

SVM Institute of Technology, Bharuch
 Department of Chemical Engineering
 Syllabus: Mid/Remid Exam (Even Sem March/April 2019)
 BE - II (4th Sem)

Name of Faculty: Dr. Dipak.A Deore , Ankur Patel

Subject Name: PROCESS HEAT TRANSFER

Subject Code: 2140503

| Sr. No. | Unit No | Topics |
|---------|---------|---|
| 1 | 1 | Introduction to three modes of heat transfer: Conduction convection & radiation. General laws of heat transfer. |
| 2 | 2 | Conduction: Fourier's law, Thermal Conductivity – its variation with temperature & Pressure and its relationship with electrical conductivity. Heat transfer through composite walls and cylinders. Unsteady state heat transfer through some important shapes. Different types of insulating materials, general properties & application of insulators. |
| 3 | 3 | Natural convection: Natural convection from vertical plates & horizontal cylinders. Forced convection: In laminar flow – Heat transfer in plate & tubes. In turbulent flow - Empirical equations for individual coefficients: inside tubes, outside tubes, outside bundle of tubes, flow past spheres. Significance of Prandtl No., Nusselt No., Grashof No., Graetz No. & Peclet No. Correction for tube length. Corrections for heating and cooling the fluid. Various analogies between heat & momentum transfer. |
| 4 | 4 | Radiation: Radiation laws like Stefan Boltzmann's law, Kirchhoff's law, Wien's law, Plank's law etc. Black body, Grey body. Transmissivity, Absorptivity, Reflectivity, Emissivity of black bodies and gray bodies. Application of thermal radiation: Radiation Transfer between surfaces. Radiation through semi transparent materials. |

Reference Book:

1. "Heat Transmission", W. H. McAdams, McGraw Hill, 3rd Edition.
2. "Process Heat Transfer", D. Q. Kern, McGraw Hill.

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Name of Faculty: Palak A. Trivedi

Subject Name: Chemical Engineering Thermodynamics -I

Subject Code: 2140502

| Sr. No. | Unit No | Topics |
|---------|---------|--|
| 1 | 1 | INTRODUCTION AND FIRST LAW OF THERMODYNAMICS: The scope of thermodynamics, Dimensions and units, Measures of amount or size, Force, temperature, pressure, work, energy, heat, etc. Internal Energy, Enthalpy, The first law of thermodynamics, Energy balance for closed systems, Equilibrium, The Phase rule, The reversible process, Heat capacity, Application of first law of thermodynamics to steady state flow process. |
| 2 | 2 | VOLUMETRIC PROPERTIES OF PURE FLUIDS : PVT behavior of pure substances, Ideal and non-ideal gases, Equation of states, Virial, Cubic, Vander waals EOS, Redlich/Kwong (RK) EOS etc., Calculation of constants in terms of P_c , T_c , V_c . Generalized Correlations for gases and liquids. |
| 3 | 3 | HEAT EFFECTS: Sensible heat effects, Temperature dependence of the heat capacity, Latent heats of pure substances, Approximate methods for the estimation of the latent heat of vapourization, Standard heat of reaction, Standard heat of formation, Standard heat of combustion, Temperature Dependence of ΔH^0 , Heat effects of Industrial Reactions. |
| 4 | 4 | SECOND LAW OF THERMODYNAMICS: Statements of second law of thermodynamics, Heat engines, Thermodynamic Temperature Scales, Concept of entropy. Entropy changes of an Ideal Gas, Third law of thermodynamics. |

Reference Book:

“A text book of Chemical Engineering Thermodynamics”; K. V. Narayanan, Prentice-Hall of India

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Name of Faculty: Dr. Pritam Patil and Prof. Aesha Mehta

Subject Name: Chemical Engineering Maths

Subject Code: 2140505

| Sr. No. | Unit No | Topics |
|---------|---------|--|
| 1 | 1 | Approximations and Errors: Types of Errors, Significant figures, Accuracy of Numbers, Precision, Error Propagation, Applications in Chemical Engineering |
| 2 | 2 | Solution of Algebraic and Transcendental Equations: Basic Properties of Equations, Relations between Roots and Coefficients, Descartes Rule of Sign, Synthetic Division of a Polynomial by a Linear Expression, Bracketing Methods (Bisection, Secant, Method of False Position or Regula Falsi, etc.), Convergence of Iterative Methods, NewtonRaphson Method, Newton-Raphson Method for Non Linear Equations in Two Variables, Algorithms & Computer Programming for all these Methods in Applications of Chemical Engineering |
| 3 | 3 | Solution of Linear Equations: Mathematical Background, Matrix inversion, Gauss Elimination, GaussJordan Method, Gauss-Seidel Iteration Method, Jacobi's Method, GaussSeidel Method, Eigen Value Problem, Algorithms & Computer Programming for all these Methods in Applications of Chemical Engineering |
| 4 | 4 | Curve Fitting : Method of Least Squares, Fitting a Straight Line and a Polynomial, Fitting a Non-linear Function, Fitting Geometric and Exponential Curves, Fitting a Hyperbola, a Trigonometric Function, etc., |

Reference Book:

1. S S Shastri, Introductory Methods of Numerical Analysis, Prentice Hall of India.
2. B S Grewal, Numerical Methods in Engineering & Science, Khanna Publishers
3. Kenneth J Beers, Numerical methods for chemical engineering, Cambridge University Press.

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Name of Faculty: Dr. P. M. Patel

Subject Name: Physical and Inorganic Chemistry (P&IC)

Subject Code: 2140501

Date : 27/03/2019

| Sr. No. | Unit No | Topics |
|---------|---------|--|
| 1 | 1 | The Phase Rule : Introduction, Phase, Components, Degree of freedom, Derivation of Gibb's phase, One component system like water, sulphur, two components system, Eutectic systems like silver-lead, zinc-cadmium system. |
| 2 | 2 | Thermo Chemistry : Introduction, Heat of solution and dilution, Exothermic reaction, Endothermic reaction, Enthalpy and Entropy of reaction numerical, Thermochemical equations like heat of reaction, heat of combustion, heat of neutralization, heat of transition, heat of vaporization, heat of sublimation , heat of formation, heat of fusion. |
| 3 | | Electrochemistry : Introduction, half reaction, electrode potential, Nernst's equation, Type of electrodes, Reference electrode, Electrochemical cell like Weston standard cell, concentration cell, galvanic cell, Denial cell, Reversible cell, Hydrogen-oxygen cell, buffer solution, buffer capacity, Handerson-Hesselblatch equation for acidic and basic buffer with numerical, Faraday's law of electrolysis |
| 4 | | Chemical Kinetics : Introduction, Reaction rate, Units of rate, Rate laws, Order of reaction, Zero order reaction, first order reaction, second order reaction, third order reaction, Pseudo-order reaction, Molecularity of a reaction, units of rate constant. |
| 5 | | Chemical Bonding : Introduction, Type of chemical bond, Ionic bond, covalent bond, polar and nonpolar, Hydroger bonding. |

Reference Book:

1. Essential of Physical Chemistry by Bahl and Tuli.
2. A Text book of Engineering chemistry by Shashi Chawala.
3. Engineering chemistry Willey India Publisher.

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Name of Faculty: S. I. CHATURVEDI

Subject Name: CHEMICAL PROCESS INDUSTRIES - II

Subject Code: 2140506

| Sr. No. | Unit No | Topics |
|---------|---------|--|
| 1 | 1 | DYES AND INTERMEDIATES : Classification of dyes according to constitution and application, various dyes such as Azo dyes, Anthroquine dyes, triamyl dyes, Dispersed dyes, Miscellaneous dyes such as azine, oxazines, thiazines ,thiazoles ,nitro dyes etc. Various types of intermediates and its mfg. based of unit processes, Manufacturing processes of Chrome blue black, H- acid, Koch acid, Vinyl sulphone, Wet dyes Nitro Benzene, Aniline, etc. |
| 2 | 2 | Drugs and Pharmaceuticals : Classification of various drugs and pharmaceuticals, Introduction of Antibiotics such as Penicilin, Streptomycin, Erythromycin, Introduction of Vitamins , Mfg. process of Aspirin, Vitamin -C, Insulin, Ascorbic acid, Barbital & Phenol Barbital |

Reference Book:

1 : Shreve's Chemical Process industries

2 : DRYDEN'S out line of chemical technology.