

for

Academic Year 2019-20


M.Tech/M.Pharm

Fourth Semester

(For 2018-19 admitted batches)

IV Semester		
Commencement of Project Work Phase - II	20.01.2020 (Monday)	
Submission of status report Internal Departmental Committee (IDC) for approval	02.03.2020 to 07.03.2020	(01 Week)
Submission of status report IDC for approval	20.04.2020 to 25.04.2020	(01 Week)
Pre-submission seminar	01.06.2020 to 06.06.2020	(01 Week)
Final thesis/dissertation submission	After successful completion of presubmission seminar	

Date: 20-01-2020


DIRECTOR OF EVALUATION

Admission Details last four years 2016-17 to 2019-20.

S. No	Name of the course*	Branch	Specialization** (if any)	Details of intake year wise								Year of starting the course
				2016-17		2017-18		2018-19		2019-20		
				Appro ved	Admi tted	Appro ved	Admi tted	Appro ved	Admi tted	Appro ved	Admi tted	
1.	B.Pharmacy	B.Pharmacy	Pharmacy	100	100	100	100	100	95	100	107	2003
2.	M.Pharmacy	Pharmaceutics	Pharmaceutics	15	05	15	11	15	06	15	4	2008
3.	M.Pharmacy	Pharmaceutical Chemistry	Pharm. Chemistry	15	10	15	07	15	03	15	4	2009
4.	M.Pharmacy	Pharmaceutical Analysis and Quality Assurance	Pharmaceutical Analysis and Quality Assurance	15	05	15	06	15	02	15	3	2010
5.	M.Pharmacy	Pharmacology	Pharmacology	15	09	15	15	15	07	15	3	2011
6.	M.Pharmacy	Pharmaceutical Technology	Pharmaceutical Technology	15	00	15	00	15	00	NA	NA	2011
7.	M.Pharmacy	Pharmaceutical Analysis	Pharmaceutical Analysis	15	01	15	01	15	02	NA	NA	2012
8.	M.Pharmacy	Pharmaceutics (Drug Regulatory Affairs)	Pharmaceutics (Drug Regulatory Affairs)	15	02	15	02	15	01	NA	NA	2012
9.	Pharm.D	Doctor of Pharmacy	Doctor of Pharmacy	30	29	30	30	30	25	30	24	2009
10	Pharm.D (PB)	Doctor of Pharmacy	Doctor of Pharmacy	10	00	10	02	10	01	10	0	2012

Research / Seminar / Conference Grants

S.No	Name	Funding agencies	Title	Sanctioned amount	Year
1	Dr. D. Swarnalatha	AICTE-RPS	Phytochemical and Biological Studies on Unexplored Tradition Medicinal Plants	6,90,000/-	2011-12
2	Dr. C. Gopinath	AICTE – Seminar Grant	Clinical Research, Pharmacovigilance & Medical writing	1,00,000/-	2016-17
3	Dr. D. Swarnalatha	AICTE – Grant for Organizing Conference (GOC)	Significance of Herbal Drugs and Nutraceuticals in Preventing Diseases	5,00,000/-	2017-18
4	Dr. D. Swarnalatha	PCI	Continuing Education Programme (CEP)	3,00,000/-	2018-19
5	Dr. P. Dwarakanadha Reddy	DST-NIMAT	Entrepreneurship Awareness Camp	20,000/-	2018-19
6	Dr. P. Dwarakanadha Reddy	AICTE	Application of QbD and other computational tools in pharmaceutical product development: Current trends and other future prospectives	401333/-	2019-20



HI Q HERBALS MEMORANDUM OF UNDERSTANDING

BETWEEN

HI Q HERBALS

AND

ANNAMACHARYA COLLEGE OF PHARMACY, RAJAMPET

This Agreement made and entered into on this 18 day of Sep 2018 between HI Q HERBALS, situated at HYDERABAD-500035 and "Annamacharya College of Pharmacy" situated at Rajampet.

1. OBJECTIVES OF THE MOU

The objective of this Memorandum of Understanding is:

- a. To implement the internal training program at Annamacharya College of Pharmacy Campus to certify their candidates for Quality control and Quality assurance departments.
- b. Taking care of Placement for trained candidates.
- c. To provide the opportunity for industrial visit and industrial training of Pharmacy students

2. PROPOSED MODES OF COLLABORATION

- a. ANCP will support the class-room and other facilities to train their college final year Pharmacy students.
- b. HI Q HERBALS will provide certification training for Pharmacy students.

3. CONFIDENTIALITY

- a. During and for a period of training duration from the date of disclosure, each party agrees to consider as confidential all information disclosed by the other party.

4. TERMS AND TERMINATION

This MOU, unless extended by mutual written agreement of the parties, shall expire 10 year after the effective date specified in the opening paragraph. This MOU may be amended or terminated earlier by mutual written agreement of the parties at any time. Either party shall have the right to unilaterally terminate this MOU upon 30 days prior written notice to the other party.

5. RELATIONSHIP

Nothing in this MOU shall be construed to make either party a partner, an agent or legal representative of the other for any purpose.

6. ASSIGNMENT



HI Q HERBALS

It is understood by the Parties herein this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

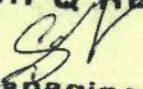
7. SIGNED IN DUPLICATE

This MOU is executed in duplicate with each copy being an official version of the Agreement and having equal legal validity.

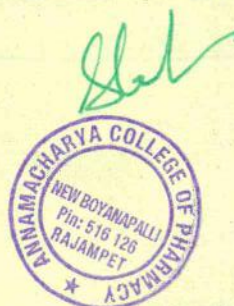
BY SIGNING BELOW, the parties, acting by their duly authorized officers, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

On behalf of

on behalf of

HI Q HERBALS
For HI Q HERBALS

Managing Partner
Director

ANNAMACHARYA COLLEGE OF PHARMACY



**MEMORANDUM OF UNDERSTANDING
BETWEEN
RA CHEM PHARMA LIMITED, HYDERABAD
AND
ANNAMACHARYA COLLEGE OF PHARMACY, RAJAMPET**

This Agreement made and entered into on this 25 day of AUG 2016 between **RA Chem Pharma Limited, situated at Nacharam, Hyderabad -500076** and **"Annamacharya College of Pharmacy" situated at Rajampet.**

1. OBJECTIVES OF THE MOU

The objective of this Memorandum of Understanding is:

- a. To implement the internal training program at Annamacharya College of Pharmacy Campus to certify their candidates for Quality control and Quality assurance departments.
- b. Taking care of Placement for trained candidates.
- c. To provide the opportunity for industrial visit and industrial training of Pharmacy students

2. PROPOSED MODES OF COLLABORATION

- a. ANCP will support the class-room and other facilities to train their college final year Pharmacy students.
- b. INDIAN HEALTHCARE BPO will provide certification training for Pharmacy students.

3. CONFIDENTIALITY

- a. During and for a period of training duration from the date of disclosure, each party agrees to consider as confidential all information disclosed by the other party.

4. TERMS AND TERMINATION

This MOU, unless extended by mutual written agreement of the parties, shall expire 10 year after the effective date specified in the opening paragraph. This MOU may be amended or terminated earlier by mutual written agreement of the parties at any time. Either party shall have the right to unilaterally terminate this MOU upon 30 days prior written notice to the other party.

5. RELATIONSHIP

Nothing in this MOU shall be construed to make either party a partner, an agent or legal representative of the other for any purpose.

6. ASSIGNMENT

It is understood by the Parties herein this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

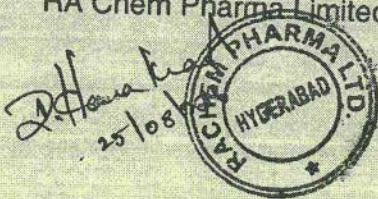
7. SIGNED IN DUPLICATE

This MOU is executed in duplicate with each copy being an official version of the Agreement and having equal legal validity.

BY SIGNING BELOW, the parties, acting by their duly authorized officers, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

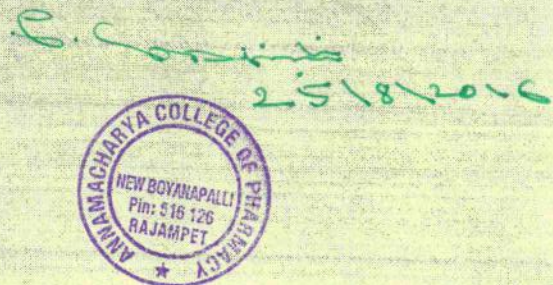
On behalf of

RA Chem Pharma Limited



on behalf of

ANNAMACHARYA COLLEGE OF PHARMACY





SODUM DRUGS & PHARMACEUTICALS (P) LTD

MEMORANDUM OF UNDERSTANDING

BETWEEN

SODUM DRUGS & PHARMACEUTICALS PVT.LTD

AND

ANNAMACHARYA COLLEGE OF PHARMACY, RAJAMPET

This Agreement made and entered into on this 25 day of AUG 2016 between SODUM DRUGS&PHARMACEUTICALS PVT.LTD, situated at HYDERABAD-500072 and "Annamacharya College of Pharmacy" situated at Rajampet.

1. OBJECTIVES OF THE MOU

The objective of this Memorandum of Understanding is:

- a. To implement the internal training program at Annamacharya College of Pharmacy Campus to certify their candidates for Quality control and Quality assurance departments.
- b. Taking care of Placement for trained candidates.
- c. To provide the opportunity for industrial visit and industrial training of Pharmacy students

2. PROPOSED MODES OF COLLABORATION

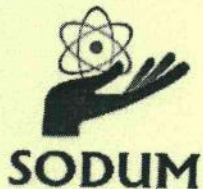
- a. ANCP will support the class-room and other facilities to train their college final year Pharmacy students.
- b. SODUM DRUGS & PHARMACEUTICALS PVT.LTD will provide certification training for Pharmacy students.

3. CONFIDENTIALITY

- a. During and for a period of training duration from the date of disclosure, each party agrees to consider as confidential all information disclosed by the other party.

4. TERMS AND TERMINATION

This MOU, unless extended by mutual written agreement of the parties, shall expire 10 year after the effective date specified in the opening paragraph. This MOU may be amended or terminated earlier by mutual written agreement of the parties at any time. Either party shall have the right to unilaterally terminate this MOU upon 30 days prior written notice to the other party.



SODUM DRUGS & PHARMACEUTICALS (P) LTD

5. RELATIONSHIP

Nothing in this MOU shall be construed to make either party a partner, an agent or legal representative of the other for any purpose.

6. ASSIGNMENT

It is understood by the Parties herein this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

7. SIGNED IN DUPLICATE

This MOU is executed in duplicate with each copy being an official version of the Agreement and having equal legal validity.

BY SIGNING BELOW, the parties, acting by their duly authorized officers, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

On behalf of

on behalf of

SODUM DRUGS & PHARMACEUTICALS

ANNAMACHARYA COLLEGE OF PHARMACY



Director

C. Chaitanya
25/08/2016



MEMORANDUM OF UNDERSTANDING

BETWEEN

TIL HEALTHCARE PRIVATE LIMITED, HYDERABAD

AND

ANNAMACHARYA COLLEGE OF PHARMACY, RAJAMPET

This Agreement made and entered into on this 22 day of September 2017 between TIL Healthcare Pvt Ltd, situated at Hyderabad and "Annamacharya College of Pharmacy" situated at Rajampet.

1. OBJECTIVES OF THE MOU

The objective of this Memorandum of Understanding is:

- a. To implement the internal training program at Annamacharya College of Pharmacy Campus to certify their candidates for Quality control and Quality assurance departments.
- b. Taking care of Placement for trained candidates.
- c. To provide the opportunity for industrial visit and project training of Pharmacy students

2. PROPOSED MODES OF COLLABORATION

- a. ANCP will support the class-room and other facilities to train their college final year Pharmacy students.
- b. **TIL HEALTHCARE PRIVATE LIMITED** will provide certification training for Pharmacy students.

3. CONFIDENTIALITY

- a. During and for a period of training duration from the date of disclosure, each party agrees to consider as confidential all information disclosed by the other party.

4. TERMS AND TERMINATION

This MOU, unless extended by mutual written agreement of the parties, shall expire 10 year after the effective date specified in the opening paragraph. This MOU may be amended or terminated earlier by mutual written agreement of the parties at any time. Either party shall have the right to unilaterally terminate this MOU upon 30 days prior written notice to the other party.

5. RELATIONSHIP

Nothing in this MOU shall be construed to make either party a partner, an agent or legal representative of the other for any purpose.

6. ASSIGNMENT

It is understood by the Parties herein this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

7. SIGNED IN DUPLICATE

This MOU is executed in duplicate with each copy being an official version of the Agreement and having equal legal validity.

BY SIGNING BELOW, the parties, acting by their duly authorized officers, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

For Tablet India Limited Healthcare




HKO Prasad

Manager - Human Resource



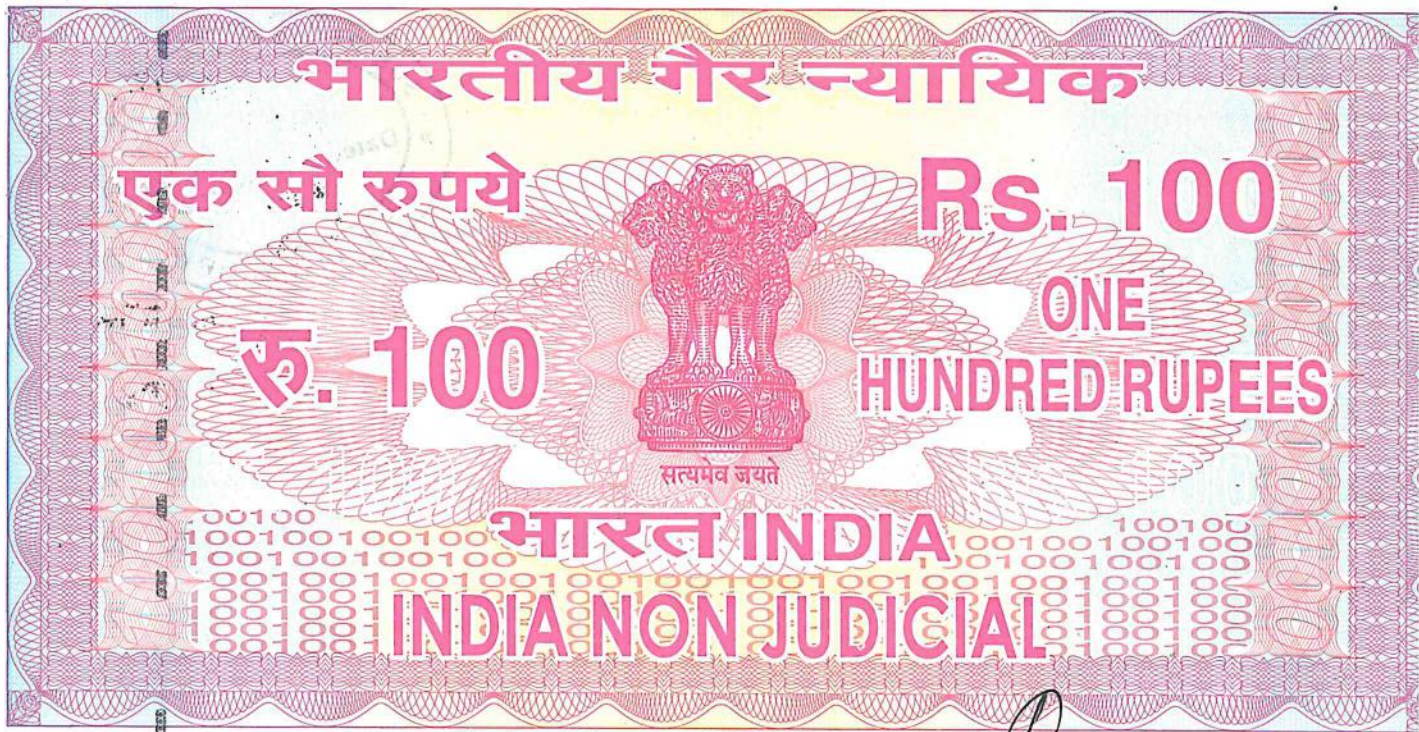
For Annamacharya College of Pharmacy



Dr. Chakka Gopinath

Principal





ఆంధ్రప్రదేశ్ ఆంధ్ర ప్రదేశ్ ANDHRA PRADESH

No. 7960... Date 15.12.2014 Rs. 100

Sold to... Dr. C. Gopinath S/o late C. Venkata Ramaiah

For Whom, Principal, Annamacharya college of Pharmacy, Rajampet

BL 984283

SKIDHAR REI
LICENCED STAMP VEN
L.No.11-18-4/1992, R.No.11-18-
RAMARAJUPALLI, KAD
S R.(Dist.) CELL:94404

MEMORANDUM OF UNDERSTANDING (MOU)

Between

ANNAMACHARYA COLLEGE OF PHARMACY (ANCP), RAJAMPET, KADAPA

AND

RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES, KADAPA

For renewal of Pharm.D Program (Pharm.D and Pharm.D Post Baccalaureate)

1.PREAMBLE:-

ANNAMACHARYA COLLEGE OF PHARMACY (ANCP):

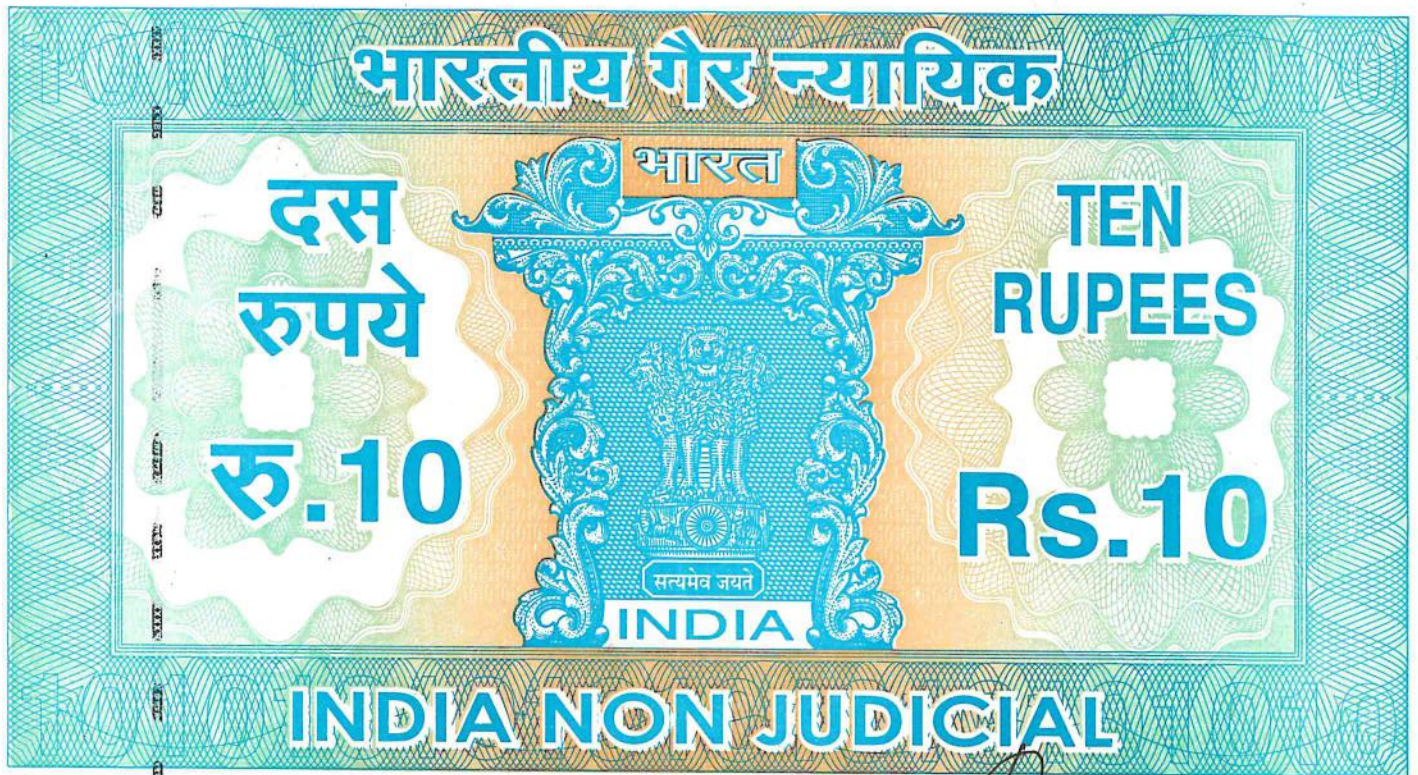
ANNAMACHARYA COLLEGE OF PHARMACY (ANCP), Rajampet is reputed teaching institution in various levels of Pharmacy like B.Pharmacy, M.Pharmacy and Ph.D in Pharmaceutical sciences with good infrastructure facilities, dedicated faculty and visiting faculty from reputed organizations. Besides the responsibilities of relation to the education, training and revalidation of Pharmacy profession, ANCP is fulfilling the statutory roles in public health and to develop the practice of Pharmacy.

RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES (RIMS):

Rajiv Gandhi institute of Medical Sciences, a teaching hospital, which is established by Govt. of A.P in a cool and cute area near palakonda hills in area of 210 acres in putlampalli (V), 5 Kms away from Kadapa city. RIMS said to be the largest of its kind in state, it has a 750 bedded hospital, a medical college with intake of 150 students and nursing with 100 students to cater the needs and to improve the health conditions of backward

PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI-516 126
RAJAMPET, Kadapa Dist. A. P.

DIRECTOR
RIMS KADAPA



No. 7964 Date 15.12.2014 Rs. 10/-

Sold to: Dr. C. Srinath S/o. Late C. Venkata Ramaiah

For Whom: Principal Annamacharya College of Pharmacy, Rajampet

60AA 769239

GRISHNA REDD
LICENCED STAMP VENDOR
L.No. H-18-4/1997, R.No. H-18-2/21
RAMARAJUPALLI, KADAPA
Dist. S.P. (Kadapa) Pin: 54401190

drought prone area of Rayalaseema region in Andhra Pradesh. RIMS is suitable place to introduce various educational and training programmes related to health care.

II. MISSION OF MOU:-

Where both ANCP and RIMS are highly preferred among them to fulfill the affiliation conditions of respective council for maximum extent to the mutual benefit of foreign formal linkage to the new collaborative teaching and research programmes in the area of pharmacy practice and allied health fields.

III. AIM AND SCOPE:-

ANCP and RIMS are both share a common aim of ensuring the patients receive the best possible pharmaceutical services this can be achieved through:

a) Ensuring that the highest standards are maintained in the provision of pharmaceutical services

b) Development of new services of delivery by clinical pharmacists.

This memorandum of understating is to guide and direct the parties respecting their affiliation and working relationship, inclusive of anticipated future arrangements and agreements in further and thereof, to provide high quality applied learning experience for the students.

Now therefore in consideration of the premises and mutual covenant herein after contained the parties here to agree as follows:-

PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI-516 126
RAJAMPET, Kadapa Dist. A. P.

DIRECTOR
RIMS, KADAPA



ఆంధ్రప్రదేశ్ ఆంధ్ర ప్రదేశ్ ANDHRA PRADESH

No. 7965 Date 15-12-2014 Rs. 10

Sold to: Dr. C. Chinapath, S/o Late C. Venkata Ramiah

For Whom: Principal, Annamacharya college of Pharmacy, Rajampet

::3::

60AA 769240

LICENCED STAMP VENDOR
L No. 11-18-4/1992, R. No 11-18-2/2012
RAMARAJUPALLI, KADAPA
V S R. (Dist.) CELL: 944019040

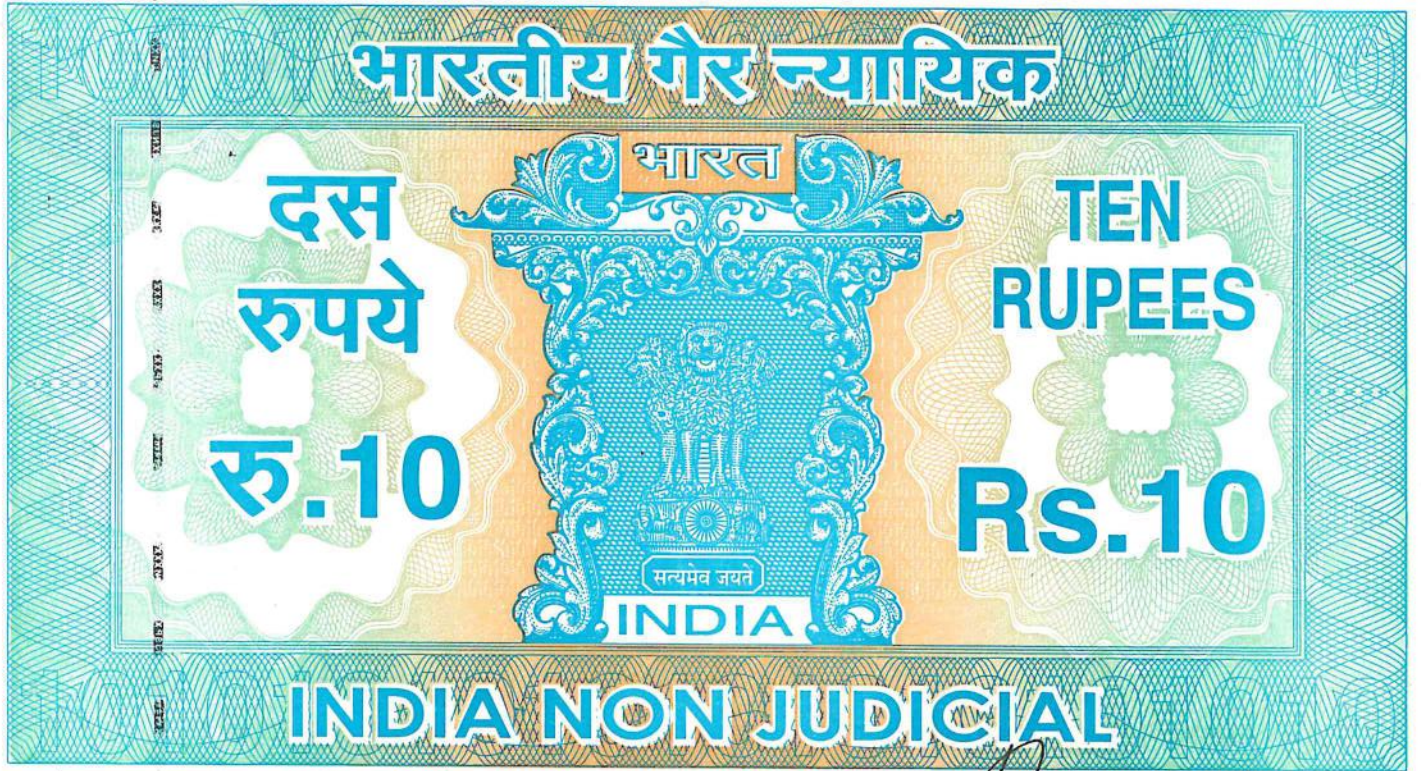
IV. FIELD OF CO-OPERATION:-

The two parties after considering their objectives and strength have agreed to an understanding for collaboration in the following areas of interest.

- Providing internship of residency training to the students of Pharm.D and Pharm.D post Baccalaureate students during their course and housing pharmacy practice Dept. Providing professional manpower to support the programme.
- Both the institutions shall evolve a mutually acceptable schedule to develop programs. Hold seminars and exchange visits.
- The said academic interaction and intellectual assimilation may include:
 - Faculty / Staff development and exchange for guest lectures as well as examiner ship.
 - Medical and pharmaceutical consultancy services of mutual interest.
 - Organizing and / participating in joint symposia / conferences / workshops / short term refresher courses.
 - Access to library and knowledge, sharing facilities and academic data, scientific information, articles and publication for both students and faculty.
 - To provide placements and executive training.

PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLE, DISTO 120
RAJAMPET, Kadapa Dist. A. P.

DIRECTOR
RIMS, KADAPA



ఆంధ్రప్రదేశ్ ఆంధ్ర ప్రదేశ్ ANDHRA PRADESH

S No. 7962 Date 15.12.2014 Rs. 10/-

Sold to Dr. C. Gopinath S/o Late C. Venkata Ramaiah

For Whom Principal Annamacharya College of Pharmacy Rajampet

60AA 769237
S. SUDHAN REDDY
LICENCED STAMP VENDOR,
L.No.H-18-4/1992, R.No.H-18-2/2013
RAMARAJUFALLI, KADAPA
V.S.R.(Dist.) CELL: 9440119040

terms with in parameters of the policies, rules and resolution of both the institutions.

- c) Each party will nominates appropriate personnel to discuss and promote detailed co-operation activities for the completion of this MOU.

VIII. WE AGREE TO PAY:-

An amount of 25,000/- (Rupees Twenty Five Thousand Only) will be paid per annum towards fees for internship for the Pharm.D and Pharm.D (post Baccalaureate) Programs and to be deposited with the Hospital Development society as per G.O.Ms.No. 398, Dated 15.11.2008 before the commencement of clinical attachment.

IX. SIGNATURE:-

In witness where of the parties here to signed executed this Memorandum of understanding on 15th day of December, 2014

For ANNAMACHARYA COLLEGE
OF PHARMACY RAJAMPET,
KADAPA.

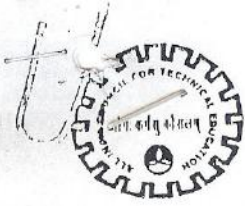
For RAJIV GANDHI INSTITUTE
OF MEDICAL SCIENCES, KADAPA

[Signature]
PRINCIPAL
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI-516 126
RAJAMPET, Kadapa Dist. A. P.

[Signature]
DIRECTOR
RIMS, KADAPA

[Signature]
16/12/14

[Signature]
4/16/14



-11/10/03
63

अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक संस्थान) (A STATUTORY BODY OF THE GOVERNMENT OF INDIA)

F.No.: 06/05/AP/PHAR/2002/001

Date : 12.05.2003

To

The Secretary Technical Education,
Govt. of Andhra Pradesh,
A.P. Govt. Secretariat,
Hyderabad -500028

Sub: AICTE approval to ANNAMACHARYA EDUCATIONAL TRUST, 2-2-25/P/7/1, D.D. COLONY, BAGH AMBERPET, HYDERABAD -500013, for establishment of ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANAPALLI, RAJAMPET-516126, in Academic year 2003-2004

Sir/Madam,

The Application/ Proposal received from ANNAMACHARYA EDUCATIONAL TRUST, 2-2-25/P/7/1, D.D. COLONY, BAGH AMBERPET, HYDERABAD -500013, has been processed as per laid down procedure, guidelines, policy and/or norms & standards of AICTE, mentioned in AICTE Regulations and/ or "AICTE Hand Book for Approval Process".

I am directed to state that the All India council for Technical Education (AICTE) is pleased to accord approval for Establishment of ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANAPALLI, RAJAMPET-516126, for the academic year 2003-2004 to conduct under-graduate degree level course in Pharmacy with annual intake as given below:

FULL TIME COURSE(S)	ANNUAL INTAKE	ENTRY LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
Pharmacy	60	10+2	4	2003-2004
Total Annual Intake	60			

RS-10000

Cont...2/

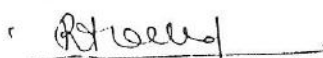
The approval accorded above is subject to fulfillment of the following Conditions:

1. All full time faculty members as per AICTE Norms must be recruited before making admissions.
2. The Institution must have Affiliation to a University for the above courses before making admissions. In the absence of such Affiliation, this Letter of approval shall be treated as Withdrawn. (Order of the High Court of Madras in W.P. No. 33256 of 2002 and other Batch of Petitions).
3. All the required Laboratories/ Workshops/ Machineries/ Equipment, as per approved syllabi of the affiliating University, must be operational before making admissions.
4. The approved course(s) shall commence as per the academic calendar of the Affiliating University.
5. If this Letter of approval is received by you after the closing date of State / National Level Central Counseling for Admissions in the concerned State / Union Territory, this Letter of approval will not be valid for making any admission during the above specified academic year, and shall be treated as withdrawn.
6. No excess admission shall be made by the Institution during any academic year.
7. The approval is valid only for the academic year 2003-2004. If no further extension of AICTE approval is received beyond the academic year 2003-2004, this Approval Letter will not be valid for making any admission for the subsequent years.
8. Name of the Institution, Name of the Society/Trust, are not allowed to be changed without prior approval of AICTE. The name and title of the institution should be such that "the Emblems and Names (Prevention of improper use) Act 12 (1950)" of Government of India, is not violated in any manner.
9. The use of word "Indian" and /or "National" and/or "All India" and/or "All India Council" and/or Commission" in any part of the name of a Technical Institution and/ or any name whose abbreviated form leads to "IIM"/ "IIT"/"IISC"/"IIT"/ "AICTE"/ "UGC" shall not be permitted. These restrictions will not be applicable for those institutions which are established with the name approved by the Govt. of India.
9. In exercise of power conferred under 10(p) of the AICTE Act, AICTE, may inspect the Institution any time it may deem fit to verify the progress/ compliance or for any other purpose.
10. Any other condition(s) as may be specified by AICTE from time to time.

It may please be noted that consequent to judgement of Hon'ble Supreme Court delivered on 31/10/2002 in TMA Pai Case, the AICTE had issued interim policy regulations, which has been notified in the Gazette of India on 20/03/2003. All the provisions contained in the interim policy regulations shall be applicable for the academic year 2003-2004 in respect of all the AICTE approved institutions.

In the event of infringement/ contravention or non-compliance of the above Conditions and/or the provision of AICTE Act & Regulations/ Guidelines/ Norms & Standards as prescribed by AICTE, further actions leading to 'Reduced Intake' or "No Admission or Withdrawal of Approval, may be taken by AICTE and the liability arising out of such actions will be solely that of the Management/ Trust/ Society and/ or the Institution.

Your faithfully,



(Prof. R.S. Gaud)
Adviser (UG)

Not enclosed
Encl: Suggested Improvements (Specific Conditions)

Copy to:

6. The Regional Officer, AICTE-SRO, 26, Haddows Road, Shastri Bhavan, Chennai-6
2. The Registrar, JNTU
3. The Principal,
ANNAMACHARYA COLLEGE OF PHARMACY,
NEW BOYANAPALLI,
RAJAMPET-516126
4. The Commissioner of Technical Education, Govt. of Andhra Pradesh, 5th Floor, BRKR, Govt. Complex, Hyderabad -63
5. Guard File Bureau (UG)

(Prof. R.S. Gaud)



अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F.No.: 06/05/AP/PHAR/2002/001
Date: 14.05.2004

To

THE SECRETARY TECHNICAL EDUCATION,
GOVT. OF ANDHRA PRADESH,
A.P. GOVT. SECRETARIAT,
HYDERABAD - 5000 28

Sub: Extension of approval of AICTE to ANNAMACHARYA COLLEGE OF PHARMACY,
NEW BOYANPALLI, RAJAMPET - 516 126 ANDHRA PRADESH for the academic
year 2004-05.

Sir/Madam,

The Application/ Proposal and/ or the Compliance Report received from ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANPALLI, RAJAMPET - 516 126 ANDHRA PRADESH has been processed as per laid down procedure, guidelines, policy and/or norms & standards of AICTE, mentioned in AICTE Regulations and/ or "AICTE Hand Book for Approval Process".

I am directed to state that the All India council for Technical Education (AICTE) is pleased to accord approval to ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANPALLI, RAJAMPET - 516 126 ANDHRA PRADESH for extension of AICTE Approval/ Introduction of new course(s)/ Variation in intake (Increase/ Decrease), as applicable for under-graduate degree level course(s) in PHARMACY with annual intake for each course as given below :

FULL TIME COURSE(S)	EXISTING ANNUAL INTAKE	REVISED APPROVED INTAKE	ENTRY LEVEL	DURATION (YEARS)	PERIOD OF APPROVAL
B. Pharmacy	60.	60.	10+2	4	2004-2005
Total Annual Intake	60.	60.			

Contd./---2

The Approval accorded above is subject to the conditions that any of the following is not violated or intervened during the period of validity of said approval:

1. The institution must continue to have Affiliation to a University for the above courses before making admissions. In the absence of such Affiliation this letter of approval shall be treated as Withdrawn (Order of the High Court of Madras in W. P. No. 33256 of 2002 and other Batch of Petitions).
2. The approved course(s) shall commence as per the academic calendar of the Affiliating University.
3. If this letter of approval is received by you after the closing date of State / National Level Central Counseling for Admissions in the concerned State / Union Territory, this Letter of Approval will not be valid for making any admission during the above specified academic year, and shall be treated as withdrawn.
4. No excess admission shall be made by the Institution during any academic year.
5. The approval is valid only for the academic year 2004-2005. If no further extension of AICTE approval is received beyond the academic year 2004-2005, this Approval Letter will not be valid for making any admission for the subsequent years.
6. Any other condition(s) as may be specified by AICTE from time to time.

Consequent to the Supreme Court Judgment, the Model Constitution of Governing Body notified by AICTE in its approval Regulations 1994, stands overruled. It has been decided that while AICTE will not insist on any nomination in the Governing Body of Private Unaided Institutions, the Affiliating University / State Government shall impose minimum conditions of affiliation, such as, prescription of qualifications of Governing Body Members, in order to ensure academic excellence. It shall be desirable for the private unaided institutions to induct at least 50% of the members of the Governing Body drawn from renowned academia, academic administrators, Subject Experts and professionals from industry, in order to seek their innovative ideas for continuous improvement in the delivery of teaching learning process, matching best practices elsewhere and achieve excellence.

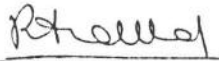
In exercise of power conferred under 10(p) of the AICTE Act, AICTE, may inspect the institution any time, it may deem fit to verify the progress / compliance or for any other purpose.

The suggested improvements, enclosed, herewith, should be complied with before the commencement of the next academic year, failing which appropriate action may be effected.

F.No.: 06/05/AP/PHAR/2002/001

In the event of infringement/ contravention or non-compliance of the above Conditions and/or the provision of AICTE Act & Regulations/ Guidelines/ Norms & Standards as prescribed by AICTE, further actions leading to "Reduced Intake" or "No Admission" or "Withdrawal of Approval", may be taken by AICTE and the liability arising out of such actions will be solely that of the Management of the Institution.

Yours faithfully,


(Prof. R.S. Gaud)
Adviser (UG)

Encl. : Suggested Improvements (Specific Conditions)

Copy to:


1. The Regional Officer,
AICTE Southern Regional Office,
26, Haddows Road,
Shastri Bhawan,
Chennai - 600 006
2. The Registrar, JNTU, UNIVERSITY
3. The Principal
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANPALLI, RAJAMPET - 516 126,
ANDHRA PRADESH,
4. The Commissioner of Tech. Education
Govt. of Andhra Pradesh,
5th Floor, BRKR Govt. Complex,
Hyderabad - 500 063.
5. Guard File, Bureau (UG), AICTE.

Name and Address of the Institution

Annamacharya College of Pharmacy,
New Boynapalli,
Rajampet 516 126

SUGGESTED IMPROVEMENTS :

- ❖ Financial status of the Institution needs to be improved.
- ❖ Hostel facility is not available.
- ❖ Builtup area is not available as per AICTE's norms.
- ❖ Qualified faculty at senior level to be recruited.
- ❖ More no. of Library Books & Journals are to be augmented.
- ❖ Qualified & Experienced Principal to be appointed as per AICTE norms.
- ❖ AICTE's pay scales to be implemented.
- ❖ Qualified & Experienced Principal to be appointed as per AICTE norms


(Aradhana Chopra)
Asst. Director(UG)



अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F.No. 06/05/AP/PHAR/2002/001

July 05, 2005

To

The Secretary Technical Education
Govt. of Andhra Pradesh.
A.P. Government Secretariat,
Hyderabad - 500 028

Sub: Extension of approval to ANNAMACHARYA COLLEGE OF PHARMACY NEW BOYANPALLI, RAJAMPET - 516 126 ANDHRA PRADESH for the year 2005-06-reg.

Sir/ Madam,

As you are aware, **All India Council for Technical Education** has been mandated under the AICTE Act, 1987 to ensure **maintenance of norms and standards** with regard to technical education in the country. In exercise of this mandate, the Council insists on fulfillment of the minimum requirements prescribed for imparting technical education by the institution so that **quality of courses** is not compromised and stakeholders are satisfied. The Council also undertakes an **annual inspection** of the institutions and conveys deficiencies to them for **rectification**.

It has been observed however that notwithstanding the Council's **repeated advice** to comply with minimum norms and standards, many institutions continue to be **complacent** about taking steps to remedy the deficiencies.

Such institutions suffer from **critical deficiencies** of faculty in proper cadre ratio, qualification, experience and other requirements. Feed back of students with regard to quality of education imparted by such institutions has evoked grave concern. The Expert Committees, following **holistic appraisal** during inspections, have also pointed out severe shortcomings

The institution has been found to be suffering from several deficiencies, which are listed in **Annexure-A** for your perusal. Shortage of faculty is of gravest concern.

The deficiencies in respect of faculty (including proper cadre ratio & qualification etc.) could have rendered your institution liable for punitive action including being placed in no admission/ reduced intake category. However the Council has decided to take a lenient view and give you yet another **last opportunity** to rectify the deficiencies particularly with regard to faculty shortage, proper cadre ratio & requisite qualification. Course-wise approved intake in respect of **ANNAMACHARYA COLLEGE OF PHARMACY NEW BOYANPALLI, RAJAMPET - 516 126 ANDHRA PRADESH**, your institution for the year 2005-06 is as under: -

COURSE (S)	APPROVED INTAKE 2004-05	APPROVED INTAKE 2005-06
B.PHARMACY	60	60
Total	60	60

Note: - Additional intake/new courses/PIO quota not granted on account of deficiencies in respect of running existing courses/intake.

इंदिरा गांधी खेल परिसर, इन्द्रप्रस्थ एस्टेट, नई दिल्ली - 110002
Indira Gandhi Sports Complex, I. P. Estate, New Delhi -110 002
दूरभाष / Phone : 23392506, 63-65-68, 71, 73 -75 फैक्स / Fax : 011-23392554
वेबसाइट / Website : www.aicte.ernet.in

The above approval is subject to your rectification of deficiencies latest by August end, 2005. A compliance report indicating rectification of deficiencies and details of faculty recruited for each course must be received by the Council, with a copy to concerned Regional Officer latest by **31st August, 2005** to entitle your institution for **extension of approval** for the year **2006-07**.

The compliance report must be accompanied with a visiting/processing fee as prescribed by the Council in the form of demand draft in favour of **Member Secretary, AICTE payable at New Delhi**. In the absence of the processing/visiting fee, the compliance report may not be entertained.

Following the compliance report, the Council would verify the status in respect of rectification of deficiencies through physical inspection without any prior intimation. The institution should therefore be prepared for random inspection without any prior notice. Extension of approval for the year 2006-07 shall be dependent on the compliance report and the outcome of the surprise inspection.

Enclosure:- Annexure-A

Yours faithfully



(Dr. P. Venkateswara Rao)
Adviser (UG/ PG)

Copy to :

1. The Principal,
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANPALLI, RAJAMPET - 516 126
ANDHRA PRADESH
2. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006
3. The Commissioner of Tech. Education Govt. of Andhra Pradesh, 5th Floor, BRKR Govt. Complex, Hyderabad - 500 063.
4. The Registrar, JNTU, HYDERABAD
(He is requested to complete the process of affiliation for facilitating admissions).
5. Guard File (UG/PG).

All India Council for Technical Education, New Delhi

Annexure "A"

Name & Address of Institution	Programme
Annamacharya College of Pharmacy, New Boyanpalli, Rajampet - 516 126, Andhra Pradesh	B.PHARMACY

Faculty:

- There is a shortfall in senior level faculty i.e. Asst. Professors. *Prof.*

Built-up Area:

- A permanent building exclusively for Pharmacy should be provided.

Library Facility:

- There is a shortfall of 560 books as only 940 are available against a requirement of 1500. ✓
- There is a shortfall of 7 Journals as only 08 are available against a requirement of 15. ✓

Computer Facility:

- LAN / WAN facility is available only on 2 computers against a requirement of availability on 20 computers, thereby causing as shortfall of 18.

Others:

- A fully furnished microbiology lab should be provided.
- Water, gas and electricity like ancillary services not properly laid down.

JS



अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

F. No. 06/05/AP/PHAR/2002/001

Date: 15/05/2006

To,

The Secretary Technical Education
Govt. of Andhra Pradesh.
A.P. Government Secretariat,
Hyderabad - 500 028

Sub: Extension of approval to Annamacharya College of Pharmacy, New Boyanpalli,, Rajampet, - 516 126 for the academic year 2006-07.

Sir,

As per the Regulations notified by the Council vide F.No. 37-3/Legal/2004 dated 28th November 2005 and norms, standards, procedures and conditions prescribed by the Council from time to time and based on the recommendations of Appraisal Committee / Expert Committee, I am directed to convey the extension of approval of the Council to Annamacharya College of Pharmacy, New Boyanpalli,, Rajampet, - 516 126 for conduct of the following courses with the intake indicated below:

Name of the Course(s)	Existing Intake	Revised Intake	Period of approval
1. B. Pharmacy	60	60	2006-2007

The above approval is subject to rectification of the following observations / deficiencies / specific conditions (if any) by 31st August 2006.

➤ **Others:**

- ❖ The deficiencies communicated in the last approval letter are not fully complied with.
- ❖ No website details provided and Mandatory Disclosure not provided on the website.

Contd.. 2/-

Note: The mandatory disclosure in prescribed format if not hosted on the website should be hosted by 31st May, 2006, failing which action would be initiated as per the rules and regulations of the AICTE including No Admission / Withdrawal of approval.

The institution is required to submit two copies of the Compliance Report, indicating the rectification of deficiencies along with mandatory disclosure and details of faculty recruited for each course in the prescribed format (available at AICTE Website www.aicte.ernet.in) to the concerned Regional Office latest by 31st August 2006 for consideration of approval beyond the session 2006-07.

The Compliance Report must be accompanied with a processing fee of Rs. 40,000/- in the form of demand draft in the favour of Member Secretary, AICTE, payable at New Delhi. In the absence of processing fee the Compliance Report will not be entertained. Following the Compliance report, the Council would verify the status in respect of rectification of deficiencies through surprise random inspection without any prior notice.

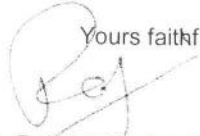
The above approval if granted after rectification of deficiencies would be subject to the fulfillment of the following general conditions:

1. That the management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.
2. (a) That the admission shall be made only after adequate infrastructure and all other facilities are provided as per norms and guidelines of the AICTE.
(b) That the admissions shall be made in accordance with the regulations notified by the Council from time to time.
(c) That the curriculum of the course, the procedure for evaluation/ assessment of students shall be in accordance with the norms prescribed by the AICTE.
(d) That the Institution shall not allow closure of the Institution or discontinuation of the course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.
(e) That no excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution
(f) That the institutions shall not have any collaborative arrangements with any Indian and/ or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution
(g) That the Institution shall not conduct any course(s) in the field of technical education in the same premises/ campus and / or in the name of the Institution without prior permission/ approval of AICTE. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution
(h) The institution shall not conduct any non-technical course(s) in the same premises/ campus under any circumstances. In case any violation is reported to the Council, appropriate penal action including withdrawal of approval shall be initiated against the Institution

- 3 That the institution shall operate only from the approved location, and that the institution shall not open any off campus study centers/ extension centers directly or in collaboration with any other institution/ university/ organization for the purpose of imparting technical education without obtaining prior approval from the AICTE.
- 4 That the tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form.
- 5 That the accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or any body or persons authorized by it.
- 6 That the Director/ Principal and the teaching and other staff shall be selected according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.
- 7 (a) That the institution shall furnish requisite returns and reports as desired by AICTE in order to ensure proper maintenance of administrative and academic standards.
(b) That the technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses/ programmes being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education on cost basis. The mandatory disclosure information shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.
(c) That it shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.
(d) That a compliance report in the prescribed format along with mandatory disclosures on fulfillment of the above conditions, shall be submitted each year by the Institution within the time limit prescribed by the Council from time to time i.e. **31st August 2006 for the current year.**
(e) That if Technical Institution fails to disclose the information or suppress and/ or misrepresent the information, appropriate action could be initiated including withdrawal of AICTE approval.
- 8 That all the laboratories, workshops etc. shall be equipped as per the syllabi of the concerned affiliated University and shall be in operational condition before making admissions.
- 9 That a library shall be established with adequate number of titles, books, journals (both Indian & Foreign) etc as per AICTE norms.
- 10 That a computer center with adequate number of terminals, Printers etc. shall be established as per AICTE norms.
- 11 AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.
- 12 That the AICTE may also conduct inspections with or without notifying the dates to verify specific complaints of mis-representation, violation of norms and standards, mal-practices etc.
- 13 That the Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid from the Central or State Government.
- 14 That the Management shall strictly follow further conditions as may be specified by the Council from time to time.

- 15 In the event of non-compliance by the Annamacharya College of Pharmacy, New Boyanpalli,, Rajampet, - 516 126 with regard to guidelines, norms and conditions prescribed from time to time the Council shall be free to take measures for withdrawal of its approval or recognition, without consideration of any related issues and that all liabilities arising out of such withdrawal would solely be that of Annamacharya College of Pharmacy, New Boyanpalli,, Rajampet, - 516 126.

Yours faithfully,


Dr. Rajnish Shrivastava
Advisor- UG/PG (M&T)

Copy to:

1. The Principal,
Annamacharya College of Pharmacy,
New Boyanpalli,,
Rajampet - 516 126
2. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006
3. The Commissioner of Tech. Education Govt. of Andhra Pradesh, 5th Floor, BRKR Govt. Complex, Hyderabad - 500 063.
4. The Registrar, JNT University, Hyderabad
(He is requested to complete the process of affiliation for facilitating admissions).
5. Guard File (UG/PG).

AICTE
approval file
13/6/07



अखिल भारतीय तकनीकी शिक्षा परिषद्
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

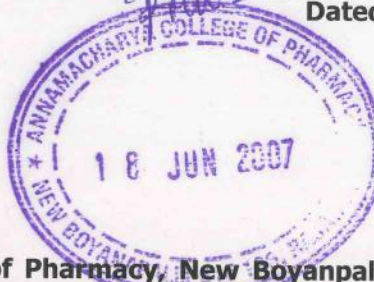
REVISED ORDER

File No. 06/05AP/PHAR/2002/001

2590
Dated: 07.06.2007

To

The Director / Principal,
Annamacharya College of Pharmacy,
New Boyanpalli, Rajampet- 516 126,
Cuddapah Dist.



Sub: AICTE approval to Annamacharya College of Pharmacy, New Boyanpalli, Rajampet- 516 126, Cuddapah Dist. for extension of approval for the academic year 2007-08.

Sir,

In partial modification to the Council's letter of even no. dated April 26, 2007, I am directed to convey the extension of approval of the Council to Annamacharya College of Pharmacy, New Boyanpalli, Rajampet- 516 126, Cuddapah Dist. for conduct of the following course(s) with the intake indicated below:

S.NO	Name of the course(s)	Existing Intake	Revised Intake	Period of approval
1	B. Pharmacy	45	60	2007-08

All others terms & conditions of the approval letter under reference will remain unchanged.

Yours Faithfully,

K. Madhu Murthy
(Prof. K. Madhu Murthy)
Advisor- M&T

Copy to:

1. The Principal Secretary, (Higher Education), Govt. of Andhra Pradesh, J Block, A.P Secretariat, Hyderabad- 5000 028
2. The Commissioner of Tech. Education, Govt. of Andhra Pradesh, V Floor, D Block, B R K Building, Tank Bund Road, Hyderabad 500 063
3. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 600 006
4. The Registrar, concerned University
5. Guard File (M&T).

ndee



अखिल भारतीय तकनीकी शिक्षा परिषद् ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

(भारत सरकार का एक सांविधिक निकाय) (A STATUTORY BODY OF THE GOVT. OF INDIA)

REVISED ORDER

Date: 15.07.2008

File No. 06/05/AP/PHAR/2002/001

To
The Principal Secretary, (Higher Education),
Govt. of Andhra Pradesh,
J Block, A.P Secretariat, Hyderabad- 5000 028

Sub: Extension of AICTE approval / Increase in intake / Grant of additional course to Annamacharya College of Pharmacy, New Boyanpalli, Rajampet - 516 126 for the academic year 2008-09.

Sir,

This is in partial modification to the Council's earlier letter no. 06/05/AP/PHAR/2002/001 dated 27.05.2008, the revised status of the programme of the Institute as follows:

S.NO	Name of the course(s)	Existing Intake	Revised Intake	Period of Approval
1.	B. Pharmacy	60	60	2008-10
2.	M.Pharm - Pharmaceutics	00	10 *	

Note: * The approval for increase in intake / additional course(s) / variation in intake is valid for two year from the date of issue of this letter for obtaining affiliation with concerned University and State Govt. requirements for admission.

"That the institution shall take appropriate measures for prevention of ragging in any form, in the light of directions of Supreme Court of India in Writ Petition No. (C) 656/1998. In case of failure to prevent the instances of ragging by the institutions, the Council shall take appropriate action including withdrawal of approval".

The additional intake is being granted based on the projection shown in the Detailed Project Report regarding additional built-up space, faculty and other facilities for the proposed intake. It may be noted that all facilities including additional built up area should be made available before the commencement of the next academic session. Random surprise inspection would be carried out to verify facilities and if the institute is found deficient in fulfillment of norms & standards of AICTE, appropriate action would be initiated by the Council.

Please note that others terms & conditions mentioned in the earlier letter of even no. dated 27.05.2008 will remain.

This approval is granted based on the Appraisal of the informed by the Institution on infrastructural facilities and academic faculty created for the proposed course(s). Therefore, the approval is subject to the verification of the claims made by the institution through an Expert Committee visit. In case the claims made by the institution is found to be false, the approval granted shall be liable to be withdrawn.

Yours Faithfully,

(Prof. Harish C. Rai)
Advisor- M&T

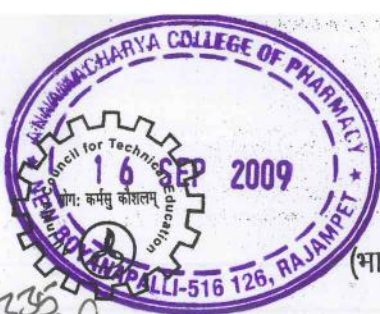
Copy to:

1. The Director / Principal,
Annamacharya College of Pharmacy,
New Boyanpalli, Rajampet - 516 126
2. The Commissioner of Tech. Education, Govt. of Andhra Pradesh, V Floor, D Block, B R K Building, Tank Bund Road, Hyderabad 500 063
3. The Regional Officer, AICTE Southern Regional Office, 26, Haddows Road, Shastri Bhawan, Chennai - 006
4. The Registrar, concerned University
5. Guard File (M&T).

7वाँ तल, चन्द्रलोक भवन, जनपथ नई दिल्ली-110001

7th Floor, Chander Lok Building, Janpath, New Delhi-110001

Phone : 011-23724151-57 Fax : 011-23724183 Website : www.aicte.ernet.in



अखिल भारतीय तकनीकी शिक्षा परिषद् ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

(भारत सरकार का एक सांविधिक निकाए) (A STATUTORY BODY OF THE GOVT. OF INDIA)

REVISED ORDER

File No. 06/05AP/PHAR/2002/001

Date: 23.07.2009

To
The Principal Secretary, (Higher Education),
Govt. of Andhra Pradesh,
J Block, A.P Secretariat, Hyderabad- 5000 028

Sub: Extension of AICTE approval / Increase in intake / Grant of additional course to Annamacharya College of Pharmacy, New Boyanpalli, Rajampet- 516 126, Cuddapah Dist..

Sir,

This is in partial modification to the Council's earlier letter no. 06/05AP/PHAR/2002/001 dated 12.06.2009, the revised status of the programme of the Institute as follows:

S.NO	Name of the course(s)	Existing Intake	Revised Intake
1.	B. Pharmacy	60	60
2.	M.Pharm (Pharmaceutics)	10	18 *
3.	M.Pharm (Pharmaceutical Chemistry)	00	10 *

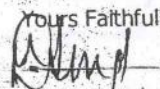
Note: * The approval for increase in intake / additional course(s) / variation in intake is valid for two year from the date of issue of this letter for obtaining affiliation with concerned University and State Govt. requirements for admission.

"That the institution shall take appropriate measures for prevention of ragging in any form, in the light of directions of Supreme Court of India in Writ Petition No. (C) 656/1998. In case of failure to prevent the instances of ragging by the institutions, the Council shall take appropriate action including withdrawal of approval".

The additional intake is being granted based on the projection shown in the Detailed Project Report regarding additional built-up space, faculty and other facilities for the proposed intake. It may be noted that all facilities including additional built up area should be made available before the commencement of the next academic session. Random surprise inspection would be carried out to verify facilities and if the institute is found deficient in fulfillment of norms & standards of AICTE appropriate action would be initiated by the Council.

Please note that others terms & conditions mentioned in the earlier letter of even no. dated 12.06.2009 will remain.

This approval is granted based on the Appraisal of the informed by the Institution on infrastructural facilities and academic faculty created for the proposed course(s). Therefore, the approval is subject to the verification of the claims made by the institution through an Expert Committee visit. In case the claims made by the institution is found to be false, the approval granted shall be liable to be withdrawn.

Yours Faithfully,

(Prof. Dev Vrat Singh)
Advisor- E&T / M&T

Copy to:

1. The Director / Principal,
Annamacharya College of Pharmacy
New Boyanpalli, Rajampet- 516 126,
Cuddapah Dist.
2. The Commissioner of Tech. Education, Govt. of Andhra Pradesh, V Floor, D Block, B R K Building, Tank Bund Road, Hyderabad 500 063
3. The Regional officer, AICTE-South Central Regional Office, First Floor, Old BICARD Building, Jawaharlal Nehru Technological University, Masab Tank, Hyderabad - 500 076
4. The Registrar, concerned University
5. Guard File (M&T).

7वाँ तल, चन्द्रलोक भवन, जनपथ नई दिल्ली-110001

7th Floor, Chander Lok Building, Janpath, New Delhi-110001

Phone : 011-23724151-57 Website : www.aicte.ernet.in



All India Council for Technical Education
(A Statutory Body under Ministry of HRD, Govt of India)

7th floor, Chandralok Building, Janpath, New Delhi 110 001
Phone : 11 23724151-57 FAX : 11 23724183 www.aicte-india.org

No. : South Central Region/1-5526861/2010/EOA

August 23, 2010

To,
Principal Secretary (Higher Education) Govt. of Andhra Pradesh, J Block,
4th Floor, Secretariat Building, Hyderabad-500022



Sub. : Extension of approval for the academic year 2010-11.

Sir,

In terms of the Regulations notified by the Council vide F. No. 37-3/Legal/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to :

ANNAMACHARYA EDUCATIONAL TRUST, ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANAPALLI (POST)THALLAPAKA PANCHAYATRAJAMPET (MANDAL)KADAPA (DISTRICT)ANDHRA PRADESHPIN: 516 126, RAJAMPET, ANDHRA PRADESH, PIN : 516 126

for conduct of the following courses with the intake indicated below in the academic year 2010-11:

Sr. No.	Program	Level	Shift	Course	Intake 2009-10	Intake 2010-11
1	Pharmacy	UG	First Shift	B.PHARMACY	60	180
2	Pharmacy	PG	First Shift	M.PHARM (PHARMACY PRACTICE & CLINICAL PHARMACY)	0	0
3	Pharmacy	PG	First Shift	M.PHARM (PHARMACOLOGY)	0	0
4	Pharmacy	PG	First Shift	M.PHARM (PHARMA ANALYSIS & QUALITY ASSURANCE)	0	18
5	Pharmacy	PG	First Shift	M.PHARM (PHARMACEUTICAL CHEMISTRY)	10	18
6	Pharmacy	PG	First Shift	M.PHARM (PHARMACEUTICS)	18	18

The above mentioned approval is subject to the condition that :

ANNAMACHARYA EDUCATIONAL TRUST, ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANAPALLI (POST)THALLAPAKA PANCHAYATRAJAMPET (MANDAL)KADAPA (DISTRICT)ANDHRA PRADESHPIN: 516 126, RAJAMPET, ANDHRA PRADESH, PIN : 516 126

shall follow and adhere to the regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal and hard copy to Regional Office.

Anti Ragging :- The approval is subject to the institutions strictly complying with all the provisions made under the Anti ragging regulation notified by council vide F.No. 37/Legal/AICTE/2009 dated 1-7-2009 failing which, it will be liable to any action defined under clause 9(4) of this regulation.

Yours faithfully,

Dr. S. G. Bhurud
Director

South Central Regional Office
All India Council for Tech. Education
JNTU Masab Tank Campus
Mahavir Marg, Hyderabad-500 028.





All India Council for Technical Education
(A Statutory Body under Ministry of HRD, Govt of India)

7th floor, Chandralok Building, Janpath, New Delhi 110 001
Phone : 11 23724151-57 FAX : 11 23724183 www.aicte-india.org

Copy to :

1. The Regional Office, South Central Region, Andhra Pradesh
2. The Director of Technical Education, Govt. of ~~Delhi~~ **AP**
3. Guard File (AICTE)
4. The Registrar, Affiliating University

5. The Principal / Director,

ANNAMACHARYA EDUCATIONAL TRUST, ANNAMACHARYA COLLEGE OF PHARMACY, NEW BOYANAPALLI (POST) THALLAPAKA
PANCHAYATRAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, ANDHRA PRADESH, PIN : 516 126





All India Council for Technical Education
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F.No. South-Central/1-407039004/2011/EOA

Date: 01-09-2011

To,
The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2011-12.
Ref : Application of the Institution for Extension of Approval for the Year 2011-12

Sir/Madam,

In terms of the Regulations notified by the Council vide F.No. 37-3/Legal/2011 dated 10/12/2010 and norms, standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the extension of approval of the Council to

Regional Office	South-Central	Application Id	1-407039004
		Permanent Id	1-5526861
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/77/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private		

to conduct following courses with the intake indicated below for the academic year 2011-12

Application Id: 1-407039004			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No



Application Id: 1-407039004			Course	Full/Part Time	Affiliating Body	Intake 2010-11	Intake Approved for 11-12	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	0	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	0	18	No	No	No
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	180	300	No	No	No

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE



All India Council for Technical Education
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7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education,**
Andhra Pradesh
3. **The Registrar,**
Jawaharlal Nehru Technological University, Anantpur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013
6. **Guard File(AICTE)**



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F.No. South-Central/1-704208702/2012/EOA

Date: 10/05/2012

To,
The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2012-13

Ref: Application of the Institution for Extension of approval for the academic year 2012-13

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2010 notified by the Council vide notification number F-No.37-3/Legal/2010 dated 10/12/2010 and amendment vide notification number F-No.37-3/Legal/2011 dated 30/09/2011 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	South-Central	Application Id	1-704208702
		Permanent Id	1-5526861
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2012-13



Application Id: 1-704208702			Course	Full/Part Time	Affiliating Body	Intake 2011-12	Intake Approved for 12-13	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	18	18	No	No	No
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	300	120	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	0	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantpur	0	18	No	No	No

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.



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In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. K P Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education,**
Andhra Pradesh
3. **The Registrar,**
Jawaharlal Nehru Technological University, Anantpur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013
6. **Guard File(AICTE)**



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F.No. South-Central/1-1443772473/2013/EOA

Date: 19-Mar-2013

To,
The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2013-14

Ref: Application of the Institution for Extension of approval for the academic year 2013-14

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	South-Central	Application Id	1-1443772473
		Permanent Id	1-5526861
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2013-14



Application Id: 1-1443772473			Course	Full/Part Time	Affiliating Body	Intake 2012-13	Intake Approved for 13-14	NRI	PIO	Foreign Collaboration
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	24	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICALS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	24	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICALS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	No	No	No
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	No	No	No
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	120	120	No	No	No

- Validity of the course details may be verified at www.aicte-india.org/departments/approvals

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution



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along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. Kuncheria P. Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education,**
Andhra Pradesh
3. **The Registrar,**
Jawaharlal Nehru Technological University, Anantapur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013
6. **Guard File(AICTE)**



All India Council for Technical Education
(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org





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F.No. South-Central/1-2018589610/2014/EOA

Date: 04-Jun-2014

To,
The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2014-15

Ref: Application of the Institution for Extension of approval for the academic year 2014-15

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	South-Central	Application Id	1-2018589610
		Permanent Id	1-5526861
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

to conduct following courses with the intake indicated below for the academic year 2014-15

Application Number: 1-2018589610*

Page 1 of 4

Note: This is a Computer generated Letter of Approval.No signature is required.

Letter Printed On:5 June 2014

Printed By : AE133217



Application Id: 1-2018589610			Course	Full/Part Time	Affiliating Body	Intake 2013-14	Intake Approved for 14-15	NRI Approval status	PIO Approval status	Foreign Collaboration Approval status
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	24	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	24	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	N
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	N
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	120	120	NA	NA	N

- Validity of the course details may be verified at www.aicte-india.org/departments/approvals



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The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal and subsequently upload and update the student/ faculty/ other data on portal as per the time schedule which will be intimated by AICTE.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

(Dr. Kuncheria P. Isaac)

Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education,**
Andhra Pradesh
3. **The Registrar,**
Jawaharlal Nehru Technological University, Anantapur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,

Application Number: 1-2018589610*

Page 3 of 4

Note: This is a Computer generated Letter of Approval.No signature is required.

Letter Printed On:5 June 2014

Printed By : AE133217



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D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013

6. Guard File(AICTE)



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(A Statutory body under Ministry of HRD, Govt. of India)

7th Floor, Chandralok Building, Janpath, New Delhi- 110 001
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F.No. South-Central/1-2453920006/2015/EOA

Date: 07-Apr-2015

To,
The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2015-16

Ref: Application of the Institution for Extension of approval for the academic year 2015-16

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	South-Central	Application Id	1-2453920006
		Permanent Id	1-5526861
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private		

Opted for change from Women to Co-ed	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

To conduct following courses with the intake indicated below for the academic year 2015-16

Application Number: 1-2453920006*

Page 1 of 4

Note: This is a Computer generated Letter of Approval.No signature is required.

Letter Printed On:11 April 2015

Printed By : AE133217



Application Id: 1-2453920006			Course	Full/Part Time	Affiliating Body	Intake 2014-15	Intake Approved for 15-16	NRI Approval status	PIO Approval status	Foreign Collaboration Approval status
Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	24	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	24	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	18	NA	NA	NA



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Application Id: 1-2453920006			Course	Full/Part Time	Affiliating Body	Intake 2014-15	Intake Approved for 15-16	NRI Approval status	PIO Approval status	Foreign Collaboration Approval status
Program	Shift	Level								
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	120	120	NA	NA	NA

Note: Validity of the course details may be verified at www.aicte-india.org/departments/approvals

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Dr. Avinash S Pant
Actg Chairman, AICTE

Copy to:

- The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
- The Director Of Technical Education,**
Andhra Pradesh
- The Registrar,**

Application Number: 1-2453920006*

Page 3 of 4

Note: This is a Computer generated Letter of Approval.No signature is required.

Letter Printed On:11 April 2015

Printed By : AE133217



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PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

Jawaharlal Nehru Technological University, Anantapur

4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013
6. **Guard File(AICTE)**



All India Council for Technical Education
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F.No. South-Central/1-2813937313/2016/EOA

Date: 05-Apr-2016

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2016-17

Ref: Application of the Institution for Extension of approval for the academic year 2016-17

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2012 notified by the Council vide notification number F-No.37-3/Legal/2012 dated 27/09/2012 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Regional Office	South-Central	Application Id	1-2813937313
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Permanent Id	1-5526861
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Institute Type	Unaided - Private	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013

Opted for change from Women to Co-ed and Vice versa	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved and Vice versa	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable

To conduct following courses with the intake indicated below for the academic year 2016-17

Application Id: 1-2813937313			Course		Affiliating Body					
Program	Shift	Level		Full/Part Time		Intake 2015-16	Intake Approved for 2016-17	NRI Approval status	PIO / FN / Gulf quota Approval status	Foreign Collaboration/Twinning Program Approval status*



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PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	24	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	18	15	NA	NA	NA
PHARMACY	1st Shift	UNDERGRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	120	100	NA	NA	NA

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In



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case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Note: Validity of the course details may be verified at www.aicte-india.org

Dr. Avinash S Pant
Vice - Chairman, AICTE

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education,**
Andhra Pradesh
3. **The Registrar,**
Jawaharlal Nehru Technological University, Anantapur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013
6. **Guard File(AICTE)**



All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg Vasant Kunj, New Delhi-110067

PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-india.org

F.No. South-Central/1-3325994110/2017/EOA

Date: 30-Mar-2017

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of approval for the academic year 2017-18

Ref: Application of the Institution for Extension of approval for the academic year 2017-18

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5526861	Application Id	1-3325994110
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126
Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDERABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private	Region	South-Central

Opted for change from Women to Co-ed and Vice versa	No	Opted for change of name	No	Opted for change of site	No
Change from Women to Co-ed approved and Vice versa	Not Applicable	Change of name Approved	Not Applicable	Change of site Approved	Not Applicable
Opted for Conversion from degree to diploma	No	Opted for Conversion from diploma to degree	No	Conversion (degree to diploma or vice-versa) Approved	Not Applicable

To conduct following courses with the intake indicated below for the academic year 2017-18

Application Id: 1-3325994110	Course	Full/Part Time	Affiliating Body	Intake 2016-17	Intake Approved for	NRI Approval status	P/O / FN / Gulf quota/ NRI	Foreign Collaboration/ Twinning Program
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All India Council for Technical Education

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Nelson Mandela Marg Vasant Kunj, New Delhi-110067

PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-india.org

Program	Shift	Level								
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	POST GRADUATE	PHARMACOLOGY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA	NA
PHARMACY	1st Shift	UNDER GRADUATE	PHARMACY	FULL TIME	Jawaharlal Nehru Technological University, Anantapur	100	100	NA	NA	NA

The above mentioned approval is subject to the condition that ANNAMACHARYA COLLEGE OF PHARMACY shall follow and adhere to the Regulations, guidelines and directions issued by AICTE from time to time and the undertaking / affidavit given by the institution along with the application submitted by the institution on portal.



All India Council for Technical Education

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Nelson Mandela Marg Vasant Kunj, New Delhi-110067

PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-india.org

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation:- Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Note: Validity of the course details may be verified at www.aicte-india.org

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. **The Director Of Technical Education**,**
Andhra Pradesh
3. **The Registrar**,**
Jawaharlal Nehru Technological University, Anantapur
4. **The Principal / Director,**
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET, YSR DISTRICT,
Andhra Pradesh, 516126
5. **The Secretary / Chairman,**
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD, HYDERABAD,
Andhra Pradesh, 500013
6. **Guard File(AICTE)**

Note: ** - Approval letter copy will not be communicated through post/email. However, provision is made in the portal for downloading Approval letter through Authorized login credentials allotted to concerned DTE/Registrar.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg, Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org



APPROVAL PROCESS 2018-19

Extension of Approval (EOA)

F.No. South-Central/1-3513684814/2018/EOA

Date: 10-Apr-2018

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of Approval for the Academic Year 2018-19

Ref: Application of the Institution for Extension of approval for the Academic Year 2018-19

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and amended on December 5, 2017 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5526861	Application Id	1-3513684814
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST
Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDER ABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private	Region	South-Central

Opted for Change from Women to Co-Ed and vice versa	No	Change from Women to Co-Ed and vice versa Approved or Not	NA
Opted for Change of Name	No	Change of Name Approved or Not	NA
Opted for Change of Site	No	Change of Site Approved or Not	NA
Opted for Conversion from Degree to Diploma or vice versa	No	Conversion for Degree to Diploma or vice versa Approved or Not	NA
Opted for Organization Name Change	No	Change of Organization Name Approved or Not	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2018-19

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2018-19	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status	Foreign Collaboration / Twinning Program Approval Status*
PHARMACY	1st	POST GRADUATE	PHARMACEUTICS	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	POST	PHARMACEUTICAL	FT	Jawaharlal Nehru	15	NA	NA	NA

		GRADUATE	L ANALYSIS AND QUALITY ASSURANCE		Technological University, Anantapur				
PHARMACY	1st	POST GRADUATE	PHARMACOLOGY	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARMACEUTICAL TECHNOLOGY	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	UNDER GRADUATE	PHARMACY	FT	Jawaharlal Nehru Technological University, Anantapur	100	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARMACEUTICAL ANALYSIS	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARMACEUTICS (DRUG REGULATORY AFFAIRS)	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARM.D.	FT	Jawaharlal Nehru Technological University, Anantapur	30	NA	NA	NA
PHARMACY	1st	POST GRADUATE	PHARM.D. (POST BACCALAUREATE)	FT	Jawaharlal Nehru Technological University, Anantapur	10	NA	NA	NA

+FT –Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. The Regional Officer,
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
2. The Director Of Technical Education**,
Andhra Pradesh
3. The Registrar**,
Jawaharlal Nehru Technological University, Anantapur
4. The Principal / Director,
ANNAMACHARYA COLLEGE OF PHARMACY
NEW BOYANAPALLI (POST)
THALLAPAKA PANCHAYAT
RAJAMPET (MANDAL)
KADAPA (DISTRICT)
ANDHRA PRADESH
PIN: 516 126,
RAJAMPET,YSR DISTRICT,
Andhra Pradesh,516126
5. The Secretary / Chairman,
ANNAMACHARYA EDUCATIONAL TRUST
2-2-25/P/7/1,

D.D.COLONY
BAGH AMBERPET
HYDERABAD,
HYDERABAD,HYDERABAD,
Andhra Pradesh,500013

6. Guard File(AICTE)

Note: Validity of the Course details may be verified at <http://www.aicte-india.org/>

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg, Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org



APPROVAL PROCESS 2019-20

Extension of Approval (EoA)

F.No. South-Central/1-4263470551/2019/EOA

Date: 25-Apr-2019

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5526861	Application Id	1-4263470551
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST
Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDER ABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private	Region	South-Central

Opted for Change from Women to Co-Ed and vice versa	No	Change from Women to Co-Ed and vice versa Approved or Not	NA
Opted for Change of Name	No	Change of Name Approved or Not	NA
Opted for Change of Site/Location	No	Change of Site/Location Approved or Not	NA
Opted for Conversion from Degree to Diploma or vice versa	No	Conversion for Degree to Diploma or vice versa Approved or Not	NA
Opted for Organization Name Change	No	Change of Organization Name Approved or Not	NA
Opted for Merger of Institution	No	Merger of Institution Approved or Not	NA
Opted for Introduction of New Program/Level	No	Introduction of Program/Level Approved or Not	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
Pharmacy	1st	POST GRADUATE	Pharmaceutics	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	POST	Pharmaceutical	FT	Jawaharlal Nehru	15	NA	NA

		GRADUA TE	Chemistry		Technological University, Anantapur			
Pharmacy	1st	POST GRADUA TE	Pharmaceutical Analysis And Quality Assurance	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharmacology	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	UNDER GRADUA TE	Pharmacy	FT	Jawaharlal Nehru Technological University, Anantapur	100	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharm.D.	FT	Jawaharlal Nehru Technological University, Anantapur	30	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharm.D. (Post Baccalaureate)	FT	Jawaharlal Nehru Technological University, Anantapur	10	NA	NA

+FT –Full Time,PT-Part Time

Punitive Action against the Institute

Course(s) Applied for Closure by the Institute for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Course Closure Status
Pharmacy	1st	POST GRADUATE	Pharmaceutical Technology	FT	Jawaharlal Nehru Technological University, Anantapur	Approved
Pharmacy	1st	POST GRADUATE	Pharmaceutical Analysis	FT	Jawaharlal Nehru Technological University, Anantapur	Approved
Pharmacy	1st	POST GRADUATE	Pharmaceutics (Drug Regulatory Affairs)	FT	Jawaharlal Nehru Technological University, Anantapur	Approved

+FT-Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

- The Director Of Technical Education**, Andhra Pradesh**
- The Registrar**,
Jawaharlal Nehru Technological University, Anantapur**

3. **The Principal / Director,**
Annamacharya College Of Pharmacy
New Boyanapalli (Post)
Thallapaka Panchayat
Rajampet (Mandal)
Kadapa (District)
Andhra Pradesh
Pin: 516 126,
Rajampet, Ysr District,
Andhra Pradesh, 516126
4. **The Secretary / Chairman,**
Annamacharya Educational Trust
2-2-25/P/7/1,
D.D.Colony
Bagh Amberpet
Hyderabad.
Hyderabad, Hyderabad,
Andhra Pradesh, 500013
5. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at <http://www.aicte-india.org/>

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg, Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org



APPROVAL PROCESS 2019-20

Extension of Approval (EOA)

F.No. South-Central/1-4263470551/2019/EOA

Date: 25-Apr-2019

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5526861	Application Id	1-4263470551
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST
Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDER ABAD, Andhra Pradesh, 500013
Institute Type	Unaided - Private	Region	South-Central

Opted for Change from Women to Co-Ed and vice versa	No	Change from Women to Co-Ed and vice versa Approved or Not	NA
Opted for Change of Name	No	Change of Name Approved or Not	NA
Opted for Change of Site/Location	No	Change of Site/Location Approved or Not	NA
Opted for Conversion from Degree to Diploma or vice versa	No	Conversion for Degree to Diploma or vice versa Approved or Not	NA
Opted for Organization Name Change	No	Change of Organization Name Approved or Not	NA
Opted for Merger of Institution	No	Merger of Institution Approved or Not	NA
Opted for Introduction of New Program/Level	No	Introduction of Program/Level Approved or Not	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
Pharmacy	1st	POST GRADUATE	Pharmaceutics	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	POST	Pharmaceutical	FT	Jawaharlal Nehru	15	NA	NA

		GRADUA TE	Chemistry		Technological University, Anantapur			
Pharmacy	1st	POST GRADUA TE	Pharmaceutical Analysis And Quality Assurance	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharmacology	FT	Jawaharlal Nehru Technological University, Anantapur	15	NA	NA
Pharmacy	1st	UNDER GRADUA TE	Pharmacy	FT	Jawaharlal Nehru Technological University, Anantapur	100	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharm.D.	FT	Jawaharlal Nehru Technological University, Anantapur	30	NA	NA
Pharmacy	1st	POST GRADUA TE	Pharm.D. (Post Baccalaureate)	FT	Jawaharlal Nehru Technological University, Anantapur	10	NA	NA

+FT –Full Time,PT-Part Time

Punitive Action against the Institute

Course(s) Applied for Closure by the Institute for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Course Closure Status
Pharmacy	1st	POST GRADUATE	Pharmaceutical Technology	FT	Jawaharlal Nehru Technological University, Anantapur	Approved
Pharmacy	1st	POST GRADUATE	Pharmaceutical Analysis	FT	Jawaharlal Nehru Technological University, Anantapur	Approved
Pharmacy	1st	POST GRADUATE	Pharmaceutics (Drug Regulatory Affairs)	FT	Jawaharlal Nehru Technological University, Anantapur	Approved

+FT-Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

- The Director Of Technical Education**, Andhra Pradesh**
- The Registrar**,
Jawaharlal Nehru Technological University, Anantapur**

3. **The Principal / Director,**
Annamacharya College Of Pharmacy
New Boyanapalli (Post)
Thallapaka Panchayat
Rajampet (Mandal)
Kadapa (District)
Andhra Pradesh
Pin: 516 126,
Rajampet, Ysr District,
Andhra Pradesh, 516126

4. **The Secretary / Chairman,**
Annamacharya Educational Trust
2-2-25/P/7/1,
D.D.Colony
Bagh Amberpet
Hyderabad.
Hyderabad, Hyderabad,
Andhra Pradesh, 500013

5. **The Regional Officer,**
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at <http://www.aicte-india.org/>

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg, Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org



APPROVAL PROCESS 2020-21

Extension of Approval (EoA)

F.No. South-Central/1-7001959237/2020/EOA

Date: 30-Apr-2020

To,

The Principal Secretary
(Higher Education) Govt. of Andhra Pradesh,
J Block, 4th Floor, Secretariat Building,
Hyderabad-500022

Sub: Extension of Approval for the Academic Year 2020-21

Ref: Application of the Institution for Extension of Approval for the Academic Year 2020-21

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2020 notified by the Council vide notification number F.No. AB/AICTE/REG/2020 dated 4th February 2020 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-5526861	Application Id	1-7001959237
Name of the Institute	ANNAMACHARYA COLLEGE OF PHARMACY	Name of the Society/Trust	ANNAMACHARYA EDUCATIONAL TRUST
Institute Address	NEW BOYANAPALLI (POST) THALLAPAKA PANCHAYAT RAJAMPET (MANDAL) KADAPA (DISTRICT) ANDHRA PRADESH PIN: 516 126, RAJAMPET, YSR DISTRICT, Andhra Pradesh, 516126	Society/Trust Address	2-2-25/P/7/1, D.D.COLONY BAGH AMBERPET HYDERABAD, HYDERABAD, HYDE RABAD,,500013
Institute Type	Private-Self Financing	Region	South-Central

To conduct following Courses with the Intake indicated below for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2019-20	Intake Approved for 2020-21	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
PHARMACY	POST GRADUATE	PHARMACEUTICS	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA
PHARMACY	POST GRADUATE	PHARMACEUTICAL CHEMISTRY	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA

PHARMACY	POST GRADUATE	PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA
PHARMACY	POST GRADUATE	PHARMACOLOGY	Jawaharlal Nehru Technological University, Anantapur	15	15	NA	NA
PHARMACY	UNDER GRADUATE	PHARMACY	Jawaharlal Nehru Technological University, Anantapur	100	100	NA	NA
PHARMACY	POST GRADUATE	PHARM.D.	Jawaharlal Nehru Technological University, Anantapur	30	30	NA	NA
PHARMACY	POST GRADUATE	PHARM.D. (POST BACCALAUREATE)	Jawaharlal Nehru Technological University, Anantapur	10	10	NA	NA

It is mandatory to comply with all the essential requirements as given in APH 2020-21 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2020-21 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years beginning with the Academic Year 2020-21
2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2020-21 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/ Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE.
3. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.
4. Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 373/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education****, Andhra Pradesh
2. **The Registrar****,
Jawaharlal Nehru Technological University, Anantapur
3. **The Principal / Director**,
ANNAMACHARYA COLLEGE OF PHARMACY
New Boyanapalli (Post)
Thallapaka Panchayat
Rajampet (Mandal)
Kadapa (District)
Andhra Pradesh
Pin: 516 126,
Rajampet, Ysr District,
Andhra Pradesh, 516126
4. **The Secretary / Chairman**,
2-2-25/P/7/1,
D.D.COLONY
BAGH AMBERPET
HYDERABAD
HYDERABAD, HYDERABAD
,500013
5. **The Regional Officer**,
All India Council for Technical Education
First Floor, old BICARD Building
Jawaharlal Nehru Technological University
Masab Tank, Hyderabad-500076
6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at <http://www.aicte-india.org/>

** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

ANNAMACHARYA EDUCATIONAL TRUST

H.No.2-2-25/P/7/1, D.D.COLONY

BAGH AMBERPET

HYDERABAD 500 013

22nd ANNUAL REPORT
FOR THE FINANCIAL YEAR
2018-2019

INDIAN INCOME TAX RETURN ACKNOWLEDGEMENT

[Where the data of the Return of Income in Form ITR-1 (SAHAJ), ITR-2, ITR-3, ITR-4, ITR-5, ITR-6, ITR-7 filed and verified electronically]

Assessment Year
2019-20

PERSONAL INFORMATION AND THE ACKNOWLEDGEMENT NUMBER	Name			PAN		
	ANNAMACHARYA EDUCATIONAL TRUST			AAATA4211D		
	Flat/Door/Block No	Name Of Premises/Building/Village		Form Number.	ITR-7	
	H.NO.2-2-25/P/7/1	D.D.COLONY				
	Road/Street/Post Office	Area/Locality				
	BAGH AMBERPET	HYDERABAD		Status	AOP/BOI	
	Town/City/District	State	Pin/ZipCode	Filed u/s		
	HYDERABAD	TELANGANA	500013	139(1)-On or before due date		
	Assessing Officer Details (Ward/Circle)			EXEMPTION CIRCLE I(1)HYD		
	e-filing Acknowledgement Number			245216181311019		
COMPUTATION OF INCOME AND TAX THEREON	1	Gross total income			1	0
	2	Total Deductions under Chapter-VI-A			2	0
	3	Total Income			3	0
	3a	Deemed Total Income under AMT/MAT			3a	0
	3b	Current Year loss, if any			3b	0
	4	Net tax payable			4	0
	5	Interest and Fee Payable			5	0
	6	Total tax, interest and Fee payable			6	0
	7	Taxes Paid	a	Advance Tax	7a	0
			b	TDS	7b	1262069
c			TCS	7c	222451	
d			Self Assessment Tax	7d	0	
e			Total Taxes Paid (7a+7b+7c +7d)	7e	1484520	
8	Tax Payable (6-7e)			8	0	
9	Refund (7e-6)			9	1484520	
10	Exempt Income	Agriculture	0	10	0	
		Others	0			

Income Tax Return submitted electronically on 31-10-2019 20:13:38 from IP address 183.83.174.152 and verified by

ABHISHEK CHOPPA having PAN AERPC9297E on 31-10-2019 20:13:38 from IP address 183.83.174.152 using Digital Signature Certificate (DSC)

DSC details: 15580339CN=e-Mudhra Sub CA for Class 2 Individual 2014,OU=Certifying Authority,O=eMudhra Consumer Services Limited,C=IN

DO NOT SEND THIS ACKNOWLEDGEMENT TO CPC, BENGALURU

Annamacharya College of Pharmacy-2018-19

New Boyanapalli
Rajampet
Kadapa (Dist)

Balance Sheet

1-Apr-2018 to 31-Mar-2019

Liabilities		as at 31-Mar-2019	Assets		as at 31-Mar-2019
Current Liabilities		2,25,72,799.50	Capital Account		5,22,73,856.30
Provisions	56,19,234.50		College Development Fund	5,22,73,856.30	
Sundry Creditors	1,69,53,565.00				
Branch / Divisions		7,98,19,300.46	Fixed Assets		3,22,45,262.00
AET - Hostel-Ancp	98,89,829.00		Building	2,34,49,216.00	
A.E.T-Rajampet-Ancp	6,48,02,077.46		College Buses	28,747.00	
AITs - HYDERABAD.Ancp	45,37,769.00		Computers	4,05,067.00	
Aits Rajampet-Ancp	5,89,625.00		Electrical Equipment	3,46,041.00	
			Furnitures & Fittings	24,96,982.00	
Suspense A/c			Lab Equipment	39,12,231.00	
Excess of expenditure over income			Library Books	3,23,685.00	
Opening Balance			Office Equipment	12,09,165.00	
Current Period	1,74,06,627.00		Software	74,128.00	
Less: Transferred	1,74,06,627.00				
			Current Assets		1,78,72,981.66
			Deposits (Asset)	13,900.00	
			Loans & Advances (Asset)	2,03,763.00	
			Sundry Debtors	1,47,17,922.40	
			Cash-in-hand	1,40,500.00	
			Bank Accounts	8,38,162.76	
			Prepaid Affiliation Fee	9,05,000.00	
			Prepaid AFRC Processing Fee	72,000.00	
			Prepaid Hospital Fee	8,27,000.00	
			Prepaid Insurance	29,324.00	
			Prepaid Processing Fee	40,000.00	
			Prepaid Subscription	85,409.50	
Total		10,23,92,099.96	Total		10,23,92,099.96



For ANNAMACHARYA EDUCATIONAL TRUST

C. Shashikala
SECRETARY

Annamacharya College of Pharmacy-2018-19

New Boyanapalli

Rajampet

Kadapa (Dist)

Income and Expenditure Statement

1-Apr-2018 to 31-Mar-2019

Particulars	1-Apr-2018 to 31-Mar-2019	Particulars	1-Apr-2018 to 31-Mar-2019
Academic Expenses	2,03,98,610.50	Bus Fee Received	5,26,825.00
Affiliation Fee	6,25,000.00	Bus Collections	5,26,825.00
Application Fee	5,000.00		
Chemical & Glassware	2,13,349.00	Examination Fee	14,040.00
Games & Sports	19,400.00	JNTU CONDONATION FEE	14,040.00
Guest Lecturers	5,92,700.00		
Hospital Posting Fee	(-)97,000.00	Interest on Fixed Deposits	
Inspection Fee	40,000.00		
Internet Expenses	59,737.00	Miscellaneous Income	6,54,423.00
Printing & Stationery	3,12,455.00	Interest on SB	40,527.00
Prizes & Medals	3,400.00	Lab Breakage	78,960.00
Processing Fee	3,46,800.00	Misc Income	43,770.00
Remuneration	1,35,500.00	Other Collections	4,63,350.00
Seminar & Conference	1,16,220.00	Other Deductions	15,000.00
Seminar & Conference (Enterprenurship)	(-)9,482.00	Xercx Collections	12,816.00
Seminar & Conference (National)	90,468.00		
Seminar & Conference (Workshop)	(-)17,970.00	Other Collections	
Staff Salaries	1,77,42,568.50	Tuition Fee	4,42,28,600.00
Subscription	2,20,465.00	Lab Utility Fee	24,12,800.00
		Library Utility Fee	7,54,000.00
Administrative Expenses	24,19,622.00	Tuition Fee Received	9,11,500.00
Advertisement Charges	3,78,809.00	Tuition Fee Received (B.Ph)	1,65,41,500.00
Annual Day Celebrations	8,000.00	Tuition Fee Received (D.Ph)	8,72,400.00
Contingencies	8,69,184.00	Tuition Fee Received (M.Pharm)	64,17,400.00
Electricity Charges	5,010.00	Tuition Fee Received (Pharm.D)	1,60,69,000.00
Hospitality	1,39,875.00	Tuition Fee Received (Pharm.D-PB)	2,50,000.00
Insurance Charges	44,210.00		
Petrol&Conveyance	19,454.00		
P.F Contribution	2,05,061.00		
Postage & Telegram	15,995.00		
Sanitary Expenses	5,04,837.00		
Telephone Charges	39,007.00		
Transport Charges	22,046.00		
Travelling Expenses	1,61,334.00		
Vehicle Hire Charges	6,800.00		
Depreciation	43,01,789.00		
Depreciation	43,01,789.00		
Financial Charges	10,206.50		
Bank Charges	10,206.50		
Maintenance Charges	8,87,033.00		
Bus Maintenance Charges	1,34,197.00		
Diesel	3,47,062.00		
Guest House Maintenance	46,400.00		
Lab Maintenance	83,375.00		
Repairs & Maintenance- Building	12,483.00		
Repairs & Maintenance-Computers	64,870.00		

continued ...

For ANNAMACHARYA EDUCATIONAL TRUST

C. Ch. K. K. K.



Annamacharya College of Pharmacy-2018-19
Income and Expenditure Statement : 1-Apr-2018 to 31-Mar-2019

Particulars	1-Apr-2018 to 31-Mar-2019	Particulars	1-Apr-2018 to 31-Mar-2019
Repairs & Maintenance (Electrical)	58,586.00		
Repairs & Maintenance-Furniture	200.00		
Xerox Machine Maintenance	1,39,860.00		
Excess of income over expenditure	1,74,06,627.00		
Total	4,54,23,888.00	Total	4,54,23,888.00



For ANNAMACHARYA EDUCATIONAL TRUST

C. Cheshankale
 SECRETARY

FIXED ASSETS :

Sl. No.	Name of the Assets	W.D.V. As on 01.4.2018	Additions during the year More than six months	Less than six months	Deductions	Total as on 31.03.2019	Rate %	Depreciation For the Year	W.D.V. As on 31.03.2019
1	Electrical Equipment	397,549	-	8,783	-	406,332	15%	60,291	346,041
2	Furniture & Fittings	2,774,425	-	-	-	2,774,425	10%	277,443	2,496,983
3	Lab Equipment	3,320,105	559,714	664,200	-	4,544,019	15%	631,788	3,912,231
4	Library Books	539,475	-	-	-	539,475	40%	215,790	323,685
5	Office Equipment	1,026,560	-	363,880	-	1,390,440	15%	181,275	1,209,165
6	Computers	569,170	97,742	6,150	-	673,062	40%	267,995	405,067
7	College Bus	41,067	-	-	-	41,067	30%	12,320	28,747
8	Building	26,054,684	-	-	-	26,054,684	10%	2,605,468	23,449,216
9	Software	123,547	-	-	-	123,547	40%	49,419	74,128
	GRAND TOTAL	34,846,582	657,456	1,043,013	-	36,547,051		4,301,789	32,245,262

For ANNAMACHARYA EDUCATIONAL TRUST

C - Sheeshkala

SECRETARY



Annamacharya College of Pharmacy-2018-19

Particulars	₹
Provisions	
Alumni Association.B.Ph	237,473
Furniture Repair Payable	401,200
Grants Received From AICTE (APCON)	86,000
Grants Received From PCI	165,047
Hostel Rent Recoveries	4,000
JNTU Exam Fee-ANCP	68,424
JNTU Infra & Recognition Fee Payable	1,500
JNTU Provisionals Fee.B.Ph	(540)
JNTU Sports Fee Payable	189,200
Lic Payable	61,066
NSS Collections.B,Ph	68,217
Outstanding Expenses	117,045
Professional Tax Payable	12,600
Provision for Gratuity	2,790,522
Salaries Payable	1,345,771
TDS on Contractors	289
TDS on Salaries	70,665
TDS on Services	756
	5,619,235
Sundry Creditors	
Ait Solutions.B.Ph	44,000
AIT Solutions - R	1,210,155
Annamaiah Ads.B.Ph	7,900
Jyoti Audio Visual Pvt.Ltd.,	(38,200)
Kanaka Durga Earth Movers	178,500
Kyocera Mita India Pvt Ltd	36,638
Lakshmi Ranga Hardware	610,540
New Vijaya Laxmi Enterprises	7,932
Pharama Book Syndicate - H	5,143,557
Sai Geetha Chemicals	5,150
Shambhavi Enterprises	610,230
Sri Gowri Sankar Printers.B.Ph	601,000
Sri Lakshmi Narasimha Hardware & Paints	350,540
Sri Lakshmi Venkateswara Nursery 17-18	1,438,750
Sri Lakshmi Venkateswara Nursery	5,142,560
Sri Sai Srinivasa Traders	10,783
Sri Satyanarayana Book House,Kadapa	92,820
Subbarayudu - Gravel	530,620
Vijayadurga Enterprises-Cr	480,530
Young Sports India-ANCP	489,560
	16,953,565
Deposits (Asset)	
Gas Deposit	7,900
Rent Deposit	6,000
	13,900
Loans & Advances (Asset)	
Caution Deposit-RIMS	10,000
Dr.D.Swarnalatha	163,482
Dr.K.Adinarayana	25,000
Dr.V S T Rajan	3,868
Mr. M Madhu (Asst.Professot)	(534)
Rajanna U (Driver)	5,550
Shiva N (Painter)	(3,603)
	203,763

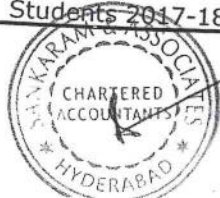


For ANNAMACHARYA EDUCATIONAL TRUST

C. Chashmi Kala
SECRETARY

Sundry Debtors

Ph.D(Research Scholar 2016-17)	(40,000)
Ph.D(Research Scholars 2015-16)	(80,000)
Students 2007-09 Batch D.Pharmacy	(7,500)
Students 2007-11 Batch	(35,700)
Students 2008-12 B.Pharmacy	(86,420)
Students 2009-11 D.Pharmacy	(6,460)
Students 2009-11 M.Ph(Pharmaceutics)	(10,007)
Students 2009-11 M.Ph (Pharmachemistry)	(5,020)
Students 2009-13 B.Pharmacy	(51,902)
Students 2009-15 Pharma.D	(11,833)
Students 2010-12 M.Pharm Analysis	(6,820)
Students 2010-12 M.Pharm Ceutics	(300)
Students 2010-14 B.Pharmacy	(22,200)
Students 2010-16 Pharm D	(5)
Students 2011-13 M.Pharmacy (P.A & Q.A)	(2,600)
Students 2011-13 M.Pharmacy (Pharmaceutics)	(2,500)
Students 2011-13 M.Pharmacy (Pharma.Chemistry)	(22,500)
Students 2011-13 M.Pharmacy (Pharmacology)	(12,600)
Students 2011-13 M.Pharmacy (Pharma. Technology)	(16,500)
Students 2011-15 B Pharmacy	(36,600)
Students 2011-17 Pharm D	265,387
Students 2012-14 M.Pharm (Ph.Analysis)	(7,750)
Students 2012-14 M.Pharm (Pharmaceutics)	(43)
Students 2012-14 M.Pharm (Pharmacology)	(100)
Students 2012-14 M.Pharm (Ph.Chemistry)	(300)
Students 2012-14 M.Pharm (Ph.DRA)	(12,000)
Students 2012-14 M.Pharm (Ph.Technology)	(600)
Students 2012-16 B.Pharmacy	9,767
Students 2012-18 Pharm.D	467,708
Students 2013-15 D.Pharmacy	(3,100)
Students 2013-17 B.Pharmacy	13,416
Students 2013-19 Pharm.D	793,128
Students 2014-16 M.Pharm(PA&QA)	(89,100)
Students 2014-16 M.Pharm(Pharmaceutics)	(20,002)
Students 2014-16 M.Pharm(Pharmacology)	(20,000)
Students 2014-16 M.Pharm(Ph.Chemistry)	(30,000)
Students 2014-16 M.Pharm(Ph.DRA)	(12,080)
Students 2014-17 Pharm.D (P.B)	(20,910)
Students 2014-18 B.Pharmacy	47,490
Students 2014-20 Pharm D	(212,236)
Students 2015-17 D.Pharmacy	58,900
Students 2015-17 M.Pharm (DRA)	(3,640)
Students 2015-17 M.Pharm(Ph.Chemistry)	116,940
Students 2015-18 Pharm.D (PB)	(1,000)
Students 2015-19 B.Pharmacy	1,199,456
Students 2015-21 Pharm.D	661,258
Students 2016-18 D.Pharmacy	56,550
Students 2016-18 M.Pharm(Pharmaceutics)	79,998
Students 2016-18 M.Pharm(Chemistry)	82,296
Students 2016-18 M.Pharmacy(PA&QA)	34,900
Students 2016-18 M.Pharm(Cology)	82,400
Students 2016-18 M.Pharm(DRA)	200
Students 2016-20 B.Pharmacy	1,215,566
Students 2016-22 Pharm.D	898,704
Students 2017- 18 B.Pharmacy	1,225,350
Students 2017-18 D.Pharmacy	59,700
Students 2017-18 M.Pharm-PAQA	329,600
Students 2017-18 M.Pharm-Ph.Analysis	19,800
Students 2017-18 M.Pharm-Pharmacology	682,100
Students 2017-18 M.Pharm Pharmceutics	874,400



For ANNAMACHARYA EDUCATIONAL TRUST

C. Ph. Ch. Kala

Students 2017-18 Pharm.D	894,377
Students 2017-19 M.Pharm DRA	192,500
Students 2017-19 M.Pharm Ph.Chemistry	412,100
Students 2017-20 Pharm.D (PB)	97,450
Students 2018-19 B.Pharmacy	1,884,400
Students 2018-19 D.Pharmacy	226,250
Students 2018-19 M.Pharm-DRA	55,000
Students 2018-19 M.Pharm - PAQA	76,700
Students 2018-19 M.Pharm.-Ph.Analysis	121,000
Students 2018-19 M.Pharm-Pharmaceutics	365,200
Students 2018-19 M.Pharm(Pharmacology)	280,800
Students 2018-19 M.Pharm-Ph.Chemistry	220,000
Students 2018-19 Pharm.D	1,517,459
Nagakeerthana A	(10,000)
Bank Accounts	14,717,922
Andhra Bank- 048011011000631	28,460
Andhra Bank - 176310100052462 Research	234,395
Andhra Bank A/c:176310100000186	(417,497)
Andhra Bank A/c:176310100000308	94,438
Andhra Bank - Alumni 176310100016442	114,805
Andhra Bank - APCON - 176310100066049	11,516
Andhra Bank - Cultural 176310100016451	1,529
Andhra Bank - Exam - 679	9,045
Andhra Bank - NSS 176310100016433	31,003
Andhra Bank S.T - Welf- 668	629,873
Andhra Bank- Trans 176310100016460	36,322
S.B.H Aicte Gate Schol.Ships A/c 62090502355	64,276
	838,163



For ANNAMACHARYA EDUCATIONAL TRUST

C. Suresh Kumar
SECRETARY

20. BEST PRACTICES ADOPTED BY THE INSTITUTION

WEBINAR PROGRAM ON TEACHERS DAY CELEBRATIONS

THE TEACHERS DAY CELEBRATIONS- 2020 VIA NATIONAL WEBINAR on the THEME ENTITLED “ TEACHERS: LEADERS IN CRISIS AND REDIFINING THE FUTURE” was conducted in association with APTI (ASSOCIATION OF PHARMACEUTICAL TEACHERS OF INDIA) by Annamacharya College of Pharmacy, Rajampet, Kadapa District, Andhra Pradesh. Chief Guest, Prof K. Hema Chandra Reddy, Chairman, APSCHE, defined the great phrase “ Role of Teacher in building student career” and called upon all the teachers and students for its success. Guest of Honour, Sri. C. Gangi Reddy, The Secretary, AET, said “THE NATION BUILD BY STUDENTS CANNOT BE DESTROYED” and appreciated all the teachers for their valuable service.

Guest of Honour, Prof. Raman Dang, Secretary, APTI (Central Committee), wished all the students and teachers and explained the significance of suggestions of Guru in the student education and profession. Guest of Honour, Prof. Dr.G. Devala Rao, President, APTI- AP State Branch, explained the concept of “ The role of TEACHER in removing the Darkness and ENLIGHTENING the wisdom for STUDENT”.

Speaker, DR. R. Nagaraju, Professor, IPT, SPMVV, take a renowned and peer lecture on “HOW TO TAKE AN EFFECTIVE CLASS”. He added to take any class to the students in association with practical knowledge of society which could develop the student morally, ethically and professionally for their twinkled future. Speaker, Dr. GSN Koteswara Rao, Associate Professor, KLCP, KL Deemed University, delivered his speech on the title “ How to Engage the Students in this Modern Teaching Era” .

Dr. D. Swarnalatha, Principal, Annamacharya College of Pharmacy, welcomed all the participants and greeted “Happy Teachers Day to all” . Organizing secretary of the program, Dr. P. Dwarakanadha Reddy, HOD, Department of Pharmaceutics, and other staff members participated in conducting the program.

Chairman, Dr. C. Ramachandra Reddy, Vice-Chairman, Sri. C. Yella Reddy, Treasurer, Sri. C. Abhishek Reddy, appreciated the organizing team that this program developed skills for 500 participants.

<https://youtu.be/beRlo36OgrY>



TEACHER'S DAY CELEBRATIONS 2020

Organized by
ANNAMACHARYA COLLEGE OF PHARMACY
 In association with
APTI

Teachers' Leaders in Caring and
 Nurturing the Future
 27 September 2020, 10AM





Prof. K. Venkatesh Reddy
Chairman, APSHE



Prof. K.V.K. Chowdary
Former Principal, AUCAPS



Sri C. Gangi Reddy
Founder, AET



Prof. K. Ramani
Secretary, APTI (I)



Dr. S. Divya Reddy
President, APTI (A.P.)



Dr. R. Nagendra
Professor, SPMMV



Dr. G.N. Krishnareddy
Assoc. Professor, KJ Somaiya



Dr. D. Swarna Lakshmi
Convener



Dr. P. Venkatesh Reddy
Org. Secretary

Resonance with the future is the only effective plan for the future. (Dr. K. R. Nagaraja)

Resonance with the future is the only effective plan for the future. (Dr. K. R. Nagaraja)



ANNAMACHARYA COLLEGE OF PHARMACY

New Boyanapalli, Rajampet, Y.S.R. Dist. - 516126, A.P., India.

in association with

ASSOCIATION OF PHARMACEUTICAL TEACHERS OF INDIA

Invites you to



TEACHER'S DAY - 2020 CELEBRATIONS

via National Webinar on the theme

Teachers: Leaders in Crisis and Redefining the Future.

September 5, 2020 || Saturday || 10:00 AM IST

for participation, we request you to kindly fill up the Google Form: <https://rb.gy/na2n88>

Inaugural Address by



Prof. K. Hemachandra Reddy

Chairman, APSCH

Keynote Address by



Prof. K.P.R. Chowdary

Former Principal, AU College of Pharmaceutical Sciences,
Andhra University, Visakhapatnam.

Special Address by



Sri. C. Gangi Reddy

Founder, AET



Prof. Raman Dang

Secretary, APTI (Central Committee)



Dr. G. Devala Rao

President, APTI-AP State Branch

Organising Secretary

Dr. P. Dwarakanadha Reddy

Professor, ANCP.

Convenor

Dr. D. Swarnalatha
Principal, ANCP.

WEBINAR ON WORLD PHARMACIST DAY CELEBRATIONS

THE WORLD PHARMACIST DAY CELEBRATIONS- 2020 VIA NATIONAL WEBINAR on the THEME ENTITLED “ ADVANCEMENTS IN PHARMACEUTICAL CHEMISTRY AND DRUG DISCOVERY” was conducted in association with IPA (INDIAN PHARMACEUTICAL ASSOCIATION) by Annamacharya College of Pharmacy, Rajampet, Kadapa District, Andhra Pradesh. Chief Guest, Prof K. B. Chandrasekhar, Vice-Chancellor, Krishna University, Machilipatnam, appreciated all the pharmacists who are contributing their service to control COVID-19 in this pandemic situation.

Guest of Honour, Sri. C. Gangi Reddy, The Secretary, AET, spoke that "this webinar program" is useful for hospital pharmacist, community pharmacist, research associates, scientists and research scholar. Guest of Honour, Prof. N. Devanna, Director, Jntua, Otri, Ananthapuramu, wished all the pharmacists and teachers a happy world pharmacists day and appreciated the scientists involved in formulation vaccine for COVID-19. Guest of Honour, Mr. P. Hanumanna, Drug Inspector, Ananthapuramu, called upon the pharmacists to create awareness to people or patients regarding social distancing, sanitizer and mask.

Speaker, Prof. N. Shankaraiah, NIPER, Hyderabad, delivered his speech on "NMR and Its applications in structural elucidation of small molecules". He created awareness in the confirmation of therapeutically useful drug molecules. Speaker, Prof. A. Puratchikody, Anna University, Trichy, delivered his speech on the title “ IMPLICATIONS OF COMPUTER SIMULATIONS FOR THE DESIGN OF LEAD MOLECULES” . Speaker, Mr. V. Srinivasa Rao, SV University, Tirupati, delivered his speech on the title “ A COMPUTATIONAL APPROACH TO IDENTIFY POTENTIAL ALLOSTERIC MODULATORS OF GABA- A RECEPTOR ” .

Dr. D. Swarnalatha, Principal, Annamacharya College of Pharmacy, welcomed all the participants and greeted “HAPPY WORLD PHARMACIST DAY to all”

Chairman, Dr. C. Ramachandra Reddy, Vice-Chairman, Sri. C. Yella Reddy, Treasurer, Sri. C. Abhishek Reddy, said the students studying NBA and NAAC “A” accredited institution like Annamacharya College of Pharmacy can be assured that they will receive a quality education and they would become a very good citizen with good morals.

A National level Colloquium on

ADVANCEMENTS IN PHARMACEUTICAL CHEMISTRY AND DRUG DISCOVERY

SPEAKERS



Prof. N SHANKARAIAH, NIPER, HYDERABAD.



NMR AND ITS APPLICATIONS IN STRUCTURAL ELUCIDATION OF SMALL MOLECULES



Prof. A. PURATCHIKODY, ANNA UNIVERSITY, TRICHY.



IMPLICATIONS OF COMPUTER SIMULATIONS FOR THE DESIGN OF LEAD MOLECULES



Mr. V. SRINIVASA RAO, SV UNIVERSITY, TIRUPATI.



A COMPUTATIONAL APPROACH TO IDENTIFY POTENTIAL ALLOSTERIC MODULATORS OF GABA A RECEPTOR

DATE & TIME: 25TH SEPTEMBER, 10 AM ONWARDS

CHIEF PATRON



SRI. C. GANGI REDDY, FOUNDER & SECRETARY, ANNAMACHARYA EDUCATIONAL TRUST.

INAUGURAL ADDRESS



PROF. K. B. CHANDRASEKHAR, VICE CHANCELLOR, KRISHNA UNIVERSITY, MACHILIPATNAM.

KEYNOTE ADDRESS



PROF. N. DEVANNA, DIRECTOR, JNTUA-OTPRI, ANANTHAPURAMU.

SPECIAL INVITEE



MR. P. HANUMANNA, DRUG INSPECTOR, ANANTHAPURAMU.

World Pharmacists Day 2020

THEME

Pharmacists Transforming Global Health



ASSOCIATION WITH



INDIAN PHARMACEUTICAL ASSOCIATION (IPA)
...CRUSADE FOR THE PROFESSION

PRINCIPAL

Prof D. SWARNALATHA, ANCP.



ORGANIZED BY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY,

ANNAMACHARYA COLLEGE OF PHARMACY,

Approved by AICTE & PCI, New Delhi, Affiliated to JNTUA, Ananthapuramu,
Accredited by NAAC with 'A' Grade, Bangalore, Accredited by NBA (UG Programme), New Delhi.
Recognized u/s 2(f) & 12(B) of the UGC Act, 1956, New Delhi, Recognized Research Center, JNTUA, Ananthapuramu.