

VEER NARMAD SUTH GUJARAT UNIVERSITY, SURAT
SCHEME OF TEACHING AND EXAMINATION B.E. – II

(CHEMICAL ENGG.) SEMESTER – 4

Course No.	Course	TEACHING SCHEME			Examination Scheme				Grand total
		<i>L</i>	<i>P</i>	<i>T</i>	THEORY	PRACTICAL TUTORIAL	T.W.		
401	Engg. ChemistryIII	3	0	2	100	30	20	--	150
402	Engg. Chem. IV	3	0	2	100	30	20	--	150
403	Chem. Engg. Mater.	3	0	0	100	--	--	--	100
404	Process calculation	3	2	0	100	--	--	50	150
405	Strength of Mat.II	3	1	0	100	--	--	25	125
406	Theory of Machines	3	1	4	100	60	40	25	225
	TOTAL :-	18	04	08	600	120	80	100	900

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
ENGG. CHEMISTRY – III (PHYSICAL)

SEMESTER –IV

TEACHING SCHEME

EXAMINATION SCHEME

SYLLABUS :

- i) Additive & Constitutive properties, Molar volume, Parachor Molar refraction, Optical activity, Molar polarization, dipole moment, Viscosity, spectrum analysis, visible and invisible spectrum, different types of spectra.
- ii) Phase rule and terms involved in it, 1-, 2- and 3- component systems, Distribution law & Henry's Law. Process of Extraction
- iii) Velocity of reactions, molecular & order of reaction, first & second order reactions, determination of order of reaction.
- iv) Lambert's & Beer's law, Laws of Photochemistry, Quantum yield, high & low quantum yield, Method to determine quantum efficiency, types of photochemical reactions, Luminescence.
- v) Surface Chemistry & colloids, adsorption, Freundlich, Langmuir & Gibbs adsorption isotherms, Partition & adsorption chromatography, Classification, preparation, purification & properties of colloids, Emulsion and gels, catalysis, general criteria of homogeneous & heterogeneous catalysis, theories of catalysis.
- vi) First and Second law of thermodynamics, spontaneous processes, entropy, efficiency of reversible cycles, free energy & maximum equations, Van't Hoff isochors, heat of reaction, heat of combustion, heat of formation, Hess's law of heat summation, heat of neutralization, some numerical examples.
- vii) Isotopes & isobars, definition, identification by Aston's mass spectrograph, separation of isotopes, conclusions from isotropy.
- viii) Electronic theory of valence. Electrovalent, covalent & coordinate bonds.
- ix) Proton concept of acids, Lewis concept, Hydrolysis, degree of hydrolysis, relative strength of acids & bases, theory of indicators.
- x) H⁺ ion conc., pH & its determination by electrometric methods using hydrogen, Redox & glass electrodes, pH-metric titrations.

TEXT BOOKS :

1. S. Glasstone, 'Elements of Physical Chemistry' Macmillan & Co. Ltd. London.
2. B.S. Bahl & G.D. Tuli, 'Essentials of Physical chemistry' S. Chand & Co., New Delhi.
3. A.J. Mee, 'Modern Physical Chemistry'

VEER NARMAD SUTH GUJARAT UNIVERSITY, SURAT
ENGG. CHEMISTRY – IV

SEMESTER –IV

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

THEORY:

1. General metallurgy
2. Chemistry of Beryllium, Lithium, Thorium, Tungsten, Uranium, Platinum and Molybdenum
3. Study of the Lanthanides La 57 to Lu 71
4. Theory of Electrolytic Dissociation, strong and weak electrolytes, Ostwald's dilution law, Buffer capacity, ionic activity and activity coefficient, theory of strong electrolyte (Debye Onsager theory).
5. Electrical conductance, conductance of electrolyte, specific, equivalent, and molecular conductance, cell constant, transport numbers, Kohlrausch's law and its applications, Electro analysis and Coulometry.
6. Equilibrium electrode potentials, classification of electrodes, types of electrochemical systems (Electrochemical cells).
7. Classification of polarization, voltametry and polarography, decomposition potential and over voltage, all types of electro-metric methods.
8. Introduction, classification, preparations, properties and chemical constitutions of Glucose and Fructose, Extraction of Sucrose from Cane Juice, Starch and cellulose.
9. Introduction to alkaloids: Extractin of alkaloids, study of conine, piperine and nicotine.
10. Types of polymerizations, elastomers, natural and synthetic rubber, vulcanization and compounding.
11. Introduction, composition, classification and isolation of proteins, qualitative tests of proteins. Classification of amino acids and their synthesis.
12. Synthesis of drugs antiseptics, halogens, halogenated compounds, antimalarials, quinoline derivatives, antibacterials, sulphur drugs.

REFERENCES:

- I P. L. Soni, Text book of Inorganic Chemistry.
- II P. L. Soni, Text book of Organic Chemistry.
- III L. Antropov, Theoretical Electrochemistry

VEER NARMAD SUTH GUJARAT UNIVERSITY, SURAT
CHEMICAL ENGG. MATERIALS

SEMESTER – IV

TEACHING SCHEME

L=3; P/D=0; TA=0

EXAMINATION SCHEME

Theory = 3hours; Marks= 100

1. Concept from physical metallurgy: crystal structure, solid solutions, point defects, fick's law, structure of high polymers phase transformation, mechanical properties, deformation of metals, failure of metals, creep, fracture, fatigue, radiation damage, equilibrium diagrams, Fe-C diagram.
2. Ferrous metals, cast iron, steel, alloy steel, effects of alloying elements.
3. Non-ferrous metals and alloys.
4. Inorganic, organic and other materials
5. Corrosion and its control, protective coatings, chemical principles involved.

Note: Topics (1) and (2) should include the study of the effect of acids and alkalies on metals and alloys.

REFERENCES:

1. D. Zaster Zebski, "Nature and Properties of Eng. Materials"
2. Van Vlack, "Elements of Material Science".

SEMESTER -IV

TEACHING SCHEME

L=3; P/D=0; TA=2

EXAMINATION SCHEME

Theory = 3hours; Marks= 100

Tutorial = 50

1. Mathematical techniques in Chemical Engg. 'Dimensions & Units'.
2. Basic Chemical calculations involving solids, liquids, solutions & gases. Gas laws & phase equilibria.
3. Material Balance with and without chemical reactions.
4. Material Balance involving recycle, bypass and purge systems.
5. Humidity, Saturation, Crystallization and Combustion calculations.
6. Thermophysics & heat capacity calculations.
7. Enthalpy changes of reactions, dissolution & laws of thermochemistry.
8. Heat of reaction, effect of temperature & pressure on heat of reaction.
9. Combined material and energy balance for single stage processes like Distillation, Absorption & Stripping, Crystallization.
10. Material & Energy balance calculations for industrial processes.

REFERENCE:

1. B. I. Bhatt & S. M. Vora , 'Stoichiometry'.
2. O. A. Hougen, K. M. Watson, R. A. Ragatz , 'Chemical Process Principles'.,part I.
3. D. M. Himmelblau , 'Basic Calculations In Chemical Engg.'
4. Richardson & Coulson , 'Chemical Engineering'., Volume VI.

VEER NARMAD SUTH GUJARAT UNIVERSITY,SURAT
STRENGTH OF MATERIALS -II

SEMESTER -IV

TEACHING SCHEME

L=3; P/D=0; TA=0

EXAMINATION SCHEME

Theory = 3hours; Marks= 100

Term work: - 25

- i) Thermal Stresses: Thermoplastic stress- strain relations, thin circular disc, temperature symmetrical at centre, long thin circular cylinder, thin sphere.
- ii) Vortex Induced Stresses, vortex wake of a stationary circular cylinder, strouhal number, effect of cylinder motion on wake, correlation model, thermocouple probe example, tow cable example
- iii) Energy Principles in solid continuum, Introduction to energy Work & internal energy, principles of virtual work, Bett's & Maxwell's laws, principles of minimum potential energy, Casti- gliano's theorem, principles of complementary work, simple deflection, problems based on above theorems, theories of failure , their significance in design.
- iv) Rotating cylinders and discs, rtating discs of uniform strength, stresses in rotating cylinders.
- v) Strength of welded joints, types of weld, eccentric loading in welded joints.
- vi) Bending of curved bars: Stresses in bars of small initial curvature-strength in bars of large curvature, extension of curved bars.

REFERENCES:

1. L.S. Srinath, ' Advanced Mechanics Of Solids', Tata McGraw Hill Co.
2. R.D. Blevines, 'Flow induced vibrations', Van-Nostrand Reinhold Co. New York.
3. Ryder, ' Strength Of Materials', ELBS.
4. S.B. Junnarkar & Adavi, 'Mechanics Of Structures Vol. I', Charotar Publishing House, Anand.

VEER NARMAD SUTH GUJARAT UNIVERSITY,SURAT
THEORY OF MACHINES AND MACHINE DESIGN

SEMESTER -IV

TEACHING SCHEME

L=3; P/D=4; TA=1

EXAMINATION SCHEME

Theory = 3hours; marks= 100

PRACTICAL / DRAWING

Internal evaluation Marks: 40

External evaluation Marks: 60
Total Marks: 100

A] THEORY OF MACHINES (40% Weightage):

- i) Introduction to machines and mechanisms : four bar and slider crank mechanisms, Cams and cam followers, cam profiles.
- ii) Friction: Screw, bearings, lubrication, clutches, brakes, Belt drives.
- iii) Gear drives : Types gears, gear nomenclature, applications.

B] MACHINE DESIGN [60% Weightage]:

- i) Design process, Material selection, factor of safety, types failures and their causes.
- ii) Design of joints: pin joints, threaded fasteners, welded joints
- iii) Design of power transmission elements.