

SEMESTER-VIII

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B81	Pharmaceutical Analysis-III	3	3	100	100	3	3

Theory	
1: Quality assurance:	30
CGMP, GLP, ISO 9000, TQM, Quality Review and Quality Documentation. Regulatory control, regulatory drug analysis, interpretation of analytical data.	
Validation, quality audit: quality of equipment, validation of equipment, validation of analytical procedures. USP parameters for method validation, ICH guidelines for method validation.	
2: Spectrophotometric Techniques:	40
Spectrophotometric Techniques: The theoretical aspects, basic instrumentation, elements of interpretation of spectra, and applications of the following analytical techniques should be discussed:	
1. Ultraviolet and visible spectrophotometry.	
3. Spectrofluorimetry, Introduction to Fluorescence microscopy, Flow cytometry	
5. Infrared spectrophotometry.	
7. Nuclear Magnetic Resonance spectroscopy including ¹³ C NMR.	
9. Mass spectrometry.	
11. Flame photometry.	
13. Emission Spectroscopy.	
15. Atomic Absorption Spectroscopy.	
3: Chromatography:	40
Chromatography: Introduction and general principles, theory of following techniques:	
HPLC, HPTLC, GC, Paper chromatography, Column chromatography, Introduction and basic principle of	
hyphenated techniques like LC-MS, GC-MS, GC-MS-MS	
Practicals	
1. To study the standards of tablets as per IP 96	
2. Sums related to standards of tablets.	

3. To perform weight variation tests as well as content of active ingredient test of given sample of the mefanamic acid tablet.	
4. Monograph of aspirin as per IP 96.	
5. To Perform assay of calcium gluconate in given sample of calcium gluconate injection as per IP 96.	
6. To determine the hardness of water.	
7. To perform test of active ingredient and test for 4-aminophenol for the given tablet of paracetamol as per IP 96.	
8. To Perform content of active ingredient test and weight variation for tablet of Metformin HCl IP 96	
9. To Perform content of active ingredient test for given amiloride HCl tablets as per IP 96.	
10. To perform weight variation test and content of active ingredient test for given chloramphenicol capsule as per IP 96.	
11. To perform content of active ingredient test for Co-trimoxazole tablet as per IP 96.(Sulphamethoxazole – nitrite titration.)	
12. To find out concentration of Potassium and Sodium using Flame photometer.	
13. To determine % of sulphamethoxazole from given sample by Bratton marshal reagent.	
14. To demonstrate HPLC as analytical tool.	
15. To demonstrate HPTLC as analytical technique.	
16. To determine dissociation constant (pKa) of indicator by using UV-visible spectrophotometer.	

Books Recommended	
Essentials:	
1. K.Bansal, Chromatography, 1 st Ed., Campus books, New Delhi, 2000.	
2. K.Bansal, Analytical spectroscopy, 1 st Ed., Campus books, New Delhi, 2000.	
3. A.Kar, Pharmaceutical drug analysis, 1 st Ed., Minerva books, New Delhi, 2001.	
4. S. Usharani, Analytical chemistry, 1 st Ed., McMillan, New Delhi, 2000.	
5. D.H.Shah, SOP; Guidelines, 1 st Ed., Business horizons, New Delhi, 1997.	
6. D.H.Shah, QA manual, 1 st Ed., Business horizons, New Delhi, 1997	
7. A.H.Beckett, J.B.Stanlake, Practical Pharmaceutical chemistry-Vol- 1, 4 th Ed., CBS, New Delhi, 2004.	
8. G.R. Chatwaal, Analytical spectroscopy, 1 st , Himalaya publishing house, Mumbai, 1996.	
9. G.R. Chatwaal, Analytical chromatography, 1 st , Himalaya publishing house, Mumbai, 1996.	
10. M.Parkany, Quality assurance and TQM for analytical laboratory, Royal society of chemistry, new Delhi,1995	
Suggested:	
11. D.A. Skoog, Principles of instrumental analysis, 5 th Ed., Saunders college, USA, 2000.	
12. B.K. Sharma, Instrumental methods of chemical analysis, 6 th Ed., Krishna Prakashan media, UP., 1997.	

13. H.H. Willard, L.L.Meritt, Instrumental methods of analysis, 6 th Ed., CBS New Delhi, 1996.	
14. J.R.Stoker, GMP for Pharmaceuticals, 4 th Marcel deckker ,USA, 1997.	
Supplementary:	
15. D.C.Garratt, Qualitative analysis of drugs, 3 rd Ed., CBS, New delhi, 2001.	
16. Indian Pharmacopoeia	
17. BritishPharmacopoeia	
18. United states Pharmacopoeia.	
19. J.W.Munson, Pharmaceutical analysis, modern methods, 1 th Marcel deckker ,USA, 1997.	
20. M.Parkany, Quality assurance and TQM for analytical laboratory, Royal society of chemisty, new delhi,1995	

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B82	Pharmaceutical Chemistry-IX (Medicinal Chemistry-III)	3	3	100	100	3	3

Theory	
1.Principles of Drug Design (Theoretical Aspects): Traditional analog (QSAR) and mechanism based approaches (Introduction to graph theory, applications of quantum mechanics, Computer Aided Drug Designing (CADD) and molecular modeling.	25
2.Drugs acting on central nervous system	45
Synthetic procedures of selected drugs, mode of action, uses, structure activity relationship including Physico-Chemical properties of the following classes of drugs: Drugs acting on central nervous system: general anesthetics, local anesthetics, hypnotics and sedatives, opioid analgesics, antitussives and anti convulsants, anti parkinsonism drugs, CNS stimulants, Psychopharmacological agents (neuroleptics, antidepressants, anxiolytics)	
3. Drugs acting on Autonomic Nervous System	30
Synthetic procedures of selected drugs, mode of action, uses, structure activity relationship including Physico-Chemical properties of the following classes of drugs: Drugs acting on Autonomic Nervous System (Drugs acting at Synaptic and neuro-effector junction sites, Cholinergics and Anticholinesterases, Adrenergic Drugs, Antispasmodic and Anti-ulcer drugs, Neuromuscular blocking agents).	
Biochemical approaches in drug designing wherever applicable should be discussed.	

Practicals	
1. Introduction to separation and Identification of organic binary mixtures and importance of solubility in separation of mixture.	
2-10. To separate and identify given organic binary mixture.	
11. To synthesize barbituric acid from ethyl acetoacetate and urea.	
12. To synthesize Orange II from sulfanilic acid	
13. To synthesize paracetamol from nitrobenzene. (Step 1)	
14. To synthesize paracetamol from nitrobenzene. (Step 2)	
15. To synthesize 2,3-diphenyl quinoxaline from <i>o</i> -phenylenediamine. (Step 1)	
16. To synthesize 2,3-diphenyl quinoxaline from <i>o</i> -phenylenediamine. (Step 2)	

Books Recommended

Essential:	
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1. Block, J. and Beale, J. M. Eds., Wilson and Giswold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, Lippincott Williams & Wilkins, Philadelphia, 2004	
2. Lemke, L. T., Williams, D. A., Victoria F Roche, V. F. Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, Philadelphia, 2007.	
3. Furniss, B.S. Hannaford, A.J., Smith, P.W.G., Tatchell, A.R., Vogel's Textbook of Practical Organic Chemistry, Pearson Education (ELBS/Longman group), London, 1989.	
4. Mann, F. G. & Saunder, B. C., Introduction to Practical Organic Chemistry, 1 st Edition, Longmans, Green, London, 1941.	
5. Shriner, R. L., Hermann, C. K. F., Morrill, T. C., The Systematic Identification of Organic Compounds, John Wiley & Sons, USA, 2003.	
6. Thomas, G., Fundamentals of Medicinal Chemistry, 1 st Edition, John Wiley & Sons, 2003.	
Suggested:	
7. Abraham, D. J., Ed., Burger's Medicinal Chemistry and Drug Discovery, Vol. 1-6, 6 th Edition, John Wiley & Sons, New Jersey, 2003. Lednicer, D., Strategies for Organic Drug Synthesis & Design, John Wiley & Sons, USA, 1998.	
8. Kar, A., Medicinal Chemistry, New Age International Publishers, New Delhi, 2007.	
9. Ladu, B. N., Mandel H.G. & E.L.Way, Fundamentals of Drug Metabolism & Disposition, William & Wilkins Co., Baltimore.	
10. Finar, I.L., Organic Chemistry, Vol. I & II, 6 th Edition, Pearson Education (ELBS/Longman group), London, 2004.	
11. Nograđey, T., Medicinal Chemistry: A Molecular and Biochemical Approach, Oxford University Press, New York, Oxford, 2005.	
12. Silverstein, R. M., Basseler, G. C., Morrill, T.C., Spectrometric Identification of Organic Compounds, John Wiley & Sons, USA, 1967.	
13. Kemp, W., Organic Spectroscopy, 3 rd Edition, W.H. Freeman & Company/ELBS, London, 1991.	
Supplementary:	
14. Taylor, J. B and Triggler, D. J., Comprehensive Medicinal Chemistry II, Vol. 1-8, Quantitative Drug Design, Elsevier Ltd., 2007	
15. Martin, Y. C. Quantitative Drug Design- A Critical Introduction (Medicinal Research Monograph, Vol. 8) Marcel Dekker Inc., New York, 1978.	
16. Lednicer, D. Strategies for Organic Drug Synthesis & Design, Vol 1-6, John Wiley & Sons, USA, 2002.	
17. Jurs, P. C. Computer Software Application in Chemistry, 2 nd Edition, John Wiley & Sons, New York, 1996.	

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B83	Pharmacognosy-VI	3	3	100	100	3	3

Theory	
1. The holistic concept of drug administration in traditional systems of medicine. Introduction to Ayurvedic preparation like Arishtas, Asavas, Gutikas, Tailas, Churna, Lehya & Bhasma.	25
2. Historical development of plant tissue culture , types of cultures, nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacy.	15
3. Chemotaxonomy of medicinal plants.	10
4. Marine Pharmacognosy , novel medicinal agents from marine sources.	05
5. Natural allergens and photosensitizing agents and fungal toxins.	05
6. Utilization of aromatic plants and derived products with special reference to sandal wood oil, menthe oil, lemongrass oil, vetiver oil, geranium oil and eucalyptus oil.	10
7. Introduction of different chromatography methods and their application in the evaluation of herbal drugs.	10
8. Role of medicinal and aromatic plants in national economy	5
9. Standardization of crude drugs and their herbal formulations	15
10. Standardization of crude drugs and their herbal formulations	15

Practicals	
1.	Introduction to Ayurvedic Pharmacopoeia of India, Indian Herbal Pharmacopoeia & Ayurvedic Formulary of India.
2.	Preparation of churnas.
3.	Preparation of herbal cough syrup
4.	Standardization of herbal cough syrup
5.	Preparation of herbal cold cream
6.	Preparation of herbal tooth paste
7.	Preparation of herbal face wash.
8.	Preparation of herbal analgesic ointment
9.	Preparation of vatika/ gutika
10.	Preparation of herbal shampoo.
11.	Determination of Physical parameters.
12.	Determination of chemical parameters.
13.	Preparation and standardization of crude extract.

BOOKS RECOMMENDED	
Essential :	
1.	Chaudhri R.D. Ed., Herbal Drugs Industry, Eastern Publishers
2.	Kalia A.N., Textbook Of Industrial Pharmacognosy, Cbs Publication
3.	Medicinal Natural Products, Paul And Devick
4.	Kumar U., Methods In Plant Tissue Culture, Agro Botanica Publication
5.	Plant Cell And Tissue Culture And Bio-Technology By Siddhiverasan
6.	Narayanaswamy S, Plant Cell And Tissue Culture, Tata Mcgraw-Hill Publication
7.	Anasari, Pharmacognosy Textbook Of Natural Products, Latest Edition.
8.	Ashutosh Kar, Pharmacognosy And Pharmacobiotechnology, New Age International Publication
9.	Rangari & Rangari, Text Book Of Pharmacognosy
10.	Herbal Drug Technology, Paridhavi

11. Edwin And Edwin, Textbook Of Pharmacognosy And Phytochemistry, CBS Publication	
Suggested :	
12. Experimental Pharmacognosy, By Tyler And Schwarting	
13. Practical Evaluation Of Phytopharmaceutical By Brain And Turner	
14. Ayurvedic Pharmacopoeia Of India	
15. Herbal Pharmacopeia 1-2 (IDMA)	
16. The Wealth Of India, Raw Materials (All Volumes) Council Of Scientific And Industrial Research (Csir), New Delhi.	
17. Who Monographs On Selected Medicinal Plants Vol-1-2	
18. Quality Control Of Herbal Drugs : An Approach To Evaluation Of Botanicals, Mukherjee Pulok	
19. Quality Control Of Indian Medicinal Plant By Icmr	
20. Ayurvedic Formulary Of India, Govt. Of India	
Supplementary :	
21. Harborne J B, Phytochemical Methods, Champan And Hall, International Edition, London	
22. Bruneton Jean, Pharmacognosy : Phytochemistry Medicinal Plants, Lavoisier Publishing	
23. Wagner, Plant Drug Analysis, Springer Verlag Publication.	
24. Pullok Mukherje, Quality control of herbal drugs.	

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B84	Clinical pharmacy-II	4	2	100	100	3	3

Theory	
Important disorders of organ systems and their management :	
<u>1.Cardiovascular disorders:</u>	12
Hypertension (classification of hypertension, empirical t/t) Congestive Heart failure, Angina, Acute Myocardial Infarction, Cardiac arrhythmias	
<u>2.CNS Disorders:</u>	12
Concepts of psychological & neurological illnesses, Epilepsy (classification of epilepsy based on clinical pattern, EEG, origin, treatment of Status Epilepticus), Parkinsonism (Scales for diagnosis, Cardinal features, pathology, oxidative mechanism of PD, use of stimulators), Schizophrenia (), Depression (Hamilton's scale, types, t/t of different depression)	
<u>3.Respiratory Disease:</u>	08
Asthma (Classification, diagnosis, use of metered dose inhalers, treatment of Status Asthmaticus)	
<u>4.Gastrointestinal Disorders:</u>	08
Peptic ulcer Disease, Ulcerative colitis, Hepatitis, cirrhosis (Diagnosis & clinical features of these disease, Anti Hepatitis vaccines, Alcoholic cirrhosis & treatment)	
<u>5.Hemopoietic Disorders:</u>	06
Anemia (types of anaemia, clinical features & diagnosis & treatment)	
<u>6.Endocrine Disorders :</u>	08

Disorders of Pituitary, Adrenal, Thyroid, Parathyroid glands (Hypofunction, Hyperfunction & autoimmune disorders of these glands, diagnostic tests, clinical features)	
<u>7.Infectious diseases:</u>	08
Tuberculosis (types of T. B,diagnostic tests, Anti TB regimen)	
<u>8.Urinary tract disease/infection:</u>	08
Renal failure: ARF, CRF, types of dialysis, concepts of CAPD & UTI (pathogens, Collection of Midstream urine, urine analysis)	
<u>9.Enteric Infections:</u>	04
Typhoid, Diarrhea, dysentery, food poisoning (clinical features & treatment)	
<u>10.Upper respiratory infections :</u>	06
Bronchitis, pharyngitis, tonsillitis, common cold (pathogens causing these diseases, clinical features & t/t)	
<u>11.Joint and Connective Tissue Disorders:</u> Rheumatic Diseases, Gout and Hyperuricemia.(.)	10
<u>12.Neoplastic Disorders:</u>	10
Acute Leukaemias, Hodgkin's Disease and carcinoma of Breast (clinical features, classification, t/t schedules, newer disease modifying agents)	

Practical	
1.Formulation audit (three exercises)	
2.Case studies involving TDM (two exercises)	
3.Case studies involving D/I (two exercises)	
4.Case studies involving ADR (two exercises)	
5.Case studies involving patient Counselling	
6.Case studies involving Data interpretations (two exercises)	
7.Case studies involving Data interpretations & drugs (four exercises)	

Books Recommended: (Latest Edition of Books)

Essential :
1.Clinical Pharmacy And Therapeutics By Herfindal
2.Clinical Pharmacy And Therapeutics By Roger Walker
3.Clinical Pharmacology By Bennet
4.Meylers Side Effects Of Drugs VOL 1 – 6 By Aronson J.K
5.Textbook Of Biopharmaceutics And Clinical Pharmacokinetics By Keane Bil
6.Applied Therapeutics:The Clinical Use Of Drugs By Koch And Kimble
7.Basic And Clinical Pharmacology By Katzung
8.Clinical Interpretation Of Laboratory Test By Widmann Frances
9.Clinical Pharmacokinetics : Concepts And Application By Rowland Macolm
10.Encyclopedia Of Clinical Pharmacy By Dipiro Joseph
11.Oxford Text Book Of Clinical Pharmacology And Drug Therapy By Grathame Smith
12.Principles Of Clinical Pharmacology By Atkinson Arthur
Suggested :
13.Basic Principles Of Clinical Research And Methodology By Gupta SK
14.Clinical Pharmacology By Laurence
15.Handbook Of Clinical Pharmacy By Yadav A.V
16.Basic And Clinical Pharmacology Made Memorable By Luty Jason
17.CLINICAL PHARMACY By Tipnis
18.CLINICAL TOXICOLOGY By Marsha Ford
19.Modern Pharmacology With Clinical Applications By Craig Charles
Supplementary :
20.A Handbook Of Experiments In Pre-Clinical Pharmacology By Kasture

21.A Text Book Of Clinical Pharmacyp Ractice:Essential Concepts And Skills By Parthasarthi

22.Aids To Clinical Pharmacology And Therapeutics By Rees John

23.Element Of Clinical Pharmacy By R K Goyal

24.Mcqs IN CLINICAL PHARMACOLOGY By Mant Timothy

25.Selected Topics In Clinical Pharmacology By Kshirsagar

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B85	Pharmaceutics VIII (Drug Delivery Systems)	3	3	100	--	3	3

Theory		
Principles, Formulation approaches and Evaluation methods in brief of:		
1. Controlled release dosage forms		60
2. New Drug Delivery Systems: Oral DDS, Osmotic DDS, Transdermal DDS, Ocular DDS, Pulmonary DDS, Buccal DDS., Targeted DDS.		40

PRACTICALS		
1. Comparative study of dissolution properties of different oral modified release dosage forms using F ₂ value. (market brands)		
2. Study of importance of various dissolution variables.		
3. Preparation and evaluation of		
4. Sodium alginate beads		
5. Microspheres		
6. Buccal patch		
7. Buccal film		
8. Preparation and evaluation of fast release products.		

BOOKS RECOMMENDED:	
Essential :	
1.“ Modern Pharmacuetical Vol-121”, Gilbert S Banker, Marcel Dekker Publication	
2.“Pharmaceutics The Science Of Dosage From Design”, Aulton Michael E., Elbs Publication	
3.“The Theory And Practice Of Industrial Pharmacy”, Lachman Leon, Varghese Publication	
4.“Ansel's Pharmacuetical Dosage Forms And Drugs Delivery System”, Loyd V Allen, B I Publication	
Suggested :	
5.“Encyclopedia Of Pharmaceutical Technology Vol 1-22”, Swarbrick James, Marcel Dekker Publication	
6.“Controlled And Novel Drug Delivery”, Jain N.K., Cbs Publication	
Supplementary :	
7.“Progress In Controlled And Novel Drug Delivery Systems”, Jain N.K. Ed., Cbs Publication	
8.“Advances In Controlled And Novel Drug Delivery”, Jain N.K., Cbs Publication	
9.“Controlled Drug Delivery Vol-29”, Robinson Joseph R., Marcel Dekker Publication	

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B86	Pharmaceutical Industrial Management	3	-	100	--	3	--

Theory	
Concept of management:	
Administrative management (planning, organizing, staffing, directing and controlling), entrepreneurship, development, operative management (personnel, Materials production, financial marketing, time/space margin/ morale). Principles of management (co-ordination, communication, motivation, decision-making, leadership, innovation, creativity, delegation of authority/responsibility, record keeping), identification of key points to give maximum thrust for development and perfection, total quality management(TQM).	
Accountancy:	
Principles of accountancy, ledger posting and book entries, preparation of trial balance, columns of a cash book, bank reconciliation statement, rectification of errors, profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques, bills of exchange, promissory notes and hundies documentary bills.	
Pharmacoeconomics:	
Principles of economics with special reference to the laws of demand and supply, demand schedule, demand curves, labor welfare, general principles of insurance and inland and foreign trade, procedure of exporting and importing goods.	
Pharmaceutical marketing:	
Functions of buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail sale, departmental store, multiple shop and mail order business.	
Salesmanship:	

Principles of sales promotion, advertising, ethics of sales, merchandising, literature, detailing.	
Market research:	
Recruitment, training, evaluation, compensation to the pharmacist, pre-requisition, basic information services.	
Materials management:	
A brief exposure of the basic principles of materials management, purchase, stores and inventory control (eligibility, efficiency, evaluation, recruitment methodology, service conditions, termination performance evaluation etc.)	
Production management:	
A brief exposure of the different aspects of production management, a visible and invisible inputs, methodology of activities, performance evaluation technique, process-flow, process know-how, maintenance management.	

BOOKS RECOMMENDED:	
1.J.A.Stoner, R.E. Freeman & D.R. Gilbert "Management" Prentice Hall, New Delhi	
2.P. Kotler, "Marketing Management Analysis, Planning, Implementation & Control", Prentice Hall, Delhi	
3.H.A. Smith, "Principles And Methods Of Pharmacy Management", Lea & Febiger, Philadelphia	
4.P.Gopalkrishan And M. Sundaresan, "Material Management: An Integrated Approach". Prentice Hall, Delhi	
5.C.B. Mannoria, "Personal Management", Himalaya Publishing House, Bombay	
6.L.Lachman, H. A.Liberman And J.L. Kanic, "Theory And Practice Of Industrial Pharmacy", Lea & Febiger, U.S.A.	
7.P. Kotler, "Principles Of Marketing", Prentice Hall, New Delhi.	

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK		Marks		Duration of Exam	
		Theory	Lab. work	Theory	Lab work	Theory	Lab Work
B87	Project related to elective	-	3	--	100	--	3