



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3143614

Semester – IV

Subject Name: Medicinal Chemistry-I & Microbiology

Type of course: Chemical Technology

Prerequisite: Studied subject PT-01(Introduction to Physiology, Medicinal Chemistry & Biochemistry). Basic knowledge of organic chemistry is required.

Rationale: The main objective of this subject is to study Drug discovery & drug design, chemistry & mechanism of action of drugs and basics of Microbiology, Immunology and morphological studies of microorganism.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Drug Discovery Process and Drug Design: General introduction to drug discovery, meaning of hit, lead, lead development, lead optimization. Various phases of clinical trials, Introduction to various sources and approaches for new chemical entities- Examples of drug discovery & design-Aspirin, Chloroquine, Cimetidine, Types of drug receptors, General screening approaches outline. Source: Medicines used in folklore and traditional system of treatment and their regulatory requirements to market. a) Random screening approach,. b) Analog design and tools: SAR, QSAR, CADD	15
2	Medicinal Chemistry: MOA, SAR, metabolism, synthesis & drug profile of: Thrombolytics, Coagulants/Anticoagulants, Histamine & Antihistamines, Local anesthetics, Antacids, Antiulcer drugs. Introduction to Microbiology	17
3	Microscope & Staining: Microscopy- concept of magnification resolution, basic of light microscopes. Dyes & stains, Observation of microorganism under light microscopy-wet	6



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	mount, hanging drop, gram staining & acid fast stains	
4	Culture: Cultivation & growth requirements, nutritional aspects & other conditions. Basis of growth media classification-principles & application. Concept of pure culture, isolation, preservation & maintenance of pure cultures	7
5	Morphology: Basis of identification & Characteristics of microorganisms Study of morphology, characteristics & reproduction of bacteria, fungi, algae & viruses	4
6	Immunology & Concept of vaccine: Basic classification of antigen/antibody, immunoglobulins, concept of allergy-antigen & antibody reaction. Concept of vaccines : Manufacture of bacterial & viral vaccines. Sterilization-methods & aseptic techniques, sterility testing.	7

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	10	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Burger's Medicinal Chemistry & Drug Discovery: Vol. 1 to 6, A. Burger & M.E. Wolff, John Wiley & Sons – New Jersey, 6th Ed, 2003
2. Foye's Principles of Medicinal Chemistry, W.O. Foye, Lippincott Williams & Wilkins-Philadelphia, Oxford, 6th Ed, 2008.
3. Microbiology Fundamentals & Applications, S S Purohit, Agrobios, 2003
4. Textbook of Medicinal & Pharmaceuticals Chemistry, Wilson & Gisvold, Williams & Wilkins, 1st Ed, 2004.
5. Medicinal Chemistry by Ashutosh Kar
6. Text Book of Medicinal Chemistry by Alagarsamy
7. Medical Microbiology Infections, Mackie & McCartney, Churchill Livingstone, 1996
8. Human Physiology by C.C Chatterjee, Culcutta Medical Allied Agency, 1994



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Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To know the basic knowledge of, drug discovery process & drug design and Microbiology	29
CO-2	To explain the drug or molecular discovery to market which include phases of clinical trials & study of new chemical entities, biological activities of drug and MOA, Synthesis of drugs include Blood coagulating and forming agents, GIT drugs and local anaesthetics and Staining techniques.	29
CO-3	To apply the knowledge of receptors , Drug-receptor interaction, theories in drug discovery and morphological characteristics of organisms and Immunological Studies	14
CO-4	To illustrate knowledge of Quantitative structure activity relationships (QSAR), SAR, Computer aided drug design (CADD) – molecular modelling concepts and bioassays.	14
CO-5	To describe the role of Sterilization, Validation and Disinfection techniques in Pharmaceutical Industries	7
CO-6	To Summarize working the regulatory requirements to market and an approach for drug discovery and working of a cell through the study of microorganisms.	7

List of Experiments: --

- 1 Study of microscopy, study of common laboratory equipment
- 2 Preparation and sterilization of nutrient broth, agar slants, stabs, plates
- 3 Inoculation technique: Colony characteristics and growth patterns in broth of cocci and bacilli
- 4 Grams staining; monochrome staining, negative and vital staining
- 5 Motility by hanging drop technique
- 6 Microbial limit test, microbial assay, biochemical tests
- 7 Literature survey of two synthetic drugs
- 8 Reflux, distillation & vacuum distillation by setting up Reflux assembly, distillation & vacuum distillation assemblies.
- 9.Synthesis of Methyl salicylate from salicylic acid.
- 10.Synthesis of Aspirin

Major Equipment: --

Microscope, Autoclave, incubator, Dryer, vacuum pump

List of Open Source Software/learning website:

- 1) Literature available on internet
- 2) Medical dictionaries
- 3) Delnet
- 4) Literature available under R&D in Pharma industry.
- 5) Pharma Journals/ e-journals