

University School of Chemical Technology
Guru Gobind Singh Indraprastha University

Syllabus of Examination

M.Tech (Full Time) (Chemical Engineering)

(3rd Semester)

(w.e.f. August 2006 Batch)

W.e.f - August 2006 Batch

Modified 11.08.2006

Approved By Academic Council_14.11.06

**SCHEME OF EXAMINATION
M.Tech (Full Time)**

L T P Credits
6 0 18 24

THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T	P	Credits
<u>Elective Courses</u>					
CT-611	Advanced Petroleum Refining	3	0	0	3
CT-613	Industrial Pollution Engineering	3	0	0	3
CT-615	Introduction to Nanotechnology	3	0	0	3
CT-651	Major Project Part-I	0	0	30	15
CT-653	Project Seminar *	0	0	06	3
Total		6	0	36	24

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Note: Student can select two electives either offered by the department from the above list or from the list of intradepartmental electives.

CT - 611 Advanced Petroleum Refining

L	T	P	Credits
3	0	0	3

Composition and properties of crude oil. Distillation methods: Atmospheric distillation, Vacuum distillation. Thermal cracking processes: Burton cracking processes, Visbreaking and different type of coking.

Catalytic Conversion Processes: Fluid Bed and Orthoflow Catalytic Cracking, Catalytic Hydrocracking: Two stage and H-oil hydrocracker, Different type of catalysts used.

Reforming-type of catalysts, hydrotreating processes, hydrodesulphurization, Alkylation, Polymerization and isomerization

Supporting processes: solvent Extraction processes for deasphalting of Gasoline, Kerosene and Diesel oil. Wax separation and preparation as a finished product.

Course Objectives:

- A brief knowledge about chemical composition, characterization and evaluation of Crude Oil.
- To introduce various processes of refinery and get familiarized with various type of refining processes to obtain finished petroleum products.

Books & References:

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

CT - 613 Industrial Pollution Engineering

L	T	P	Credits
3	0	0	3

General : Different water quality requirements of various industries for different pressure boiler feed waters, cooling water and process water. Waste generation and characterization from different industries like paper and pulp, breweries and distilleries, tanneries, textile, dairy, fertilizer, sugar mill, steel, oil refinery, petrochemical and pharmaceutical industries.

Treatment methods for water and waste: Volume reduction, strength reduction, Neutralization, equalization and precipitation: Basic Processes of Treatment: Pretreatment - Primary Treatment - Sedimentation - Flotation - Secondary Treatment - Design of Conventional biological treatment - Activated Sludge -Trickling Filters - Sludge digestion - Disposal of treated effluent and sludge. Tertiary Treatment systems- Removal of Dissolved Solids, Nitrogen, Phosphorous

Air pollutants - generation, characterization - stack height - dispersal mechanisms. Control methods, particulate emission control methods such as gravitational settling chambers, cyclone separators, fabric filters, electrostatic precipitators, wet scrubbers, control of gaseous emissions by adsorption on solids, and by absorption in liquids, combustion.

Generation and treatment of sludge and solid wastes - identification of hazardous wastes - disposal methods.

Waste minimization and Life Cycle Analysis of a pollutant.

Books & References:

1. Waste Water Treatment , M.N.Rao and A.K. Dutta, 1987, Oxford & IBH Pub.Co.
2. Environmental Pollution Control, C.S.Rao, 1993, Wiley Eastern Ltd.
3. Industrial wastes their disposal and treatment W. Rudolfs 1997.
4. Industrial environment, assessment and strategies S.K. Agarwal 1996.
5. Hazardous waste management, Charles A. Wertz. 2nd edition.
6. Integrated solid waste management Goerge Tchobanoglous, Hilary Theisen & Samuel A. Vigil.
7. Hazardous waste management Micheal La. Grege, Philip Buckingham, Jeffery Evans

CT - 615 Introduction to Nanotechnology

L	T	P	Credits
3	0	0	3

Introduction to Nanotechnology - History of nano-revolution, nano scale materials and their applications, Carbon nano tubes, organic and inorganic nano structures. Future of the nanotechnology.

Materials used in Nanotechnology - An overview of the physical (mechanical, electrical) and chemical properties of different classes of solid materials such as metals, semiconductors, insulators and polymers. Examples of size effects of properties observed in thin films, colloids and nanocrystals.

Conventional Fabrication Techniques - Topdown and bottom up process, techniques used in conventional microfabrication including thin film deposition (e.g. CVD, PVD), lithography, chemical etching and electrodeposition.

Analytical Techniques - Analytical techniques such as Electron Microscopy, Electron and X-ray Diffraction, Ellipsometry, Photoelectron, Optical and Ion spectroscopy and Probe Microscopy.

Applications - Examples of applications in Micro and Nano technology including, Micro fluidics, Micro Electron Mechanical Systems (MEMS) membrane technology, and catalyst and coatings

Books & Reference :

1. M. Wilson, K. K. G. Smith, M. Simmons and B. Raguse; Nanotechnology, Chapman & Hall/CRC press 2002
2. M. Meyyappan; Carbon Nanotubes, Science and application; CRC Press, 2005
3. Alexei Nabok; Organic and Inorganic Nanostructures; Publisher Artech House, London, 2005
4. H. Watarai, N. Teramae and T Sawada; Interfacial Nanochemistry; Kluwer Academic/Plenum press, 2005

CT-651 Major Project Part-I

L	T	P	C
0	0	30	15

The student should select any one of the topics offered from the department or select one on his own duly approved from the department. As part of the project work, candidate should give oral presentation of the work atleast one in a semester **(CT - 653)**. The candidate is required to submit the detailed synopsis of the work that he would complete in the part-II **(CT - 652)** along with the report of the work already completed.