VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT

SCHEME OF TEACHING AND EXAMINATION B.E. – III

(CHEMICAL ENGG.)

SEMESTER – 5

Course No.	Course	TEACHING SCHEME *L*	*P*	*T*	Examination Scheme THEORY	PRACTICAL	TUTORIAL	T.W.	Grand total
501	Gen. Chem. Tech.I	3	0	2	100	30	20	--	150
502	Chem. Engg. Therm-I	3	1	0	100	--	--	25	125
503	Fluid flow operation	3	1	2	100	30	20	25	175
504	MechanicalOperation	3	0	2	100	30	20	--	150
505	Heat Transfer	3	1	2	100	30	20	25	175
506	Mass Transfer – I	3	1	0	100	--	--	25	125
	TOTAL :-	**18**	**04**	**08**	**600**	**120**	**80**	**100**	**900**

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
GENERAL CHEMICAL TECHNOLOGY – I

SEMESTER –V

TEACHING SCHEME	**L=3; P/D=2; TA=0**
EXAMINATION SCHEME	**Theory = 3hours; marks= 100**
PRACTICAL / DRAWING	**Internal evaluation marks : 20** **External evaluation marks: 30** **Total Marks: 50**

1. Water conditioning & Environmental protection : demineralisation, deionisation, Desalination industrial waste treatment and pollution.
2. Fuels & Energy : Coal, coal chemicals, Fuel gases
3. Chlor alkali industries : manufacture of soda ash, caustic soda chlorine hydrogen and hydrochloric acid.
4. Cement and glass manufacture.
5. Sulfuric acid manufacture.
6. Electrolytic manufacture of Al and Mg.
7. Pulp and paper industry.
8. Sugar and Starch industry
9. Oil, fats soaps and detergents
10. Nitrogeneous fertilisers.
11. Phosphatic fertilisers
12. Mixed fertilisers
13. Environmental aspects of various industries.

REFERENCES:

1. R.N. Shreve, J.A. Brink, " Chemical Process Industries" 4th edition.International Students edition
2. G.F. Austin . "Shreve's Chemical Process Industries" 5th edition., Mcgraw Hill Publications.
3. M.Gopala Rao and M. Sitting, " Dryden's Outline of Chemical Technology" 2nd edition., East-West publications.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

CHEMICAL ENGINEERING THERMODYNAMICS - I

SEMESTER -V

TEACHING SCHEME **L=3; P/D=1; TA=1**

EXAMINATION SCHEME **Theory = 3hours; Marks= 100**

Tutorial = 25

1. **Introduction** : Conservation of energy and first law of thermodynamics, application to steady state flow process, enthalpy, internal energy, equillibrium state, phase rule, reversible and irreversible processes, heat capacity and specific heat.
2. **Properties of pure substances** : P V T behaviour, ideal and non ideal gases, different equations of state for real gases.
3. Heat effects : Heat capacities of gases as a function of temp., of liquids and solids, heat of vapourisation, heat of fusion, heat of sublimation etc.
4. **Second law of thermodynamics** : Thermodynamic temperature scale, ideal gas temp., scale,concept of entropy,entropy change and irreversibility, third law of thermodynamics.
5. **Thermodynamic properties of fluids** : Mathematical relations among thermodynamic functions, Maxwells' relations, interrelations between H,S,U,G,C_p,C_v, properties of single and two phase systems. Types of thermodynamic diagrams.
6. **Thermodynamics of flow processes** : Fundamental relations for flow in pipes, max. velocity in pipe flow, throttling process, flow through nozzles, single stage and multistage compressors.
7. **Refrigeration and liquifaction** : Carnot refrigeration cycle, air refrigeration cycle, absorption refrigeration, heat pump, choice of refrigeration, liquifaction processes.

REFERENCE:

1. P. K. Nag , 'Chemical Engg. Thermodynamics'.
2. J.M. Smith and H-C. Van Ness, "Introduction to chem.. Thermodynamics 3rd and 4th ed,. McGraw.
3. B.F. Dodge, " Chemical Engineering, Thermodynamics", McGraw Hill Book company

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
FLUID FLOW OPERATIONS

SEMESTER -V

TEACHING SCHEME	**L=3; P/D=2; TA=1**
EXAMINATION SCHEME	**Theory = 3hours; marks= 100**
PRACTICAL / DRAWING	**Internal evaluation Marks: - 20** **External evaluation Marks – 30** **Tutorial = 25** **Total Marks - 75**

1. Fluid properties and Dimensional Analysis
2. Fluid statics and its applications
3. Fluid flow phenomena: Types of flow-potential flow, one dimensional flow, laminar flow, turbulent flow, Reynolds number, Non-newtonian fluids, nature of tubulence, eddy viscosity, eddy diffusivity of momentum, flow in boundary layers, laminar and turbulent boundary layers, boundary layer thickness, boundary layer separation, wake formation
4. Basic equations of fluid flow
5. Friction in pipes and channels
6. Flow of compressible fluids and two phase flows.
7. Flow past immersed bodies
8. Fluid flow measurement
9. Pumping of fluids
10. Agitation and mixing of liquids

REFERENCE:

1. W.L. Mcabe, J.C. Smith & Peter Harriot, ‘ Unit operations of Chem. Engg.’ 4th Ed. , MGH, 1985, USA.
2. J.M. Coulson, J.P. Richardson, ‘ Chemical Engineering’ 3rd Ed., Peragmon International, 1984, UK.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
MECHANICAL OPERATION

SEMESTER –V

TEACHING SCHEME	**L=3; P/D=2; TA=0**
EXAMINATION SCHEME	**Theory = 3hours; marks= 100**
PRACTICAL / DRAWING	**Internal evaluation Marks: 20** **External evaluation Marks: 30** **Total Marks: 50**

1. Solids, characteristics of solid particles, type of standard screen series.
2. Size reduction & enlargement, crushers, grinders, disintigraters for coarse, intermediate and fine grinding, energy and power requirements, law of crushing, work index, etc.
3. Screening and other separation methods: screen analysis, estimation of particle size, surface area and particle population based on screen analysis, ideal and actual screens, principle of elutriation, flotation, jigging, electrostatics and magnetic separation processes.
4. Sedimentation, settling velocity, flocculation etc.
5. Fluidization, Dense phase fluidization and boiling bed, min. fluidization velocity, min. porosity of bed and bed height, batch and continuous fluidization.
6. Filtration, filter media, filter aids, batch and continuous filtration, filtration equipments, filter press, leaf, cartridge, vacuum nauch and rotary drum filters.
7. Mixing and agitation: equipments, agitation of liquids, types of impellers, power consumption in agitated vessel etc.
8. Conveying: mechanical and pneumatic conveying, elevators etc.

REFERENCES:

1. WL MacCabe, JC Smith, “Unit Operations in Chemical Eng.” 4th Ed. And 5th ed., McGraw Hill Pub.
2. Brown et al., “Unit Operations”, John Wiley Sons.
3. Badder and Banchero, "In troduction to chem.. Engg., Ha Graw Hill

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT
HEAT TRANSFER

SEMESTER –V

TEACHING SCHEME	**L=3; P/D=2; TA=1**
EXAMINATION SCHEME	**Theory = 3hours; marks= 100**
PRACTICAL / DRAWING	**Internal evaluation marks :- 20** **External evaluation marks – 30** **Tutorial = 25** **Total Marks - 75**

1. Modes of heat transfer: Fourier conduction equation, General conduction equation in cartesian, cylindrical and spherical co-ordinates.
2. Heat transfer by convection: Fluids with and without phase change, free and forced convection, laminar and turbulent flows heat transfer inside and outside tubes, concepts of thermal boundary layers, overall heat transfer coefficients, LMTD, Fouling factors, transfer units, flow over flat plates with heat transfer, empirical relations
3. Natural convection: grashoff number, heat transfer to molten metals.
4. Boiling phenomena: Regimes of boiling etc.
5. Condensation: Film and drop condensation etc.
6. Evaporation: Single effect, multi effect evaporation, forward and backward feed system.
7. Heat exchangers
8. Radiation heat transfer
9. Extended surfaces

REFERENCES:

1. J. P. Holman, Heat Transfer, McGraw Hill Publication
2. M. N. Ozisic, Heat Transfer – Basic Approach, McGraw Hill Publication-1985
3. B. U. Gebhart, Heat Transfer, McGraw Hill Publication

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT

MASS TRANSFER-I

SEMESTER –V

TEACHING SCHEME	**L=3; P/D=0; TA=1**
EXAMINATION SCHEME	**Theory = 3hours; Marks= 100** **Tutorial = 25**

1. Introduction to mass transfer operation: classification and methods.
2. Molecular diffusion in fluids: steady state diffusion in fluids at rest and in laminar flow (both gases and liquids), diffusivities of gases and liquids.
3. Mass transfer coefficient: in laminar, turbulent flows, theories of mass transfer, heat momentum and mass transfer analogies.
4. Introduction to diffusion in solids: Fick's law
5. Interphase mass transfer
6. Equipments for gas liquid operation
7. Distillation: VLE data, flash and simple distillation, continuous, McCabe thiele and ponchon savarit method etc.

REFERENCES :

1. R. E. Treybal, Mass transfer operations, 3rd Edition, McGraw Hill Publication
2. McCabe and Smith, Unit operation in chemical engineering, McGraw Hill Publication