

University School of Chemical Technology
Guru Gobind Singh Indraprastha University

Syllabus of Examination

B.Tech/M.Tech Dual Degree (Chemical Engineering)

(8th Semester)

(w.e.f. August 2004 Batch)

SCHEME OF EXAMINATION
B.TECH/M.TECH DUAL DEGREE (CHEMICAL ENGINEERING)

L T P Credits
12 1 18 22

EIGHTH SEMESTER SCHEME

Code No.	Paper	L	T	P	Credits
Theory Papers					
14402 CT-402	Chemical Process Engineering	3	1	0	4
14420 CT-420/ 14422 CT-422/	Petroleum Engineering/ Polymer Engineering/				
14424 CT-424	Biomass for Energy and Chemicals	3	0	0	3
---	Elective -III/ IDS	3	0	0	3
98412 HS-412	Project writing	3	0	0	3
<u>Practical/Viva Voce</u>					
14452 CT-452	Project Work-II	0	0	18	9
Total		12	1	18	22

CT-402 Chemical Process Engineering

L	T	P	Credits
3	1	0	4

System and subsystem in chemical process engineering. System analysis. Economic degree of freedom - various algorithms.

Economic design criteria. Terms involved in profitability analysis. Capital cost and manufacturing cost estimation methods.

Strategy of scale-up and design of chemical processes; Role of pilot plant, process validation, salient features of patent literature.

Process evaluation and selection with special reference to eco-friendly technologies. Preparation of process specifications for typical equipment. Choice of batch v/s continuous process. Concept of dedicated and multiproduct plant facilities. Time cycle for batch processes. Development and evaluation of alternative flow sheets; efficient utilisation of energy; heat exchanger net-works. Preparation of process and instrumentation diagrams. Conceptual, project implementation- stage wise.

Books and References:

1. Strategy of Process Engineering, Rudd and Watson,. Wiley
2. Chemical Engineering Handbook, Perry, J.H., Mc GrawHill.
3. Plant Design and Economics for Chemical Engineers, Peters , M.S. and Timmerhaus, K.D, Mc GrawHill.

CT-420 Petroleum Refining

L	T	P	Credits
3	0	0	3

Transportation and storage of crude oil, Characterization of Crude oil, Selection of crude for refining processing. **(8 Hrs)**

Classification and composition of petroleum, Evaluation of Crude oil and Chemical compositions, Non hydrocarbon compounds in petroleum. Physical and thermal properties of TBP distillation of crude petroleum. **(8 Hrs)**

Quality control of petroleum products, LPG, Naphtha, Motor Sprit, Kerosene, ATF, Diesel fuels, Fuel oil, Petroleum Waxes, Bitumen properties and test methods. Properties and applications of all petroleum products. **(10 Hrs)**

Distillation methods, Atmospheric distillation, Vacuum distillation.
Thermal cracking and catalytic cracking.
Introduction to reforming, Isomerization and alkylation processes **(14 Hrs)**

Course Objectives :

- A brief knowledge about chemical composition, characterization and evaluation of Crude oil.
- To introduce the various processes of refinery and get familiarized with properties and composition of various petroleum products.

Books and References:

1. Modern Petroleum Refining Processes, B.K. Bhaskar Rao Oxford and IBM Pub. Co. Pvt Ltd, N.Delhi, 1990
2. Petroleum Refining Technology and Economics, J.H. Gary, G.E. Handiwerk, Marcel and Dekker INC., New York.
3. The Chemistry and Technology of Petroleum, J.G. Speight, Marcel Dekker, 1991.

CT-422	Polymer Science and Engineering	L	T	P	Credits
		3	0	0	3

Fundamentals: Polymer structure-properties, molecular weight and its distribution. (6 Hrs)

Polymer Reaction Engineering: Polymerization Processes, Polymerization reactors, Reaction engineering of step growth and chain growth polymerization. (18 Hrs)

Thermodynamics of Polymer solution and mixtures, Diffusion through polymeric materials, Flow behaviour of polymeric fluids. (10 Hrs)

Unit operations of polymer processing, Properties of commodity and engineering polymers, Polymer product and its applications. (6 Hrs)

Books and References:

1. Polymer Science and Technology, Ebewele R.O., CRC, 196.
2. Plastics Engineering, Crawford, P.J., Butterworth, Heinemann, 3rd Ed., 1998.
3. Fundamentals of Polymers, Kumar A., and Gupta R.K., McGraw-Hill, 1998.
4. Polymer Science and Technology, Fried J.R., Prentice Hall of India, 1999.
5. Plastics Materials, Brydson J.A., Butterworth Scientific, current edition.
6. Encyclopedia of Polymer Science and Technology, Herman F. Mark, Norman G. Gaylord, and Norbert M. Bikales, Wiley-Interscience, New York. 3rd Edition.
7. Fundamental Principles of polymeric Material, Rosen L. Stephen, Wiley Interscience, New York, current edition.
8. Principles of Polymerization, Odian George, 3rd Edition, John Wiley & Sons.

CT-424 Biomass for Energy and Chemicals

L	T	P	Credits
3	0	0	3

Biomass as a source of energy, feed stock, food stuff.

Biomass characterization. Solid, liquid and gaseous products from biomass.

Sources of biomass-agricultural residue, forestry waste, industrial waste.

Overview of conversion technologies - in particular, thermo chemical conversion of biomass.

Combustion, pyrolysis and gasification of biomass.

Design of gasifier for biomass conversion.

Electricity generation and charcoal production from biomass.

Useful chemicals and energy from rice husk.

Books & References:

1. Biomass Application, Nicholas P. Cheremisinoff, Paul N. Cheremisinoff, Fred Ellerbusch, Technology and Production, Marcel Dekker, inc. NY
2. Developments in Thermochemical Biomass Conversion, A.V. Bridgwater and D.G.B. Boocock , Editors, Vol I & II , Blackie Academic and Professional Publisher, London, ed.1997
3. Biomass Conversion Processes for Energy and Fuels, S.S.Sofer and O.R. Zaborsky, editor, Plenum Press N.Y.
4. Advances in Thermochemical Conversion , A.V.Bridgwater, editor, Blackie Academic and Professional Publisher, London

CT-452 Project Work-II

L	T	P	Credits
0	0	16	8

Each student shall be assigned a specific project. He/she shall select most appropriate process from various available alternatives and design the plants. A cost analysis, plant layout etc. may also form part of the total exercise. The final report will be examined by a panel. Experimental projects with well defined aims may also be offered subject to the availability of facilities