



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences  
**Department:** Pharmaceutics & Pharmaceutical Technology  
**Semester:** V  
**Name of Subject:** Pharmaceutical Microbiology-I (Theory)  
**Subject Code:** 4PS05PMI1

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Theory				Total
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05PMI1	Pharmaceutical Microbiology-I	3	0	0	3	3	20	1	70	3	100
									10 (CEC)	--			

### Objectives:-

- The objectives of Pharmaceutical Microbiology are to develop the knowledge behind the basic Microbiology which is involved in pharmacy.

### Prerequisites:-

- To have a more thorough theoretical background in many of the topics covered in this course; students should have basic knowledge of biology and microbes.

### Course outline:-

Sr. No.	Course Contents	Hours
1	<b>Introduction to microbiology:</b> Contribution of great scientists in the field of microbiology, Scope of microbiology and its applications.	02
2	<b>Classification and taxonomy :</b> Bacteria, Actinomycetes, Spirochetes, Rickettsia and Viruses Morphology and Physiology of Bacteria – Structure of bacteria, Nutrition, cultivation, isolation, identification of bacteria, reproduction and growth of bacteria	12
3	<b>Microscopy :</b> Microscope and various types of microscopes	03
4	Culture media and culture methods	05
5	<b>Control of microbes:</b> Sterilization: Methods of Sterilization , Validation of Sterilization Methods and Equipment. Disinfection: definition, factors influencing disinfectants and antiseptics and their evaluation	12
6	<b>Analytical microbiology:</b> Sterility of Pharmaceuticals, Microbiological Assay of Vitamins, Antibiotics and Amino acids	08
7	<b>Industrial Microbiology :</b> Microorganism such as bacteria, yeast and molds used in Industrial processes	03
<b>Total</b>		<b>45</b>



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester:** V

**Name of Subject:** Pharmaceutical Microbiology Practical

**Subject Code:** 4PS05PMIP

**Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Practical				
									Sessional Exam		University Exam		Total
									Marks	Hrs	Marks	Hrs	
1	04	4PS05PMIP	Pharmaceutical Microbiology –I Practical	0	0	3	3	1.5	20	3	70	3	
									10 (CEC)	--			

The practical exercises are based on topics describe under theory. The practicals should broadly cover the following:

1. Experiments devised to prepare various types of culture media
2. Sub culturing of common aerobic and anaerobic bacteria, fungus, and yeast
3. Various staining methods, various methods of isolation and identification of microbes
4. Sterilizing techniques and their validation
5. Evaluation of antiseptics and disinfectants
6. Testing the sterility of pharmaceutical products as per IP requirements
7. Microbial assay of antibiotics and Vitamins etc.

**Learning Outcomes:-**

- The course would help the student to deal with basic techniques involved in Pharmaceutical Microbiology.

**Teaching & Learning Methodology:-**

- Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each Unit/topic and will be evaluated at regular interval.
- Specific discussion questions will be assigned each week.

**Books Recommended:-**

**Text Book**

1. Textbook of microbiology by Tortora.
2. Microbiology, Pelczar, Chan Krieg Tata McGraw Hill.
3. Dispensing Pharmacy by Cooper and Gunn, Twelfth edn.
4. Bentley's Text book of Pharmaceutics.

**Reference Book**

1. Russell-Principles and Practice of Disinfections, Preservation and Sterilization latest Ed.
2. Brooks-Medical Microbiology 22nd Ed. 2001
3. Bergey's Manual of Systematic Bacteriology Williams and Wilkins-A Waverly Company
4. W. Thompson, Bioassay techniques for Drug Developments Hughes and Anderson's, Antibiotics Development and Resistance



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5. Stephen Denyer Rosemund Baird: Guide to Microbiological Control In Pharmaceutical and Medical Devices
6. Pharmaceutical Microbiology Sixth Edition Edited by W. B. Hugo and A. D. Rusell, Backwell Science
7. Remington Pharmaceutical Science, Latest edn.



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester:** V

**Name of Subject:** Hospital & Community Pharmacy (Theory)

**Subject Code:** 4PS05HPH1

**Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Theory				Total
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05HPH1	Hospital & Community Pharmacy	2	0	0	2	2	20	1	70	3	100
									10 (CEC)	--			

**Objectives:-**

- The objectives of Hospital & Community Pharmacy are to develop the knowledge about the Hospital Pharmacy and Community Pharmacy

**Prerequisites:-**

- To have a more thorough theoretical background in many of the topics covered in this course; students should have basic knowledge of Hospital pharmacy.

**Course outline:-**

Sr. No.	Course Contents	Hours
1	<b>Hospital: Organization and Structure</b> Organization of a hospital and hospital pharmacy, Responsibilities of a hospital pharmacist, Pharmacy and therapeutic committee, Budget preparation and Implementation.	06
2	<b>Hospital Formulary:</b> Contents, preparation and revision of hospital formulary.	02
3	<b>Drug Store Management and Inventory Control:</b> (a) Organization of drug store, organization and structure of retail and whole sale drug store-types of drug store and design, legal requirements for establishment, maintenance and drug store-dispensing of proprietary products, maintenance of records of retail and wholesale. (b) Purchase and Inventory Control principles, methods of inventory control, purchase procedures, Purchase order, Procurement and stocking. Types of materials stocked, storage conditions.	09
4	<b>Drug distribution Systems in Hospitals:</b> (a) Out-patient dispensing, methods adopted. (b) Dispensing of drugs to in-patients. Types of drug distribution systems. Charging policy, labelling. (c) Dispensing of drugs to ambulatory patients. (d) Dispensing of controlled drugs.	06
7	<b>Drug Information Services:</b> Sources' of Information on drugs, disease, treatment schedules, procurement of information, Computerized services (e.g., MEDLINE), Retrieval of information, Medication error.	02



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8	<b>Records and Reports:</b> Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases etc.	02
9	<b>Community Pharmacy:</b> patient counselling, role of pharmacist in community health care and education.	03
Total		30

### **Learning Outcomes:-**

- The course would help the student to achieve more confidence in terms of Hospital & Community Pharmacy which is the basic requirement for pharmacist in Health care.

### **Teaching & Learning Methodology:-**

- Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each Unit/topic and will be evaluated at regular interval.
- Specific discussion questions will be assigned each week.

### **Books Recommended:-**

#### **Text Book**

1. Hospital Pharmacy: Dr. R. K. Goyal and Parikh, B. S. Shah Publication.
2. Hospital Pharmacy by Hassan, Henry Kimpton Publishers, London.
3. Merchant H.S and Qadry J. S, Text Book of Hospital Pharmacy, B.S. Shah Prakashan, Ahmedabad.

#### **Reference Book**

1. Hospital Organization and Management by Kurt Dan and Jonathan S. Ratich, 4<sup>th</sup> Edition, CBS Publishers.
2. Remington: The Science and Practice of Pharmacy, Latest Edition by Mack Publishers.
3. A text book of Hospital & Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K. Khar, Birla Publication.
4. Drug and Cosmetic act and Rules by Vijay Malik
5. Allwodd M C and Fell J T, Textbook of Hospital Pharmacy, Blackwell Scientific Publications, Oxford.



## C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry

**Semester:** V

**Name of Subject:** Pharmaceutical Chemistry-V  
(Medicinal Chemistry-II) (Theory)

**Subject Code:** 4PS05PCH5

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester					
				Th	Tu	Pr	Total		Theory				Total	
									Sessional Exam		University Exam			
									Marks	Hrs	Marks	Hrs		
1	04	4PS05PCH5	Pharmaceutical Chemistry-V (Medicinal Chemistry-II)	3	0	0	3	3	20	1	70	3	100	
									10 (CEC)	--				

### Objective:-

- The course is designed to make students familiar with the principles of medicinal chemistry as applied to pharmaceuticals and to study the synthetic approaches and structure activity relationship of different therapeutic class of drugs.

### Prerequisites:-

- Basic understanding of concepts related to Synthetic chemistry along with pharmacology and biochemical studies.

### Course outline:-

Sr. No.	Course contents	Hours
	Course should cover Introduction, history, classification, and mechanism of action, chemistry and stereochemistry, structure activity relationship (SAR) and synthetic procedures of selected drugs, therapeutic uses, adverse effects and recent developments of following categories to be covered.	
1	<b>Drugs acting on ANS (Cholinergic nervous system)</b> <b>a) Parasympathomimetic agents:</b> SAR- Parasympathomimetics (Synthesis: Neostigmine, Dicyclomine HCl) <b>b) Parasympatholytic agents:</b> SAR:- Muscarinic antagonists <b>c) Neuromuscular blocking agents and ganglionic blockers</b>	06
2	<b>Drugs acting upon Adrenergic Nervous System</b> <b>a) Sympathomimetic agents:</b> SAR:- $\beta$ -Phenylethanolamine class (Synthesis: Adrenaline, Salbutamol, Isoprenaline and Ephedrine) <b>b) Smpatholytic agents:</b> (Synthesis:- Propranolol and atenolol)	05



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3	<p><b>Drugs acting On CNS</b>  <b>CNS stimulants:</b></p> <ul style="list-style-type: none"> <li>• Analeptics</li> <li>• Antidepressants</li> <li>• Hallucinogens</li> </ul> <p><b>SAR:-</b> Tricyclic antidepressants  <b>Synthesis:-</b> Amphetamine, Fluoxetine, Imipramine, Nikethamide</p>	05
4	<p><b>CNS Depressants:</b></p> <ul style="list-style-type: none"> <li>• General anaesthetics</li> <li>• Local anaesthetics</li> <li>• Sedative and Hypnotics</li> <li>• Anxiolytics</li> <li>• Antiepileptics</li> <li>• Antipsychotics</li> </ul> <p><b>SAR:-</b> Benzoic acid and Aniline derivatives with Local anesthetic activity, Barbiturates, Benzodiazepines, Phenothiazines, Butyrophenones  <b>Synthesis:-</b> Halothane, Lignocaine, Thiopental sodium, Phenobarbitone, Chlordiazepoxide, Phenytoin, Carbamazepine, Chlopromazine, Trifluoperazine</p>	14
5	<p><b>Antiparkinson's agents</b>  <b>Synthesis:</b> L-Dopa</p>	02
6	<p><b>Non Steroidal Anti-Inflammatory Agents, Anti Gout and DMARDS:</b>  <b>Synthesis:-</b> Paracetamol, Aspirin, Diclofenac, Ibuprofen, Indomethacin, Allopurinol, Mefenamic acid, Nimesulide, Naproxen</p>	07
7	<p><b>Opioid and Non-Opioid Analgesics;</b>  <b>SAR:-</b></p> <ul style="list-style-type: none"> <li>• Morphine,</li> <li>• Pethidine,</li> <li>• Benzomorphan,</li> <li>• Morphinan</li> </ul> <p><b>Synthesis:-</b> Pethidine, Methadone</p>	04
8	<p><b>Alzheimer's disease</b>  <b>Cognition enhancers</b></p>	02
Total		45



# **C. U. SHAH UNIVERSITY**

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry

**Semester:** V

**Name of Subject:** Pharmaceutical Chemistry-V (Medicinal Chemistry-II)  
Practical

**Subject Code:** 4PS05PCHP

## **Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				Total
				Th	Tu	Pr	Total		Practical				
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05PCHP	Pharmaceutical Chemistry-V (Medicinal Chemistry-II) Practical	0	0	3	3	1.5	20	3	70	3	100
									10 (CEC)	--			

The practical exercises are based on topics described under theory. The practicals should broadly cover the following:

1. Separation and qualitative analysis of Organic binary mixtures containing water insoluble components having salt, acidic, phenolic, amphoteric, basic and neutral nature (Solid + Solid, Solid + liquid, Liquid + liquid and Eutectic mixtures) with derivative preparations.
2. Synthesis of Aspirin
3. Synthesis of succinic anhydride
4. Synthesis of Methyl orange
5. Synthesis of Methyl Salicylate
6. Synthesis of Paracetamol
7. Purification Techniques and reaction monitoring by TLC

## **Learning outcomes:-**

- By the end of this course, the student should have a good understanding of the history and basic concepts of Medicinal chemistry
- Students should be able to describe in detail synthetic approaches, mechanisms of action as well as structure activity relationship of some important therapeutic class of Drugs.
- The course may help the students in understanding rational approaches towards the design of important therapeutic agents and their biological implications.

## **Teaching & Learning Methodology:-**

- Using black board and one-way communication from a teacher to as student. Using an overhead and LCD projector

## **Books recommended:-**

### **Text Books**

1. J. N. Delagado and W. A. R. Remers, edn, Wilson and Giswolds Textbook of organic medicinal and pharmaceutical chemistry, J. Lippincott Co. Philadelphia
2. W. C. Foye, Principles of medicinal chemistry, Lea and febiger, Philadelphia
3. H. E. Wolff, edn, Burgers Medicinal chemistry, John Wiley and sons, New York





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4. Text Book of Medicinal Chemistry by Alagaraswamy, Elsevier Publication, New Delhi.
5. Text Book of Medicinal Chemistry by Kadam & Bothara, Volume I & II, Nirali Publication, New Delhi.

### **Reference Books**

1. Daniel Lednicer, Strategies for organic drug synthesis and design, John Wiley and Sons USA
2. B. N. Ladu, H. G. Mandel and E. L. Way. Fundamentals of drug metabolism and disposition. William and Willkins co. Baltimore
3. I. L. Finar. Organic chemistry Vol. I and Vol. II. ELBS/Longman, London
4. Vogels Text books practical organic chemistry, ELBS/Longman, London
5. Mann and Saunders, Practical organic chemistry, Orient Longman, UK
6. Shriner, Hermann, Morill, Curtin and Fusion. The systematic identification of organic compounds, John Wiley and Sons
7. Strategies for Organic Drug Synthesis & Design by Daniel Lednicer, John Wiley & sons, USA.



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry & Pharmaceutical Analysis

**Semester:** V

**Name of Subject:** Pharmaceutical Analysis-II (Theory)

**Subject Code:** 4PS05PHA2

## Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				Total
				Th	Tu	Pr	Total		Theory				
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05PHA2	Pharmaceutical Analysis-II	3	0	0	3	3	20	1	70	3	100
									10 (CEC)	--			

## Objectives:-

- To Design and application of analytical method to obtain analysis data with high precision and accuracy.
- To Introduce various analytical techniques and their applications.
- To make students familiar with the principles of pharmaceutical analysis and its application in pharmacy.

## Prerequisites:-

- Student must have taken general chemistry or science at 10+2 level subject related to simple titration before this course.

## Course outline:-

Sr. No.	Course contents	Hours
1	<b>Basics of instrumental analytical methods</b> Advantages, limitations, validation	03
2	<b>Electroanalytical methods</b> Basics of electroanalytical methods	02
3	<b>Potential and pH metric methods</b> Standard reduction potentials, various electrodes, electrodes and cell potential, applications of potentiometry and pH metry	04
4	<b>Conductometry</b> Conductances, factors affecting conductance, Kohlrausch law, conductivity cells, applications	04
5	<b>Polarography, amperometry</b> Basics of current flow in polarography, dropping mercury electrode, diffusion current, half wave potential, modifications like pulsed and differential pulse polarography, stripping voltametry, biamperometric titrations, amperometric titrations	06
6	<b>Chromatography</b> Classification, theories, retention mechanism, separation efficiency, methodology an pharmacopoeial applications of following types of chromatography <ul style="list-style-type: none"> <li>Column chromatography</li> </ul>	15



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	<ul style="list-style-type: none"><li>• Paper chromatography</li><li>• Thin layer chromatography</li></ul>	
7	<b>Calorimetry</b> Types, thermogravimetric analysis, differential scanning calorimetry, differential thermal analysis, melting point, etc. and their applications	03
8	<b>Polarimetry</b> Polarimeter, qualitative and quantitative applications	02
9	<b>Extraction techniques</b> Simple extraction, multiple extractions, separation of drugs in multicomponent system. Applications of supercritical fluid extraction. Effect of pH on extractability of drugs, continuous extractions	04
10	<b>Miscellaneous methods</b> Oxygen combustion flask method, Karl Fischer titration.	02
	Total	45



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry & Pharmaceutical Analysis

**Semester:** V

**Name of Subject:** Pharmaceutical Analysis-II (Practical)

**Subject Code:** 4PS05PHAP

## **Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Practical				Total
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05PHAP	Pharmaceutical Analysis-II	0	0	2	2	1	20	3	70	3	100
									10 (CEC)	--			

The practical exercises are based on topics described under theory. The practicals should broadly cover the following:

### **Analysis of different compounds involving following techniques:**

1. Conductometry
2. Potentiometry
3. pH metry
4. Polarimetry
5. Column chromatography
6. Thin layer chromatography
7. Paper chromatography
8. Polarography, amperometry and biamperometry

### **Learning Outcomes:-**

- At the end of the course, the student will be able to understand the concept of pharmaceutical analysis, which is important for qualitative as well as quantitative analysis of drug substances and drug product.
- Understand and be able to apply the fundamental principles of analytical chemistry.
- Demonstrate an understanding of the application of and use of different methods of analysis.
- Competently undertake advanced qualitative and quantitative laboratory tasks, including the operation of advanced analytical instrumentation.
- Demonstrate the ability to follow the analytical approach to the solution of problems in chemical analysis and adhere to good laboratory practice.
- Be able to understand and follow standard documented methods of analysis.

### **Teaching & Learning Methodology:-**

- Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each Unit/topic and will be evaluated at regular interval.
- Specific discussion questions will be assigned each week.



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### **Books Recommended:-**

#### **Text Books**

1. Quantitative chemical analysis – Vogel A.I, Pearson Education
2. Instrumental Methods of Analysis H. H. Willard (CBS Publishers, Delhi)
3. Fundamentals of Analytical Chemistry – Skoog, Harcourt College Publishers

#### **Reference Books**

1. The Quantitative analysis of drugs Garratt.
2. Quantitative chemical analysis by Gilbert H. Ayers. Harper and Row New York.
3. A Textbook of pharmaceutical analysis by Kenneth A. Connors. Jon Wiley and sons.
4. Analysis chemistry by Gary D. Christian, John Wiley and sons N.Y.
5. Quantitative analysis by V. Alexeyev. Mir publishers, Moscow.
6. Pharmaceutical Analysis by T. Higuchi etc. CBS Publishers, New Delhi.
7. Quantitative Analysis R. A. Day and A. L. Underwood Prentice Hall of India.
8. Pharmacopoeia: USP, B.P., I.P
9. Analytical Chemistry by R. M. Verma CBS Publishers.
10. Text Book of Pharmaceutical Analysis by Kasture, Wadodkar, Vol II Nirali Publication.
11. Pharmaceutical analysis by Ravishankar



## C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacognosy

**Semester:** V

**Name of Subject:** Pharmacognosy-IV (Theory)

**Subject Code:** 4PS05COG4

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Theory				
									Sessional Exam		University Exam		Total
									Marks	Hrs	Marks	Hrs	
1	04	4PS05COG4	Pharmacognosy -IV	3	0	0	3	3	20	1	70	3	100
									10 (CEC)	--			

### Objectives:-

- The main objective of this course is to familiarize the students with the basic aspects of Pharmacognosy. Knowledge regarding exploiting the full potential of herbs may be gained from this course.

### Prerequisites:-

- The students should have a clear concept of Botany and crude drugs.

### Course outline:-

Sr. No	Course Contents	Hours
1	<p><b>Alkaloids:</b> Definition, classification, physico-chemical properties, general methods for isolation, biological sources, agronomy (cultivation, collection), processing, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic, microscopic features and specific chemical tests of following alkaloid containing drugs</p> <p>a)<b>Pyridine – Piperidine:</b> Tobacco, Lobelia, Pomegranate, Piper, Areca nut</p> <p>b)<b>Tropane:</b> Datura, Belladonna, Hyocyamus, Scopolia, Withania, Dubosia, Cocca</p> <p>c)<b>Quinoline &amp; Isoquinoline:</b> Cinchona, Ipecac, Opium, Camptotheca</p> <p>d)<b>Indole:</b> Ergot, Rauwolfia, Catharanthus, Nuxvomica, Physostigma</p> <p>e)<b>Imidazole:</b> Pilocarpus</p> <p>f)<b>Steroidal:</b> Veratrum, Kurchi, Kantakari</p> <p>g)<b>Alkaloidal Amine:</b> Ephedra, Colchicum</p> <p>h)<b>Purines:</b> Coffee, Tea, Cola</p> <p>i)<b>Quinazoline:</b> Vasaka</p> <p>j)<b>Diterpene Alkaloids:</b> Aconite, Taxus</p> <p>k)<b>Others:</b> Tylophora</p>	32
2	<b>Marine Pharmacognosy:</b> Novel medicinal agents from marine sources	5
3	<b>Plant Tissue Culture:</b> Introduction, Basic requirements, Types of culture, Nutritional requirements, & Application	08
	Total	45



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacognosy

**Semester:** V

**Name of Subject:** Pharmacognosy IV (Practical)

**Subject Code:** 4PS05COGP

## Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				Total
				Th	Tu	Pr	Total		Practical				
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05COGP	Pharmacognosy IV Practical	0	0	3	3	1.5	20	3	70	3	100
									10 (CEC)	--			

The practical exercises are based on topics describe under theory. The practicals should broadly cover the following:

- Study of Morphology, Microscopy and TLC of crude drugs: (T.S., Powder and TLC of underlined drugs):
  - Datura, Tobacco, Pomegranate, *Piper longum*, *Piper nigrum*
  - Withania (Root), Belladonna, Hyocyamus, Dubosia, Lobelia, Areca
  - Cinchona, Ipecac, Camptotheca
  - Rauwolfia, Ergot
  - Nuxvomica, Catharanthus, Physostigma
  - Kurchi, Kantakari (Leaf & Stem)
  - Ephedra, Colchicum, (Seed & Corm)
  - Vasaka, Coffee, Tea, Cola
- Isolation of Quinine from Cinchona.
- Isolation of Caffeine from Tea
- Isolation of Piperine from Black Piper.
- Estimation of Total Alkaloids from Datura by titrimetric method
- Estimation of Quinine by UV Spectroscopy

## Learning Outcomes:-

- The student would have gained knowledge regarding herbal drugs, i.e: alkaloids which is of almost importance.

## Teaching Methodology:-

- Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each Unit/topic and will be evaluated at regular interval.
- Specific discussion questions will be assigned each week.

## Books Recommended:

### Text Book

- A Text book of Pharmacognosy: Shah C. S., Quadry J. S., B. S. Shah Prakashan, Ahmadabad. 15<sup>th</sup> Edition, 2009.



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2. Pharmacognosy: Kokate C. K., Purohit A. P., Gokhale S. B., Nirali Prakashan Pune, 42nd edition, 2008.
3. Trease and Evans Pharmacognosy. 16h Edition, William Charles Evans, W.
4. Textbook of Pharmacognosy: Wallis T. E., CBS Publishers and Distributors, New Delhi, 5th Edition, reprinted, 2009.
5. Study of Crude drugs, Iyengar M. A. and Nayak S.G.K. Manipal Power Press, Manipal.
6. Practical Pharmacognosy, Technique and Experiment by Kokate C. K. and Gokhale S. B., Nirali Prakashan, Pune, 8<sup>th</sup>edition, 2005.

### **Reference Book**

1. Saunders, Edinburg London New York Philadelphia St. Louis Sydney Toronto 2009.
2. Natural Products, Vol I & II, by Agrawal O. P., Goel Publishing House, Meerut, 28th Edition, 2004.
3. Chemistry of Natural products. Bhat SV, Nagasampagi BA, Meenakshi S. Narosa Publishing house, New Delhi, 2005.
4. Medicinal Natural Products a Biosynthetic Approach, Dewick Paul M. John Wiley and Sons, West Sussex, 2009.
5. Pharmacognosy and Pharmacobiotechnology by Ashutosh Kar, 2nd Edition, New Age International Pvt. Ltd.; New Delhi, 2007.
6. The Wealth of India (Raw Material & Industrial Product), Published by Council of Scientific Industrial Research, New Delhi, 1st Edition, (1950-2014).
7. Indian Medicinal Plants by Kirtikar and Basu, 1st Edition, International Book Distributors, Dehradun, 1999.
8. Compendium of Indian Medicinal Plant Vol. 1 to 6, by Rastogi Ram P., Mehrotra B. N., CDRI & NISCOM, 1st Edition, New Delhi, 1998.
9. Review on Indian Medicinal Plants, Vol I to XI (2004 to 2014) Editor: Gupta A K & Tundon Neeraj. By: Indian Council of Medicinal Research (ICMR), New Delhi.
11. Powdered Vegetable Drugs by Jeckson B. P. & Snewden D. W. Chanhnan M. G & Pillai A. P.G, Microscopic profile of powdered drugs used in
12. Indian system of medicine, Volume I, Bark drugs 2005, Institute of Ayurvedic medicinal plant science, Gujarat Ayurved University, Jamnagar.
13. Chauhan M. G & Pillai A.P.G, "Microscopic profile of powdered drugs used in Indian systems of Medicine, Leaf Drugs, Vol 2, 2007, Institute of P.G Teaching & Research in Ayurveda, Gujarat Ayurved University, Jamnagar.
14. Chauhan M. G & Pillai A.P.G, " Microscopic profile of Drugs used in Indian system of Medicine, Seed drugs, Volume- 3, part- 1, 2011; Publisher: Prof Malati G Chauhan, P.G T- S.F C cell, I.P. G T. & R.A, Gujarat Ayurved University, Jamnagar.
15. Anatomy of Crude Drugs, Iyengar M. A. and Nayak S.G.K, Manipal Power Press, Manipal.
16. Quality Control of Plants. WHO publication.





# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacology

**Semester:** V

**Name of Subject:** Pharmacology II (Theory)

**Subject Code:** 4PS05COL2

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Theory				Total
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05COL2	Pharmacology II	3	0	0	3	3	20	1	70	3	100
									10 (CEC)	--			

### Objectives:-

- To learn the mechanism of action, pharmacological effects, and therapeutic application of various classes of drugs with special attention to drugs acting on CNS, cardiovascular and Hemopoietic system.

### Prerequisites:-

- Knowledge of Human Anatomy Physiology, Health Education, Biochemistry and basic physics and chemistry. Fundamentals of pharmacology learnt in previous semesters.

### Course outline:-

Sr. No.	Course Contents	Hours
1	<b>Drugs acting on Nervous system:</b> a. Neuronal transmitters in CNS. b. General Anesthetics. c. Ethyl and Methyl Alcohols. d. Sedatives and Hypnotics, Anxiolytic Agents and Centrally acting Muscle Relaxants e. Antipsychotics and Drugs used in Affective Disorders f. Antiepileptic Drugs. g. Antiparkinson Drugs h. Analgesics, Antipyretics and Anti-Inflammatory Drugs. i. Opioids Analgesics and Antagonists. j. CNS Stimulants and Psychotomimetic Agents. k. Drug Dependence and Drug abuse	22
2	<b>Drugs acting on Cardiovascular and Renal System:</b> a. Cardiac Glycosides and other Cardiotonics. b. Antihypertensive Drugs. c. Anti-anginal Drugs. d. Anti-arrhythmic Drugs. e. Antihyperlipidemic Drugs. f. Diuretics and anti-Diuretics	17



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3	<b>Drugs Acting on the Hemopoietic System:</b> a. Hematinics and Erythropoietin. b. Drugs Affecting Coagulation, Bleeding and Thrombosis. c. Plasma Expanders.	03
4	<b>Gene Based Therapy</b>	03
	Total	45



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacology

**Semester:** V

**Name of Subject:** Pharmacology II Practical

**Subject Code:** 4PS05COLP

## **Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester				
				Th	Tu	Pr	Total		Practical				Total
									Sessional Exam		University Exam		
									Marks	Hrs	Marks	Hrs	
1	04	4PS05COLP	Pharmacology II Practical	0	0	3	3	1.5	20	3	70	3	100
									10 (CEC)	--			

The practical exercises are based on topics described under theory. The practical should broadly cover the following:

1. Experiments on Central Nervous System:
  - a) Recording of Spontaneous motor activity
  - b) Stereotype
  - c) Analgesia
  - d) Anticonvulsant
  - e) Activity and Muscle Relaxant
2. To find out Nature of Unknown Drugs: using Rat/Guinea Pig/Chicken Ileum Preparation.
  - a) Acetylcholine
  - b) Histamine
  - c) BaCl<sub>2</sub>
  - d) Physostigmine
  - e) Atropine
  - f) Mepyramine
  - g) Papaverine
3. Demonstration
  - a) Effects of Various Drugs on Isolated rat/frog Heart.
  - b) Effects of Various Drugs on the Rat blood Pressure.
  - c) Study on the Effects of CNS Stimulant (Coffee/Tea) on Human Volunteers.

## **Learning Outcomes:**

- Define and correctly use scientific terminology in regard to human body and processes.
- Apply principles of scientific inquiry, differentiate a theory from a hypothesis, and differentiate fact from opinion in regard to use of drugs in different human system.
- Describe and practice laboratory safety guidelines relating to working with drugs, experimental animals and body fluids.
- Show proficiency in taking lab practical exams, responding to questions quickly and accurately, effectively handling the pressure of a timed exam.

## **Teaching & Learning Methodology:-**

- Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.



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- Assignments based on course content will be given to the students at the end of each Unit/topic and will be evaluated at regular interval.
- Specific discussion questions will be assigned each week.

### **Books Recommended:**

#### **Text Book:**

1. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and Pharmacotherapeutics. 16<sup>th</sup> edition (single volume), 1999. Publisher: Popular, Dubai.
2. K. D. Tripathi, Essential of Medical Pharmacology, 6<sup>th</sup> edition J.P. Publication.
3. Kulakarni S. K.- handbook of Experimental Pharmacology (1993)2<sup>nd</sup> Edn. Vallabh Prakashan, New Delhi.
4. R. K. Goyal. Practicals in Pharmacology: B.S. Shah Prakashan, Ahmedabad.
5. Kulakarni S.K. - Handbook of Experimental Pharmacology (1993) 2<sup>nd</sup> Edn. Vallabh Prakashan, New Delhi.

#### **Reference Book**

1. Rang, H.P. & Dale, M.M. Pharmacology. 4<sup>th</sup> edition, 1999. Publisher: Churchill Living stone.
2. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, Int.
3. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 9<sup>th</sup> Ed, 1996. Publisher McGraw Hill, Pergamon press.
4. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
5. Sheth U.K. et al-Selected topics in Experimental Pharmacology (1972)15<sup>th</sup> Edn. The Kothari Book Depot, Mumbai.
6. Harvel, R.A., Champe P.C. et al — Pharmacology (1997) 2<sup>nd</sup> Edn. Lippincott- Raven Company, Philadelphia, New York.