

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.Pharm

## PHARMACEUTICAL CHEMISTRY

SEMESTER: I

**Subject Name: CHEMISTRY OF NATURAL PRODUCTS**

**Subject Code: MPC104T**

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

1. Different types of natural compounds and their chemistry and medicinal importance
2. The importance of natural compounds as lead molecules for new drug Discovery
3. The concept of rDNA technology tool for new drug discovery
4. General methods of structural elucidation of compounds of natural origin
5. Isolation, purification and characterization of simple chemical constituents from natural source

Sr No	Course Contents	Total Hrs
1	Study of Natural products as leads for new pharmaceuticals for the following class of drugs a) Drugs Affecting the Central Nervous System: Morphine alkaloid 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 $\beta$ - Lactam antibiotics(Cephalosporins and Carbapenem)	12
2	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, ergotemetine 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 cardiacglycosides. Stereochemistry and nomenclature of steroids, chemistry of contraceptive agents male & female sex hormones(Testosterone, Estradiol, Progesterone), adrenocorticoids(Cortisone), contraceptive agents and steroids (Vit – D).	12
3	a) Terpenoids Classification, isolation, isoprene rule and general methods of structural elucidation of Terpenoids; Structural elucidation of drugs belonging to mono (cital, menthol, camphor), di(retinol,Phytol, taxol) and tri terpenoids (Squalene,Ginsenoside) carotinoids ( $\beta$ carotene).	12

	b) Vitamins Chemistry and Physiological significance of Vitamin A, B1, B2, B12, C, E, Folic acid and Niacin.	
4	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 – <i>Gymnema sylvestre</i> , <i>Salacia reticulata</i> , <i>Pterocarpus marsupium</i> , <i>Swertia chirata</i> , <i>Trigonella foenum graecum</i> ; Liver dysfunction – <i>Phyllanthus niruri</i> ; Antitumor – <i>Curcuma longa</i> Linn.	12
5	Structural Characterization of natural compounds Structural characterization of natural compounds using IR, <sup>1</sup> HNMR, <sup>13</sup> CNMR and MS Spectroscopy of specific drugs e.g., Penicillin, Morphine, Camphor, Vit-D, Quercetin and Digitalis glycosides.	12

#### 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 Nostrant Rein Hld.
3. Recent advances in Phytochemistry Vol. I to IV – Scikel Runeckles, Springer Science & Business Media.
4. Chemistry of natural products Vol I onwards IWPAC.
5. Natural Product Chemistry Nakanishi Ggolo, 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 Gurdeep and Chatwall, Himalaya Publishing House.
10. Organic Chemistry of Natural Products Vol I and II by O.P. Agarwal, Krishan Prakashan.
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.