

EVALUATION SCHEME
DIPLOMA –CHEMICAL ENGINEERING (4th SEM)

Study And Evaluation Scheme For Diploma Chemical Engineering

YEAR 2ND /SEMESTER -4TH

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DCHEMCH401	Chemical Technology	4	0	0	4	30	-	30	70	-	70	100
DCONVCH402	Conventional & Non-conventional Source of energy	4	0	0	4	30	-	30	70	-	70	100
DFLUICH403	Fluid Mechanics	4	0	0	4	30	-	30	70	-	70	100
DPROCCH404	Process Plant Utilities	4	0	0	4	30	-	30	70	-	70	100
DCHEMCH405	Chemical Technology Lab	0	0	2	1	-	25	25	-	25	25	50
DFLUICH406	Fluid Mechanics Lab	0	0	2	1	-	25	25	-	25	25	50
Total		16	0	4	18	120	50	170	280	50	330	500

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L	T	P
4	0	0

DCHEMCH401: CHEMICAL TECHNOLOGY

1. **INDUSTRIAL GASES:**
Manufacture and uses of Oxygen , Hydrogen, Nitrogen, Carbon Dioxide.
2. **FERTILIZER INDUSTRIES:**
Ammonia, Nitric acid, Ammonium Sulphate, Urea, Ammonium Nitrate, Phosphorus, Phosphoric Acid, Calcium Phosphates- Super Phosphates, Triple Super Phosphate, Nitro Phosphate, N-P-K fertilizer.
3. **CHLOR-ALKALI INDUSTRIES:**
Common Salt, Caustic Soda, Chlorine, Hydrochloric Acid, Soda-Ash, Bleaching Powder.
4. **SULPHUR INDUSTRIES:** Manufacture of Sulphuric acid, Oleum.
5. **CEMENT INDUSTRIES:** Manufacture of Portland Cement.
6. **INSECTISIDES, PESTICIDES & HERBICIDES:**
Definition, types of insecticides, pesticides and herbicides, Uses and Quantity and variety, benefits.
7. **PROCESS INDUSTRIES:**
 - A. **Petroleum Refining:** Constituent of petroleum including petroleum gases, products of refining, distillation- atmospheric distillation unit and vacuum distillation unit.
 - B. **Sugar Industry:** Manufacture of cane sugar.
 - C. **Fermentation Industry:** Introduction, Types of fermentation processes, Production of ethyl alcohol by fermentation, Industrial alcohol, manufacture of industrial alcohol-, Beers, Wines & Liquors.
 - D. **Soap & Detergents Industry:**
Manufacturing of soap, glycerin as by products from soap manufacturing , Detergents raw material and manufacturing of detergents. House disinfect (Phynyle).
 - E. **Pulp and Paper industry:** Sulfite & ground wood pulp for paper manufacture of paper, especially paper.
 - F. **Polymer Industry:** Types of polymer, Polymerization Process, Manufacture of Polyethylene, Styrene Nylon 6, Nylon 66

REFERENCE BOOKS

1. Outline of Chemicals Technology by M. GopalaRao.
2. Chemical Process Industry by Shreve and Austin
3. Chemical Technology Vol I & II by G. N. Pandey
4. Industrial chemicals by Faith, Keyes and Clark
5. Industrial Chemistry by Dr. B. K. Sharma

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L	T	P
0	0	2

DCHEMCH405: CHEMICAL TECHNOLOGY LAB

1. Preparation of Phenyl (domestic disinfectant).
2. Preparation of Soap.
3. Preparation of Detergent/liquid detergent.
4. Atmospheric distillation of Petroleum Fractional analysis of petroleum.
5. Determination of fire and flash point :Open Cup & Closed Cup
 - a) Cleveland open cup(COC)
 - b) Pensky-Martin closed cup(PMC)
6. Preparation of Polymer by Bulk Polymerization.
7. Preparation of Thermo Plastics PMMA.
8. To find out the viscosity and viscosity index of given sample by red wood no-1 and red wood no-2 viscometer.
9. To find out viscosity of and viscosity index given sample by Saybolt viscometer.

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DCONVCH402: CONVENTIONAL AND NON CONVENTIONAL SOURCE OF ENERGY

PART-A: CONVENTIONAL ENERGY SOURCE

- 1. INTRODUCTION:** Introduction of various Solid, Liquid and Gaseous fuels.
- 2. SOLID FUELS:** Wood, Charcoal, Coal (Peat, Lignite, Bituminous and Anthracite) and Coke. Calorific value Definition and experimental determination by bomb calorimeter and calculations. Washing of coal, Purpose of washing, Principle description and operation of Jigs and washers, Carbonization (Low temperature and High temperature).
- 3. LIQUID FUELS:**
 - a) Fuel Oil, Gasoline, Diesel Fuels, Kerosene, Biogas, Biomass, GNG, PNG.
 - b) Properties (Sp. gravity, Viscosity, Flash & fire Point, Octane no, Cetane no. & ignition delay).
 - c) Advantages and disadvantages of liquid fuels.
- 4. GASEOUS FUELS:** Natural Gas, LPG -Advantages and disadvantages of gaseous fuels.
- 5. COMBUSTION CALCULATION:** Calculation of percentage of products of combustion, numerical Questions.

PART-B : NON CONVENTIONAL ENERGY SOURCE

- SOLAR ENERGY:** Energy from the Sun, Application of solar technology: Solar thermal, Electricity production, Fuel production, Energy storage methods.
- 1. WIND ENERGY:** Source of wind energy, Wind power: Types of wind power, Wind power industry : Wind forms, wind turbine.
 - 2. BIO ENERGY:** Resource of Bio energy, Solid bioMass, Electricity generation from biomass, Bio energy product.
 - 3. HYDRO ENERGY:** Types of Hydropower, Advantage and disadvantages of hydro energy
 - 4. GEOTHERMAL ENERGY:** Types of Geothermal energy, Resources, Production, Renewability and sustainability.
 - 5. WAVE AND TIDAL ENERGY:** Generation of Tidal energy and wave energy. Generating methods, Difference between wave and tidal energy.

REFERENCE BOOKS

1. Nonconventional Energy Resources by D. S. Chauhan
2. Thermal Engineering by R. K. Rajpoot
3. Fundamental of Renewable Energy System by D. Mukherjee

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DFLUICH403: FLUID MECHANICS

PART - A

1. FLUIDS

- i. Properties
- ii. Classification of Fluids.
- iii. Fluid mano meters, description and simple numerical problems.

2. FLOW OF INCOMPRESSIBLE FLUIDS:

- i. Shear stress distribution in a cylindrical tube, velocity distribution for Newtonian fluid.
- ii. Reynold No. Elementary knowledge of laminar and turbulent flow, Reynold experiment.
- iii. Continuity equations, Bernaulli's theorem, fluid heads and power requirement calculation.
- iv. Friction factor, Fanning equation and Hagen Poiseuille equation friction losses in pipes, calculation of friction loss due to enlargement, contraction, fittings and valves.
- v. N.P.S.H., cavitation, pipes, tubing, fittings & (Valves numerical problems)

3. MEASUREMENT OF FLOWING FLUIDS:

Orifice meter, venturimeter, pitot tube, rotameter, weirs and notches (Their construction and derivation of formulae simple numerical problems, Definition:-Coefficient of contraction, Coefficient of velocity, coefficient of discharge (Simple numerical problems).

4. PIPE AND PIPE FITTINGS:

Tupes. Pipes, Schedule Number, Difference between tube and pipes, Various type of valves (Gate, Close, Check, Pressure Reducing valve, Steam Traps, etc). Pipe fittings (Flange, Socket, Albow, Tees, Star, etc.).

5. TRANSPORTATION OF FLUIDS:

- a. Classification of pumps, construction and operation of Air lift, reciprocating, rotary, centrifugal and gear pumps.
- b. NPHS, Cavitations, Simple numerical problems.

6. FLOWMETERS: Orifice, venturi and nozzle type flow meters, pitot tube, rotameters positive displacement type flow meters.

REFERENCE BOOKS

1. Unit operation of chemical engineering by McCabe and Smith
2. Chemical Engineering Vol I & II by Coulson & Richardson.
3. Hydraulics, Hydraulic Machine and Fluid Mechanics by R.S. Khurmi.

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DFLUICH406: FLUID MECHANICS LAB

1. To determine the co-efficient of discharge of orifice-meter by Flow measurement
2. To determine the co-efficient of discharge of venturimeter.
3. To determine the co-efficient of discharge of V-Notches.
4. To determine the co-efficient of discharge of Rectangular Notches.
5. To determine coefficient of velocity (Cv), coefficient of discharge (Cd), coefficient of contraction (Cc) and verify the relation between them.
6. To determine friction losses in pipes and fittings.
7. To verify loss of head due to
 - a. Sudden Enlargement.
 - b. Sudden Contraction.
8. To verify Bernoulli's Theorem.
9. To perform Reynold's experiments.
10. To determine the efficiency of a centrifugal pump.
11. Study the following.
 - a. Reciprocating Pump.
 - b. Pressure Gauge/Water Meter/Mechanical Flow Meter/Pitot Tube.
 - c. Valves (Gate, Globe, Cock, Check, Butterfly, Steam trap, Safety valve, Ball valve).
 - d. Fittings (Flange, Socket, Union, Nipple, Elbow, Reducer, T, Plug)

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DPROCCH404:PROCESS PLANT UTILITIES

1. GENERATION, PROCESS & STEAM PROPERTIES:

Generations of steam at constant pressure, phases of transformation. Pressure-temperature, curve for steam. Latent Heat-external work of evaporation, Sensible heat of water, dry & saturated steam. Dryness fraction, Latent heat of wet steam, detail of wet steam, total heat of super-heated steam, specific volume of wet & super-heated steam. Simple problems using steam-table,

2. TYPES OF FUELS USED IN BOILERS:

Types of fuels used in boilers, Coal, Fuel Oil, Rice husk, Natural gas, etc. produced/forced draught concept.

3. STEAM GENERATOR:

Type of steam generators (boilers)-Fire tube & water tube and their principles. Elementary concept and principles of modern water tube boilers. Boiler mountings and accessories. Quantity of heat spent in generation. Ideal cycle of a steam plant. Ways of increasing the efficiency of steam power plant (No numerical question).

4. STEAM DISTRIBUTION:

Pipe quality, layout of piping, steam trap, pressure reducing station : Steam ejectors.

5. PRESSURE & VACUUM SYSTEM:

Construction and working of Blowers, Fan, Compressors, Vacuum Pump, Steam Ejectors.

6. WATER:

Different water resources, storage, quality parameters like hardness, suspended solids, turbidity, etc.

7. WATER TREATMENT TECHNIQUES:

Water treatment techniques, Flow diagram, Coagulation by Iron compounds like Alum, sedimentation, filtration, Softened by Sodium Carbonate and Bi-carbonate.

8. DEMINERALIZATION:

Demineralization flow diagram, Cation and Anion exchangers mixed bed, Regeneration of cation and anion exchangers and degasor.

9. COOLING WATER:

Recycling of water, Cooling towers, Principles, details and problems like scaling use of inhibitors, like sodium and chromates.

REFERENCE BOOKS

1. Engineering Chemistry by P. C. Jain
2. Unit Operation of Chemical Engg. by McCabe and Smith
3. Thermal Environmental Engineering by J. K. Thakur