



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester:** III

**Name of Subject:** Pharmaceutical Industrial Process II (Theory)

**Subject Code:** 4PS03PIP2

**Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester							
				Th	Tu	Pr	Total		Theory				Practical			Total
									Sessional Exam		University Exam		Internal		University	
									Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
1	4	4PS03PIP2	Pharmaceutical Industrial Process II	3	0	3	6	4.5	20	1	70	3	20	--	70	200
									10 (CEC)	--			10 (CEC)	--		

**Objectives:-**

The objectives of Pharmaceutical Industrial Process-II is to develop the ability to predict the approach of applications of pharmaceutical engineering from initial stages to the field of dosage form manufacturing in a pharmaceutical industry.

**Prerequisites:-**To have a more thorough theoretical background in many of the topics covered in this course, the candidate should have an adequate knowledge about general physics as well as chemistry studied during his/her standard - 12 (10+2) pattern science stream from the Examination Board of respective State.

**Course outline:-**

Sr. No	Course Contents	Hours
1	<b>Evaporation:</b> Basic concept of phase equilibria, factors affecting evaporation, heat transfer in evaporators, Duhring's Rule and Raoult's law, evaporators- natural circulation forced circulation & film evaporators, single effect and multiple effect evaporators, mathematic problems.	08
2	<b>Distillation:</b> Basic concepts, vapour liquid equilibrium relationship, volatility and relative volatility, types of distillation such as simple steam, flash distillations, batch and continuous distillation, rectification, distillation columns (packed, plate) and their efficiency, McCabe Thiele method for calculation of number of theoretical plates, mathematical problems.	08
3	<b>Drying:</b> Principle, Moisture content, loss on drying, theory & mechanism of drying, drying rate and time calculations, classification of dryers, factors affecting selection of dryers, dryers used in pharmaceutical industries - tray, vacuum, fluidized bed, spray, freeze, tunnel, Microwave, Infra Red(IR), rotary dryers. Mathematical problems.	09
4	<b>HVAC(Humidity Ventilation and Air Conditioning):</b> Definitions of various terms, wet bulb and adiabatic saturation temperatures, psychrometric chart and determination of humidity, equipments for humidification and de-humidification operations, applications of humidity control in various pharmaceutical processes.	08



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	Basic concepts and types of refrigeration cycles, air conditioning, applications in pharmacy. Design of HVAC systems.	
5	<b>Compression and Compaction:</b> Solid-Air Interface, Mass-volume relationships, Effect of applied force, Compressed tablets, consolidation, granulation, granulators, Physics of tablet compression, force-volume relationships, Compaction profiles, Energy involved in compaction, types of tablets machine.	08
6	<b>Industrial Waste Water Management:</b> Introduction of water, Waste water characteristics, Waste water treatment (Pretreatment, Primary treatment, Secondary treatment)	04
		Total 45



## **C. U. SHAH UNIVERSITY**

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**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester:** III

**Name of Subject:** Pharmaceutical Industrial Process II (Practical)

**Subject Code:** 4PS03PIP2

The practical exercises are based on topics describe under theory.

The practicals should broadly cover the following:

1. To find out the rate of drying of sample containing different Moisture Content (MC) and to evaluate Critical Moisture Content (CMC), Equilibrium Moisture Content (EMC), Free Moisture Content (FMC).
2. To study the effect of surface area on rate of drying of prepared sample.
3. Study the effect of surface area, percentage of impurity and agitation method on rate of evaporation.
4. To prepare distilled water with the help of simple distillation unit.
5. To purify the given alcohol and water mixture by rectification / fractional distillation using, (A)Simple open column (B) Packed column and determine HETP
6. To separate absolute alcohol by Azeotropic distillation using, (A)Simple open column (B) Packed column and determine HETP
7. To separate absolute alcohol by Extractive distillation using, (A)Simple open column (B) Packed column and determine HETP.
8. Demonstration of tray Dryer.
9. To determine the humidity by DBT, WBT method and to calculate H%, HP%, HR%,  $V_0$ ,  $V_s$ ,  $V_H$ ,  $C_s$ .
10. To determine humidity using Dew point method.
11. To determine moisture content of given sample.
12. To prepare granules with different types of binders.
13. Demonstration of single tablet punching machine.
14. Demonstration of rotary tablet punching machine.
15. Demonstration of air-conditioning.

### **Learning Outcomes:-**

On the completion of the course, students will be able to:

- Learning method of dosage form manufacturing pharmaceutical industry.
- Learning role of Evaporation, Distillation, Drying and its implementation in Pharmaceutical Industrial Process.
- Learning the utilization of waste water for recirculation and making the environment eco-friendly.

### **Teaching Methodology:-**

- Lectures will be conducted with the aid of various Audio visual aids.
- 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:**

1. S.J. Carter, Cooper and Gunn's Tutorial Pharmacy 6th ed CBS publisher, Delhi
2. C.V.S. Subramanayam, Pharmaceutical Unit Operation, Vallabh Prakashan
3. Prof. K. Samba Murthy, Pharmaceutical Engineering.
4. Badzer & Banchemo, Introduction to Chemical Engineering.
5. Perry's Handbook of Chemical Engineering.
6. Unit Operations by Mc Cabe & Smith.
7. Mc Cabe & Smith, Elements of Chemical Engineering.
8. Lippincott Williams and Wilkins: Remington Pharmaceutical Sciences.
9. EA Rawlins, Bentley's Text Book of Pharmaceutics, 8th edition, ELBS
10. L.Lachman, H.A. Lieberman, J.L. Kanig, Theory and practice of Industrial Pharmacy, 4<sup>th</sup> Edition, Varghese publishing house.

### **E-Resources:**

1. <http://en.wikipedia.org/wiki/HVAC>
2. <http://www.njatc.org/downloads/TRC018EN.pdf>
3. <http://en.wikipedia.org/wiki/Wastewater>
4. <http://www.defence.gov.au/jlc/Documents/DSCC/ADF%20Health%20Manual%20Vo1%2020,%20part8,%20chp2.pdf>



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester: III**

**Name of Subject:** Physical Pharmacy I (Theory)

**Subject Code:** 4PS03PHP1

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester							
				Th	Tu	Pr	Total		Theory				Practical			Total
									Sessional Exam		University Exam		Internal		University	
									Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
1	04	4PS03PHP1	Physical Pharmacy I	3	0	3	6	4.5	20	1	70	3	20	--	70	200
									10 (CEC)	--			10 (CEC)	--		

**Objectives:** - The objectives of Physical Pharmaceutics are: To develop the knowledge behind the basic physical parameters which involves in pharmaceuticals.

**Prerequisites:** - To have a more thorough theoretical background in many of the topics covered in this course; students should have basic knowledge of physical properties of substance.

### Course Content:-

Sr. No.	Course Contents	Hours
1	<b>States of Matter:</b> Introduction, binding forces between molecules, states of matter-solids, liquids, gases, liquid crystals, glassy state, phase equilibrium and phase rule, condensed systems	7
2	<b>Solubility and Distribution Phenomenon:</b> General principles, solvent-solute interactions, solubility of gases in liquids, solubility of liquids in liquids, solubility of solids in liquids, distribution of solutes between immiscible solvents.	6
3	<b>Solutions of non-electrolytes :</b> Concentration expressions, equivalent weights, ideal and real solutions, colligative properties, molecular weight determination	6
4	<b>Surface and Interfacial phenomenon:</b> Liquid interface, adsorption at liquid interfaces, adsorption at solid interface, applications of surface active agents, electrical properties of interfaces.	6
5	<b>Disperse systems:</b> <b>a. Colloidal dispersions:</b> Definition, types, properties of colloids, protective colloids, applications of colloids in pharmacy. <b>b. Suspensions:</b> Interfacial properties of suspended particles/globules, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicle, rheological considerations.	12



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	<b>c. Emulsions:</b> Types, theories, physical stability.	
6	<b>Diffusion and dissolution :</b> <b>a. Diffusion:</b> Steady state diffusion, Fick's laws, Applications <b>b. Dissolution:</b> Dissolution & drug absorption, drug release, Noyes-Whitney's equation, factors influencing, apparatus I & II, Applications.	8
	Total	45



## **C. U. SHAH UNIVERSITY**

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutics & Pharmaceutical Technology

**Semester:** III

**Name of Subject:** Physical Pharmacy I (Practical)

**Subject Code:** 4PS03PHP1

### **PRACTICALS:**

1. Determination of solubility by gravimetric method.
2. Determination of solubility by titrimetry.
3. Determination of phenol water coefficient.
4. To find out the distribution coefficient of given solid without association/dissociation.
5. To find out the distribution coefficient of given solid involving association.
6. Determination of molecular weight by colligative property.
7. Determination of surface tension by Stalagnometer.
8. To study the effect of temperature on surface tension.
9. To study the effect of concentration on surface tension.
10. Determination of HLB value.
11. Determination of CMC of surfactants.
12. To study the physical stability of suspension.
13. To study the physical stability of emulsion.
14. Demonstration of diffusion apparatus.
15. Demonstration of dissolution apparatus.

### **Learning Outcomes:-**

The course would help the student to achieve more confidence in terms of physical Pharmaceutics which is the basic requirement in pharmaceuticals.

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

1. Lectures will be conducted with the aid of multimedia projector, black board, OHP etc.
2. 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.
3. Specific discussion questions will be assigned each week.

### **Books Recommended:**

1. Martin's Physical pharmacy by Patrick J. Sinko, 5th edition, Lippincott Williams & Wilkins, New York, 2006.
2. Pharmaceutics: The Science of Dosage Form Design, 2nd edition, Aulton, Michael E., Churchill Livingstone, London, 2002.
3. Remington: The Science and Practice of Pharmacy, Vol-I & II, 20th edition, Gennaro, Alfonso R., Lippincott Williams & Wilkins, New York, 2002.
4. Physicochemical Principles of Pharmacy, 3rd edition, Florence, A. T. Atwood, D. Macmillan Press Ltd., London 1998.



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5. Pharmaceutical Dosage Forms and Drug Delivery Systems, Ansel, Howard. C., Allen, Lloyd V., Popovich, Nicholas G. Lippincott Williams & Wilkins, New York, 2002.
6. Cooper and Gunn's Tutorial Pharmacy, ed. Carter, S. J., 6th edition, CBS Publishers & Distributors, Delhi, 2000.
7. Bentley's textbook of Pharmaceutics by E. A. Rawlins, 8th edition, Bailliere Tindall, London, 2005.





# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry and Pharmaceutical Analysis

**Semester:** III

**Name of Subject:** Pharmaceutical Chemistry-IV (Org. Chemistry-II) (Theory)

**Subject Code:** 4PS03PCH4

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester								Total
				Th	Tu	Pr	Total		Theory				Practical				
									Sessional Exam		University Exam		Internal		University		
									Marks	Hrs	Marks	Hrs	Pr	TW	Pr		
1	04	4PS03PCH4	Pharmaceutical Chemistry-IV (Organic Chemistry-II)	3	0	3	6	4.5	20	1	70	3	20	--	70	200	
									10 (CEC)	--			10 (CEC)	--			

### Objectives: -

- The course is designed to make students familiar with the principles of organic chemistry as applied to pharmaceuticals and to study organic compounds.

### Prerequisites:-

- Basic understanding of concepts related chemistry.

### Course outline:

Sr. No.	Content	Hours
1	<b>Benzene and Aromaticity</b> <ul style="list-style-type: none"> <li>Aromatic electrophilic substitution</li> <li>Electrophilic attack on benzene, Nitration, halogenation, sulphonation, Friedal Craft alkylation and acylation, diazo)coupling. Orientation in Mono)substituted benzene, Polynuclear Aromatic Compounds – Naphthalene, Anthracene, Phenanthrene</li> </ul>	07
2	<b>Stereochemistry:</b> <ul style="list-style-type: none"> <li>Chirality</li> <li>Optical activity (dextro and leavo rotation concept)</li> <li>Stereoisomerism</li> <li>Enantiomers, Diastereomers, Mesomers with physical, chemical and biological properties of the same.</li> <li>Geometrical isomers and its nomenclature. Physical and chemical properties of the same</li> <li>Racemic mixture and its resolution methods.</li> <li>Specification of configuration:</li> <li>Relative configuration (L and D), Absolute configuration (Rand S) (CIP Rules)</li> <li>Axial Chirality: Stereochemistry of Allene, spiran and Biphenyl.</li> <li>Conformational isomers: Alkanes and Cyclohexane</li> </ul>	08



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3	<b>Structure, properties, nomenclature, preparation and reactions of following class of functional groups</b> <ul style="list-style-type: none"><li>• phenols</li><li>• aldehydes and ketones</li><li>• carboxylic acids and their derivatives.</li></ul>	15
4	<b>Heterocyclic compounds: Chemistry, preparation and properties</b> <ul style="list-style-type: none"><li>• Furan, thiophene, pyrrol and pyridine</li><li>• Pyrazole, imidazole, oxazole, isoxazole and thiazole</li><li>• Pyrazine, pyridazine and pyrimidine</li><li>• Quinoline, isoquinoline and indole</li></ul>	12
5	<b>Introduction, principles and applications of:</b> <ul style="list-style-type: none"><li>• nanochemistry,</li><li>• microwave synthesis and</li><li>• green chemistry.</li></ul>	03
Total		45



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry and Pharmaceutical Analysis

**Semester:** III

**Name of Subject:** Pharmaceutical Chemistry-IV (Org. Chemistry-II) (Practical)

**Subject Code:** 4PS03PCH4

**Detailed syllabus (Practical):**

Sr. No.	Aim of the Practical
1	Identification of Unknown organic compound (acid, base, neutral, phenolic and amphoteric).
2	1. Synthesis of m-Dinitrobenzene
	2. Synthesis of Aspirin
	3. Synthesis of <i>p</i> -Bromo Acetanilide
	4. Synthesis of <i>p</i> -Nitro Acetanilide
	5. Synthesis of <i>p</i> -Nitro Aniline
	6. Synthesis of Phthalimide
	7. Synthesis of Phenyl Urea
	8. Synthesis of Picric Acid

**Learning Outcomes:-**

- The course will help the student to have a good understanding of the history and basic concepts of organic chemistry.
- Students should be able to describe in detail synthetic approaches as well as mechanisms of action of some important organic base therapeutic and diagnostic agents.
- The course may help the students in understanding rational approaches towards the design of important therapeutic agents and their biological implications.

**Teaching & Learning Methodology:-**

- The faculty shall explain the lectures using black board, Over Head Projector or Multimedia projector.

**Books Recommended:**

1. Organic Chemistry by Morrison & Boyd, 6<sup>th</sup> edition, Pearson Education.
2. Advanced Organic Chemistry: Reaction, Mechanism and Structure by Jerry March 4<sup>th</sup> edition, A Wiley-Interscience Publication.
3. Vogel's Text Book of Practical Organic Chemistry- Brian Furness, Antony Hannaford, Peter Smith, Austrin (Eds), 5<sup>th</sup> edition, ELBS Publication, Singapore, 1997.



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4. Experimental Pharmaceutical Organic Chemistry, A Benchtop Manual by K. S. Jain, P. B. Miniyar & T. S. Chitre, 2<sup>nd</sup> Edition Carrier publications,.
5. Organic Chemistry by I. A. Finar
6. A Guidebook to Mechanism in Organic Chemistry by Peter Sykes
7. Organic Chemistry, G. Marc Loudon, 4th Ed., Oxford University Press, 2004.



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry and Pharmaceutical Analysis

**Semester:** III

**Name of Subject:** Pharmaceutical Biochemistry- I (Theory)

**Subject Code:** 4PS03PBC1

**Teaching & Evaluation Scheme:-**

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester							Total
									Theory				Practical			
				Sessional Exam		University Exam			Internal		University					
				Marks	Hrs	Marks	Hrs		Pr	TW	Pr					
1	04	4PS03PBC1	Pharmaceutical Biochemistry I	3	0	2	5	4	20	1	70	3	20	--	70	200
								10 (CEC)	--				10 (CEC)	--		

**Objectives: -**

- This course is designed as an introduction to the organic structure of living systems. Lecture will address introduction of Carbohydrate, Proteins, Lipid and enzymes and their metabolism. An understanding of biochemistry is a useful background for many areas of scientific study. It relates the studies of biology and chemistry, allowing an integration of knowledge from both areas of coursework

**Prerequisites:-**

- Basic understanding of concepts related to cell , and basic biochemistry

**Course Outline:-**

Sr. No.	Course contents	Hours
1	Biochemical Organization of the cell and Transport Processes Across cell Membrane.	4
2	Introduction to Carbohydrates, Lipids	8
3	<p><b>a. Carbohydrate Metabolism:</b> Conversion of Polysaccharides to Glucose-1-Phosphate. Glycolysis and Fermentation and their Regulation, Gluconeogenesis, Glycogenesis and Glycogenolysis, Metabolism of Galactose and Fructose. Role of Sugar Nucleosides in Biosynthesis and Pentose-Phosphate Pathway.</p> <p><b>b. The Citric Acid Cycle:</b> Significance, Reaction and Energetic of the Cycle, Amphibolic Role of the Cycle and Glyoxalic Acid Cycle, Uric Acid Cycle</p> <p><b>c. Role of Hormones in Maintenance of Blood Sugar Level.</b></p>	15
4	<b>Lipid metabolism:</b> oxidation of fatty acids, beta-oxidation and energetic, alpha-oxidation, omega-oxidations, biosynthesis of ketone bodies and their utilization, biosynthesis of saturated and unsaturated fatty acids, control of lipid metabolism and metabolism of cholesterol.	7
5	<b>Enzymes:</b> Nomenclature, Enzyme Kinetics and its Mechanism of action, Mechanism of Inhibition, Enzymes and Iso-Enzymes in Clinical Diagnosis.	5



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6	<b>Co-Enzymes:</b> Vitamins as Co-Enzymes and their Significance. Metals as Co-Enzymes and their Significance.	3
7	<b>Water and mineral metabolism: brief introduction</b>	3
	<b>Total</b>	45



# **C. U. SHAH UNIVERSITY**

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmaceutical Chemistry and Pharmaceutical Analysis

**Semester:** III

**Name of Subject:** Pharmaceutical Biochemistry- I (Practical)

**Subject Code:** 4PS03PBC1

## **Detailed Practical Syllabus:**

1.	To perform the identification for carbohydrates (Glucose, Maltose, Lactose, Sucrose, Fructose etc.)
2.	Detection and identification of lipids (Glycerol, Cholesterol, Oleic Acid, Stearic Acid Etc.).
3.	To determine the Acid value and Saponification value of the given fixed oil.
4.	To determine the Iodine value of the given fixed oil.
5.	To estimate glucose in urine by Benedict's method.
6.	To determine glucose content in blood by folin Wu method.
7.	To estimate the total cholesterol in plasma.
8.	To perform biochemical analysis of flour and potato.
9.	To perform biochemical analysis of cheese or milk or bread.
10.	To perform biochemical analysis of (i) gastric juice and (ii) estimation of total acidity in
11.	To perform the estimation of pepsin in gastric juice.
12.	To perform the Gastric juice analysis.
13.	To perform estimation of diastase in urine.
14.	To determine the achromic point and chromic period of salivary amylase.
15.	To estimate acidity and ammonia in Urea.

## **Learning Outcomes:-**

The students are expected to

- Learn the biochemistry aspects specifically, the metabolisms, enzymes, basic chemistry of cell etc.
- Understand basic idea of enzymes, biomolecules, and different types of metabolism take place in to the body.
- Understand concept of chemistry of living systems which will further help in understanding of drug interaction in the body, drug-protein binding, enzyme inhibition etc.

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

- The faculty shall explain the lectures using black board, using Over Head Projector, Multimedia projector.

## **Books Recommended:**

1. E. E. Conn and P. K. Stumpf, Outlines of biochemistry, John Wiley and Sons, New York.
2. L. Lehninger, Principles of biochemistry, CBS Publishers and Distributors.
3. R. K. Murray, D. K. Granner, P. A. Mayes. V.W. Rodwell, Harpers Biochemistry, Prentice hall International Inc. latest edn.
4. S. C. Rastogi, Biochemistry, Tata McGraw Hill New delhi, Latest edn.
5. M.Cohn, K.S. Roth, Biochemistry and Disease. William and Wilkins co.



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- Baltimore, Latest edn.
6. U. Satyanarayan, Biochemistry, Books and allied (P) ltd. Calcutta, latest edn.
  7. G. F. Zubay, W. W. Parson, D. E. Vance, Principles of Biochemistry, WCB Publishers, England, latest edn.
  8. S. Ramkrishnan, K. G. Prasannan, R. Rajan. Textbook of medical Biochemistry, Orient Longman Madras, Latest edn.
  9. S.K. Sawhney, Randir Singh Eds, Introductory practical Biochemistry, Narosa Publishing house New Delhi.
  10. D. T. Plummer, An Introduction to Practical Biochemistry, Tata McGraw Hill New Delhi.
  11. J. Jayaraman, Laboratory manual in Biochemistry, Wiley eastern Ltd. New Delhi





## C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacognosy

**Semester:** III

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

**Subject Code:** 4PS03COG2

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester							Total
				Th	Tu	Pr	Total		Theory				Practical			
									Sessional Exam		University Exam		Internal		University	
									Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
1	04	4PS03COG2	Pharmacognosy II	3	0	3	6	4.5	20	1	70	3	20	--	70	200
								10 (CEC)	--				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.

### Course outline:-

Sr. No	Course Contents	Hours
1	<b>Histology</b> : dicot and monocot root, stem and leaf	05
2	<b>Carbohydrates and lipids:</b> Carbohydrates and derived products: Agar, Guar gum, Acacia, Honey, Isabgol, Pectin, Starch, Stercuila, Tragacanth and sodium alginate. b) Lipids: Beeswax, castor oil, coca butter, cod liver oil, hydrocarpus oil, sesame oil and wool fat, kokum butter, linseed oil, shark liver oil.	15
3	<b>Volatile Oils</b> : General methods of obtaining volatile oils from plants, Study of crude drugs and volatile oils of Mentha , Coriander , Cinnamon, Cassia, Lemon peel, Lemon grass, Caraway, Dill, Clove , Fennel, Nutmeg, Eucalyptus , Chenopodium, Cardamom , Valerian, Sandal wood.	15
4	<b>Fibres:</b> Study of fibers used in pharmacy such as cotton, silk, wool, nylon.	5
5	<b>Pharmaceutical aids:</b> Study of pharmaceutical aids like talc, diatomite, gelatin and natural colours.	5
<b>Total</b>		<b>45</b>



## **C. U. SHAH UNIVERSITY**

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacognosy

**Semester:** III

**Name of Subject:** Pharmacognosy-II (Practical)

**Subject Code:** 4PS03PCOG2

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

- 1) Identification of crude drugs mentioned in theory (morphology and chemical tests.)
- 2) Study of fibres and pharmaceutical aids.
- 3) Microscopic studies of seven underlined crude drugs and their powders mentioned under the category of volatile oils in theory and their chemicals tests
- 4) Study of Carbohydrates and lipids.

### **Learning Outcomes:-**

- The student would have gained knowledge regarding herbal drugs, i.e: carbohydrates lipids as well as volatile oils 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:**

1. Pharmacognosy, Trease G.E. and Evans, W.C., Bailliere Tindall, Eastbourne, U.K
2. Pharmacognosy, Kokate C.K., Purohit A.P. and Gokhale S.B, Nirali Prakashan.
3. Study of Crude drugs, Iyengar M.A.and Nayak S.G.K. Manipal Power Press, Manipal.
4. Anatomy of Crude Drugs, Iyengar M.A.and Nayak S.G.K, Manipal Power Press, Manipal.
5. Practical Pharmacognosy, Kokate C.K., Vallabh Prakashan.
6. The chemotaxonomy of Plants. Smith P.M, Edinburgh.
7. Quality Control of Plants. WHO publication.
8. A Text book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahmedabad. 13 th Edition, 2007-08.

### **E-Resources:**

1. [sites.google.com/site/mystuden/Home/Pharmacognosy](http://sites.google.com/site/mystuden/Home/Pharmacognosy)
2. [www.klescoph.org/sis/Question%20Bank/Files/Pharmacognosy.doc](http://www.klescoph.org/sis/Question%20Bank/Files/Pharmacognosy.doc)
3. [faculty.ksu.edu.sa/alqasoumi/Documents/Pharmacognosy-I%2520\(Part-1\).ppt](http://faculty.ksu.edu.sa/alqasoumi/Documents/Pharmacognosy-I%2520(Part-1).ppt)
4. [http://elearning.najah.edu/OldData/pdfs/Pharmacognosy%20%20objectives\(103331\).ppt](http://elearning.najah.edu/OldData/pdfs/Pharmacognosy%20%20objectives(103331).ppt)



# C. U. SHAH UNIVERSITY

**Faculty:** - Pharmaceutical Sciences

**Department:** Pharmacology

**Semester:** III

**Name of Subject:** Pathophysiology (Theory)

**Subject Code:** 4PS03PAT1

### Teaching & Evaluation Scheme:-

Sr. No	Branch Code	Subject Code	Subject Name	Teaching hours/ week				Credit	Evaluation Scheme/ Semester							Total
				Th	Tu	Pr	Total		Theory				Practical			
									Sessional Exam		University Exam		Internal		University	
									Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
1	04	4PS03PAT1	Pathophysiology	3	0	0	3	3	20	1	70	3	---	---	---	100
									10 (CEC)	--						

**Objective of Course:** Introductory exploration and analysis of selected topics in Pathophysiology with a specific theme indicated by course title listed in a syllabus. This subject will take three times for credit as long as different topics are selected. (3 lecture hours)

**Prerequisites:** Pathophysiology studies required in a third semester, it is the base (core) of the major subjects in pharmaceutical studies like, pharmacology, Bio pharmaceuticals and Biochemistry.

### Course outline:-

Sr. No	Course Contents	Hours
1	<b>Basic principles of cell injury, cell death and adaptation :</b> Causes, pathogenesis and morphology of cell injury, apoptosis-causes and mechanism, intracellular alteration in lipids, proteins and carbohydrates,(abnormalities of lipoproteinemia, glycogen infiltration, and glycogen storage diseases) calcification, cellular adaptations-Atrophy, hypertrophy, metaplasia and hyperplasia	7
2	<b>Inflammation :</b> Basic mechanism involved in the process of inflammation, pathogenesis of acute and chronic inflammation, chemical mediators of inflammation.	6
3	<b>Tissue repair processes :</b> Control of cell proliferation, Growth factors and extra cellular matrix, Cell and tissue regeneration, repairs of wound in skin, pathological aspects of repair.	6
4	<b>Diseases of the immune system :</b> Introduction, Hypersensitivity(type I,II,III,IV with examples of diseases), allergy due to food, chemicals, drugs; Autoimmunity (Immunological tolerance, mechanism of autoimmunity); transplantation and mechanism of allograft rejection; Autoimmune diseases (Systemic Lupus erythematosus, Rheumatoid arthritis, Systemic sclerosis, and Mixed connective tissue disease), AIDS, Amyloidosis.	13



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5	<b>Environmental and nutritional diseases :</b> Air pollution and smoking, SO <sub>2</sub> , NO, NO <sub>2</sub> and CO; protein calorie malnutrition, pathogenesis of starvation, vitamins, obesity.	6
6	Concept of disease concept of causation, natural history of disease (Prepathogenesis and pathogenesis phase, agent factors, host factors, environmental factors, risk factors, risk groups, spectrum of disease, iceberg of disease), concepts of disease control, concepts of prevention Mode of intervention. List of communicable and non-communicable diseases.	5
7	<b>Biological effects of radiation and aging</b>	2
Total		45

### **Learning Outcomes:**

- Define and correctly use scientific terminology in regard to human diseases and its processes.
- Apply principles of scientific inquiry, differentiate a theory from a hypothesis, and differentiate fact from opinion in regard to different pathological condition of human system.
- Show proficiency in taking 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.
- 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:**

1. Kumar, Cotran and Robbins, Basic Pathophysiology – 7<sup>th</sup> Edition Elsevier
2. Harsh Mohan Text book of Pathology

### **E-Resources:**

1. <http://faculty.sdmiramar.edu/dtrubovitz/anatomy/>
2. <http://academic.pg.cc.md.us/~aimholtz/AandP/AandPLinks/ANPLinks.html>
3. <https://sites.google.com/site/bio2324atbcc/Home/bio23>