GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VII

CHEMICAL TECHNOLOGY

Subject Name: Process Technology of Drugs & Intermediates
Subject Code: 173602

Teaching Scheme				Evaluation Scheme			
Theory	**Tutorial**	**Practical**	**Total**	**University Exam(E)**	**University Exam(P)**	**Mid Sem Exam(Theory) (M)**	**Practical (Internal)**
4	0	3	7	70	30	30	20

Sr. No	Course contents
1.	Overall view of Pharmaceutical Industry ,Raw materials for Pharmaceutical Industry
2.	Enzymes as catalyst (a) in Synthesis for Pharmaceuticals (b) Introduction to Principle of enzymes catalyst, Lipases & esterase are for hydrolytic conversion. Lipases & esterase's in organic solvents, other hydrolytic reactions, Enzyme-catalyzed C-X bond synthesis, Enzyme-catalyzed reduction, Chiral Technology, Chemical Development of enantiomerically pure products, resolution, chiral synthesis etc.
3.	Separation (a) aspect of Chemical Purification & process separation technology (b), Introduction to Separation technology; choosing a separation process, Adsorption Separation methods, Simulated moving bad (SMB) chromatography; Large scale chromatography; homogeneous, Heterogeneous catalyst & phase transfer catalyst
4.	Mixing (a) Flow pattern & theories (impeller); suspension of solid particles; lipid-lipid dispersion; three phase dispersion; mass transfer at gas-liquid, solid, solid-solid, process design & scale up of mixing.
5.	The Design & Development of Safe Chemical Processes: Introduction, the chemical process life-cycle, Legislative requirements for safe process development & scale up, Development technologies for safe Process design, Unit operations posing particular hazards during development, Strategies for chemical hazards assessment, Hazards of gas & vapor generation, Identification of highly-energetic materials, Small scale screening tests: case studies, Flammability issues associated with chemical manufacture, Gas & Vapor pressure systems, Process control considerations & safety critical systems, GMP in chemical development.
6.	Optimization of Organic Reactions & Processes : Introduction the purpose of chemical development, Discovering the best synthetic route; Selecting the best route for scale-up, Choice of raw materials, reagents etc; case studies, the investigative approach to chemical development, Effect of process variables on yield & quality of products; Quality control in process analysis as an aid to optimization, Designing a robust process & preventing scale-up problems, Solvent effects, Work up & product isolation, Selecting the parameters to vary, Planning for scale up, Design of environmentally friendly processes, Effluent minimization & control, Statistical methods of optimizations

Reference Books:

1. Enzymes in Industry Prod & App Wolfgang Aehle, Wiley VCH Publication, 2003
2. Industrial Pharmaceutical Biotechnology. Heinrich Klefenz, Wiley-VCH Publication, 2002
3. Process Integration in Biochemical Engineering, T.Scheper, Springer Publication, 2003.
4. Principles of Research & Chemical Development in the Pharmaceutical Industry,Oligan Repic, Wiley Interscience 1998
5. From Bench to Market the Evolution Chemical Synthesis, Romano Di Fabio, Oxford University Press, 2000.
6. Industrial Bio transformations, A. Liese, Wiley – VCH 2000
7. Pollution Prevention through Process Integration (Systematic Design Tools), Mahmound M. Academic Press, 1997.
8. Practical Process Research & Development, Neal G. Anderson, Academic Press, 2000
9. Fine Chemicals Manufacture – Tech & Engg, A.Cybulski, Elsevier Publication, 2000
10. Mixing Equipment (Impeller type),AIChE Publication 2001
11. Chemical Process Quantitative Risk Analysis, AIChE Publication, 2000
12. Strategies for Organic Drug Synthesis & Design, & Daniel Led nicer, John Willey & Sons Inc. New York., 2nd Ed, 1998.
13. Organic Chemistry of Drug Synthesis: Vol.1 to 6, Daniel Lednicer, John Wiley & Sons Inc.
14. Burger's Medicinal Chemistry & Drug Discovery: Vol. 1 to 6, A. Burger & M.E.Wolff, John Wiley & Sons – New Jersey,6th Ed, 2003
15. Foye's Principles of Medicinal Chemistry, W.O. Foye, Lippincott Williams & Wilkins- Philadelphia, Oxford, 6th Ed, 2008
16. Text book of Medicinal & Pharmaceutical Chemistry, Charles Owens Wilson Lippincott Williams & Wilkins – Philadelphia. 1962
17. Organic Synthesis – The Disconnection Approach, Warren S., John Wiley & Sons – Chichester.,1st Ed., 2005
18. Pharmaceutical Substances: Synthesis, Patents, Applications (N-Z), A. Kleemann, Georg Thieme Verlag,Stuttgart.4th Ed, 2001
19. Textbook of Medicinal & pharmaceuticals Chemistry, Wilson & Gisvold ., Williams & Wilkins,1st Ed, 2004.