VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

S.Y. B.Sc.

Industrial Chemistry (Vocational)

(1998-99)

Paper - III

Total 60 Marks

(42+18)

Material Science

Unit - I Mechanical properties of materiels and change with respect to temperature. 2 L

Materials of constructions used in Industry Metals and Alloys : Principles of mettallurgy Important metals and alloys ; iron, copper, aluminium lead, nickel,titanium and their alloys Mechenical and chemical Properties an' their applications. 6 L

Cement :– Types of co ment composition, Manufacturing process, setting of cement. 4 L

Unit –II Ceramic : Introduction, Types, Manufacturing processes, applications Refractories. 6 L

Polymerisation ; - Gene_ ,l and Classification, polymeric 'materials : Industrial Polymers like Backelife Polyvinyl acetats and alcohol, Polystyrine, Melamine, Polyester. Their constitution chemical and physical properties, Industrial applications.

Unit –III : Fermentation Industries :

Manufacture of Industrial alcohol, Absolute alcohol, beers, wines and liquors, Butyl alcohol and acetone ,vinegar and acetic acid, citric acid, lactic acid, monosodium gutamate, lysine, Dihydroxy acetone. 6 L

Fermentation and life processinc for antibiotics, biologicals, hormons and vitamins.

Corrasion and Errosion :— Types of corrosion ? corrosion reactions, special corrosions, fectors-affcting corrosion rate, protection against corrosion, inhibiters protective coatings and surface preparation. Metallic inorganic and orcanic coatings, Pigments and paint manufacture.. 6 L

Unit - IV : 5 L

POLLUTION: Air, Oxygen, nitrccen cycle, Water, Biosphere,

Flora and fauna, Energy, Soil,
Pollutants and their statutory limits
Pollution evaluation methodst 7 L

Unit - V

Air pollution—Various pollutants
Water pollution orcanic/ inorganic Pollutants. 12 L
Noise Pollution
Sewage analysis
Pesticide Pollution
Radiation Pollution, Green house effect, Future

BOOKS :

1. Pollution controdl in Chemical and allied Industries, Maharani S.P.
2. Pollution control in industries. A series of books by Jones H.B.
3. System's approach to Air Pollution Control R.J. Fibber and I.G. Young.
4, Air Pollution—Vol. I—IV Edⁱtor, A.C. Stern. Academic Press, New York.
5. Gas Purifica Process for Air Pollution Control, G. Nohnhebel Newnes Putterworths, London.
6. Air Pollution Technology, Paintr D..E.Reston Publishinᶜ co.
7. Science of Ceramics Chemical l Processing, Hench, L.L.
8. Chemistry and Physics of Clays other ceramics
9 Science of ceremics, Stewart, C.H.
1o. Chemistry of cement
11. Properties of glass, Morey, G . .
12. Chemistry of glasses, Paul A.
13. Corrosion : Causes *and* prevention, Spellur, F.N.
14. Corrosion and Corrosion Engineering, Fontana. M.G. and Green N.D. Mc Craw - Hill Book Co.
15. Experiments in Materials Technology, a Laboratory Text for engineers, Manufacturing metallurgy and materials testinc Govt. of India ;East West Publication
16. Selecting Materials for Process Equipment Mc Mauchton K.J. Mc Graw-Hill Book Co.
17. Industrial Chemistry including chemical engineering gineering by B.K. Sharma

Paper-IV ;

Unit Processes in organic chemicals manufacture-i 12 L

Unit - I Elementary concepts of Unit operation and Unit Process, Flow sheet preparation and elements of process flow diagram, Symbols, abbreviations and rules for Flow sheet preparation. Types of processes and flow sheets, foundamental of chemical processing Industrial cases : carbon dioxide , hydrogen oxygen, nitrocen sulfurdioxide acetylene and ethylene.

Unit —II : Nitration : Introduction - Nitrating a[g]ents kinetics and mechanism of nitration process nitration of :

i) Paraffinic hydrocarbons
ii) Penzene
iii) Chlorobenzene
iv) Acetanilide
V) Toluene.

Continuous *vs* batch nitration.

Unit —III

Halocenation : Introduction - kinetics of halogenation reactions, Reagents for halogenation , Halogenation of armomatics - sidechain and' nuclear halogenations, Commercial manufactures chlorobenzenes chloral, monochloracetic and chloromethenes, dichlerofluoromethene. 6 L

suliphonation : Introduction - Sulphonating agents, Chemical and' hysical factors in sulphonation kineties and mechanism of Sulphonation react -on, Commercial sulfonation of benezene, naphthalene, alkyl benzene, Patch vs continuous sulphonation 6 L

Unit¯IV : Effluent Treatment and waste Management Principles and equipments for aerobic , anaerobic treatment, adsorption, filtration, s sedimentation. Eag 'filters, lectrostatic precipitator, mist eliminitors, tors, wet scrubbers. 6 L

Unit—V Absorb-ers 4 L

Solid waste management 4 L

Industrial Hazzard Safety 4 L

BOOKS

Effluent Treatment in Process Industries - inst. of G e m , En .

Effluent Treatment and waste disposal --Inst. of chem. Engg.

Effluent treatment and disposal —Inst. of chem. Engg system's Approach to Air Pollution Control, R.J. Eiboero and I.S. Youg.

Air Pollution - Vol . I-IV Editor, A.C.Stern, Academic Press, New Yourk.

Cas Purification Process for Air Pollution Control, G, Nonhehel Newnes - Eutterworths, London,

Air Pollution Technology, Painter D.E.Rostion Publishing co. Unit Process in organic Synthesis P.M. Groggins, McGraw-Hill Book G.New York.

PAPER —V :

Unit Processes in Organic Chemicals Manufacture

Unit—I : Oxidation Introduction — Types of Oxidarion reactions, Oxidizing J agents, Kinetics and mechanism of oxidation of Organic compounds Liquid phase oxidation, Vapourphase oxidation, Commercial manufacture of benzoic acid maleic anhydride, phthalic anhydride, acrolein, acetaldehyde, acetic acid. 6 L

Hydrogenation :Introduction —Kinetics and thermodynamics of hydrogenation reactions, Catalysts for hydrogenation reactions, Hydrogenation of Vagetable oil, Manufacture of methanol from carbon monoxide and' hydrogen, hydrogenation of acids and esters to alcohols, catalytic reforming 6 L

UNIT-II Alkylation : Introduction : Types of alkylation Alkylatinc agents, Thermodynamics and mechanism of alkylation alkylating, Manufacture of alkyl

benzenes (for deterrent manufacture), ethyl benzene, phenyl ethyl alcohol, N- alkyl anilines (mono and di—methyl and ethyl anilines).6 L

Esterification : Introduction : Hydrodynamics and kinetics of esterification reactions, Esterification by organic acids by addtion of unsaturated compounds, esterifica.tion of carboxy acid dericvaives, commercial manufacture of ethyl acetate, dioctyl phthalate, vinyl acetate, cellulose acetate. 6 L

UNIT-III : Aminaction t (A) By reduction. : Introductuion Methods of reduction—metal and acid, catalytic, sulfide, dectrolytic metal and alkali sulfites, metal hydrides, sodium metal, concentrated caustic oxidation, reduction commercial manufacture of aniline, m—nitroaniline p—amino phenol. 6 L

(B) Amondysis Introduction, aminating agents, 3 L

Facfors ; effecting amonolysis.

Hydrolysis Introduction : hydrolysing agents, 3 L

Kinetics, themmodyanics end mcchenism of hydrolysis.

UNIT -IV : Process Instrumentation :

Concepsts, of measurement and accuracy L Principles, construction end workinc of following measuring instruments. 2 L

Temperature -class thermometers, bimetallic thermometer pressure spring thermometer, vapour. filled thermometers, resistance, thermometers, radiation pyrometers. 10 L

Unit -V : Pressure manometers, baromteters bourdon pressure cauce, bellow type, diaphragm type,prossurc causes, mecleod cauces, Pireni cauces, 4 L

Licuid level : Direct end indirect liquid level, meassurement, Float type liquid level cauge Ulltrasonic level gauges ; bubbler system. 4 L

Density measurement 2 L

Viscocity measurement 2 L

BOOKS :

Unit Processes in Organic Synthesis, P. H. Groggins, ns, McCraw -Hill Book co. Hew .York.

Industrial instrumentation.

Echman, John-Wileys Sons.

Instrumentation in Proce Industries,II and III W. C. Andrews, Gulf Publication. Instrumentation and Control for the Process industries. S borer, Elsevier Applied Science publishers.

Chemical Engineer's and book, J. H. Perry and Grenb McGFrew-Hill Publishing Co, New Yourk Yourk.

Practical :

1. Use of Transducers for measuring flow control.
2. Determination of flash point and ignition points, of liquids.
3 Water analysis –solid content, Hardness, GOD , and LOD other tests as per industrial specifications.
4. Flow Measuring devices –floats.
5. Monocraphs of representative new materials such as sulphuric acid, toluene, sodium, carbonate, sodium hyroxide, carbon tetrachloride Benzoic acid,
6. Limit tests for heavy metals Pb As Hg , Fe and ash content.

Unit Process :

One to t o examples of each of the following unit processes..

Nitration, sulphonation, Friedel–crafts reaction, esterification, Hydrolysis, Oxidation, Ealocenation chlorcsul Phonation, Reduction, Polymerization, reactions of diazonium salts.

Instrumental methods of analysis –Use of colorimeter, PH meter, potentiometer, conductometor, refractometer, polarimeter.

Material testing, : Testing of alloys, identification of plastics/rubber; Estimation of yield point, Young's modulus Optical thermal mechanical and electrical properties.

Process Instrumentation transducers of different types.