

CH :885.1 ALTERNATIVE ENERGY RESOURCES (ELECTIVE – IV)

Theory : 100 marks

L- T- P

Sessional : 75 marks

3 -1- 0

Energy Crisis – Present position in India and World. Remedial measures.

Energy Resources – Survey, classification and scope of utilization, Alternative uses of conventional sources of energy, Synthetic liquid fuels.

Hydroelectricity – its production and future prospects in India.

Nuclear Energy – Nuclear reaction, materials and reactors, Reprocessing of spent nuclear fuels.

Solar Energy and its effective utilization for room and water heating and other industrial processes, Solar Heat Pump, Silicon cells, storage of solar energy.

Energy from Biomass – Animal and vegetable wastes, Utilization of Municipal Solid Waste as a renewable source of energy.

Geothermal, Wind and Tidal Energy – Energy from geothermal, tidal and ocean thermal sources, Energy from high velocity winds and high pressure gases.

Developments in energy routes, Fuel cells.
Energy carriers.

Conservation of energy, Energy Audit.

BOOKS :

1. Renewable Energy Resources and their Environmental Impact, S A abbasi and Naseema abbasi, Prentice Hall India
2. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme, McGraw-Hill.
3. Energy Resource, Demand and Conservation in India, C. Kashkari, Tata McGraw-Hill.
4. Energy Resources and Economic Development in India, Tyner, Allied Publishers.
5. Principles of Energy Conservation, Jr. Culp, McGraw-Hill.
6. Fuels and Combustion, S. Sarkar, Orient Longman.
7. Fuel Combustion Energy Technology, S N Saha, Dhanpat Rai Publishing Company
8. Non-Conventional Energy Resources, Third edition, B.H. khan, McGraw-Hil Education (India) Private limited.

CH 882: CHEMICAL PROCESS DESIGN AND DRAWING

Theory : 100 marks
Sessional : 75 marks

L - T - P
3 - 1 - 0

1. DESIGN OF MASS TRANSFER EQUIPMENTS: Design and Drawing of mass transfer equipments such as distillation columns, absorption columns, extraction columns, dryers and cooling towers.
2. TARGETTING: Heat exchanger networks, targeting, energy targeting, area targeting, unit targeting, shell targeting, and cost targeting.
3. Design of heat transfer equipments: Design and drawing of multiple effects Evaporator.
4. Principles of multi-component distillation.

TEXTBOOKS:

1. R .H. Perry, "Chemical Engineers' Hand Book", 6" Edn., McGraw Hill Company, 1984
2. J. M. Coulson and J. F. Richardson, "Chemical Engineering", Vol. 6, Pergamon Press, 1993.
3. Uday V. Shenoy Gulb "Heat Exchanger Network Synthesis", by Publishing Co. USA, 1995.
4. R. Smith, "Chemical Process Design", McGraw Hill Book Co., New York 1997
5. B.K. Datta , Mass Transfer Operation,

REFERENCES:

1. L.E. Brownell and E.H. Young, "Process Equipment Design Vessel Design' Wiley Eastern Edn. New York, 1968.
2. M. V. Joshi, "Process Equipment Design and Drawing", Mac Millan Press, New Delhi, 1996

CH 883 Membrane Separation Processes

Theory : 100 marks

L – T – P

Seasonal: 75 marks

3 – 1 – 0

1. Introduction: Definition of Membrane, Classification of Membranes and Membrane Processes, Advantages and Disadvantages of Membrane Processes, Major areas of Application.

2. Membrane Types and Materials for Preparation.

3. Preparation techniques of synthetic membranes, Influence of various parameters; Characterization of porous and nonporous membranes.

4. Membrane Processes:

Pressure driven membrane processes: Reverse Osmosis, Microfiltration, Ultrafiltration

Concentration driven membrane processes: Gas separation, Pervaporation, Dialysis

Liquid membrane, Facilitated Transport.

Book:

1. Membrane Separation Processes, Kaushik Nath

2. Basic Principles of Membrane Technology, Marcel Mulder

3. Reverse Osmosis: S Sourirajan

4. Ultra filtration hand book, M Cheryan

CH 884.1 PETROLEUM PRODUCTION TECHNOLOGY_(Elective –III)

Theory: 100 marks

L – T – P

Sectional: 75 marks

3 – 1 – 0

Introduction.

Geologic consideration in Production Operations: Habitat for oil and gas, Traps of oil and gas, Structural Geology, folds, faults, Sedimentary petrology, Sand stone Reservoir, Carbonate Reservoir, Migration of Petroleum.

Reservoir consideration: Hydrocarbon properties of oil & gas, Characteristics of reservoir rocks, porosity, permeability, resistivity etc, Fluid flow in the reservoir, Reservoir drive mechanism, reservoir homogeneity.

Drilling technology: Methods of Drilling, Rotary Drilling rig, Rotary rig circulation system, Basic operation in drilling, the drill stem, Introduction to offshore drilling, types of offshore rigs,

Well Completion: Casing and Cementation, Well Head, Production Techniques

Problem well analysis: Low reservoir pressure, Low reservoir permeability, plugging, high viscosity oil, Removal of wax deposits etc.

Formation damage: Significance, Damage mechanism, Determination of permeability reduction.

Fundamental of stimulation/Activation techniques: Acidization, Fracturing, Sand control, Gravel packing, Nitrogen application etc.

Work over rigs and work over jobs: Main composition of WOR, Minor and Major Work Over Operations.

Reference: Production operation Vol I and Vol II –by Thomas O. Allen P. Roberts.

CH 886 PROJECT – II

Sessional : 150

In this course each student is required to submit a Project Report on the designing of a Chemical Plant. The Report will consist of important chapters such as the following :

- Introduction
- Literature Survey
- Selection of the Process and Process Details with justification of selection.
- Thermodynamic and kinetic Considerations
- Material Balances with Flow Sheet
- Physico-Chemical data and Properties
- Energy Balane with Flow Sheets
- Process Design of Equipments and Optimum Conditions of Operation (Design of a minimum of two process equipments must be undertaken)
- Fabrication drawing of one of the major equipments
- Instrumentation & Process Control, Plant Layout, Safety, Precaution, etc.
- Cost Estimation
- Site Selection and Conclusion.

CH 881: TRANSPORT PHENOMENA

Theory : 100 marks

L – T – P

Sessional : 75 marks

3 – 1 – 0

Introduction:

- Transport phenomena and Unit Operation
- Equilibrium and rate processes.
- Role of intermolecular forces.

Molecular Transport Mechanisms:

- Heat, mass and momentum transport by molecular mechanism.
- The Analogy – Case of Heat Transfer, Case of Mass Transfer, Case of Momentum Transfer, the analogous forms.
- Heat Transfer.
- Mass Transfer – Equimolar Counter Diffusion, Partial Pressure.
- Momentum transfer.

General Property Balance:

- The balance or conservation concept- input-output balance, generation, accumulation, the balance equation in differential form.
- The one directional balance equation including molecular and convective transport.
- The three dimensional balance equation.
- The continuity equation.
- The general property balance equation for an incompressible fluid.

Molecular Transport and the General Property Balance:

- Steady transport in one dimension involving input-output with no generation (constant area and variable area transport).
- Steady transport with generation (Heat and mass transport with constant generation, momentum transfer with generation at steady state – laminar flow in a tube, Hagen-Poiseuille Equation, laminar flow between parallel plates).

Transport with net convective flux :

- Convective flux caused by forced convection.
- Relation between shear stress and shear rate.
- Navier-Stoke's Equation.
- Fick's Law.

Books :

1. Brodkey, R.S. & Hershey, H.C., Transport Phenomena – An Unified Approach, McGraw-Hill.
2. Bird, Stewart & Lightfoot, Transport Phenomena, John Wiley.
3. Bodhraj, Introduction to Transport Phenomena: Momentum, Heat & Mass

CH 887 VIVA VOCE

Total marks : 75

A final semester viva voce examination will be held at the end of 8th semester. The viva voce will be to assess the student on his/her overall knowledge of the subjects related to Chemical Engineering in addition to the project works he/she had undertaken in 7th and 8th semester.