

SVM Institute of Technology, Bharuch
 Department of Chemical Engineering
 Syllabus: Mid/Remid Exam (Even Sem March/April 2019)
 BE – VI (6th Sem)

Name of Faculty: Ankur.R Patel

Subject Code: 2160503

Subject Name: PROCESS EQUIPMENT DESIGN-I

| Sr. No. | Unit | Topics |
|---------|--------|---|
| 1 | Unit 1 | Process design of piping, Fluid moving devices and Flow meters: Introduction, Process design of piping, NPSHA &NPSHR, Power required by pump, evaluation of Centrifugal pump performance when handling viscous liquids, Power required in Fan, Blower and adiabatic compressor, flow meters, Process design of Orifice meter, Rotameter etc. |
| 2 | Unit 2 | Process design of Heat exchangers: Shell & Tube heat exchangers, Functions of various parts of shell & Tube Heat exchanger, General design method of shell & tube heat exchanger, Criteria of selection among Fixed Tube sheet, U Tube & Floating Head heat exchanger, Process design of without phase change heat exchanger, Process design of condenser, Criteria of selection for Horizontal and vertical condenser, Process design of Kettle type &Thermosyphon Reboilers and vaporizes, Tinker’s flow model, Air cooled heat exchangers and air heaters, plate heat exchangers, etc. |
| 3 | Unit 3 | Process design of Distillation Column: Introduction, Criteria of selection, Selection of equipment for distillation, Distillation column design, Selection of key components for multicomponent distillation, Determination of operating pressure for distillation column, Advantages & disadvantages of vacuum distillation, Determination of nos. of theoretical stages for binary distillation by McCabe Thiele method Determination of nos. of theoretical stages for multi-component distillation by Fenskey-Underwood-Gilliland’s method, Selection of trays, Calculations for tower diameter & pressure drop of sieve tray tower, Checking of conditions for weeping, down comer flooding, liquid entrainment, etc, tray efficiency, Jet Flooding & down comer Flooding, Different types of weirs & down comers of tray tower, their selection criteria. |

Reference Book:

1. Introduction to Process Engineering and Design by S B Thakore and B I Bhatt, Tata McGraw Hill, 1st Edition, 2007.

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Name of Faculty: Dr. Dipak Deore and Dr. Pritam Patil

Subject Code: 2160507

Subject Name: Advanced Separation Techniques

| Sr. No. | Unit | Topics |
|---------|------|---|
| 1 | 1 | Super Critical Extraction Working Principal, Advantage & Disadvantages of supercritical solvents over conventional liquid solvents, Advantage & Disadvantages of supercritical extraction over liquid- liquid extraction, Decaffeination, ROSE process, Commercial applications of supercritical extraction |
| 2 | 2 | Short path Distillation: Concept & working of short path Distillation Unit (SPDU), Difference between short path Distillation & molecular distillation, applications of SPDU. |
| 3 | 3 | Reactive & Catalytic Distillation: Concept, Advantage & Disadvantages, BALE & KATMAX packing Manufacturing of MTBE and ETBE and it's comparison with conventional techniques. |
| 4 | 4 | Pressure Swing Distillation: Concept & Working, Advantage & Disadvantages of PSD over azeotropic and Extractive Distillation, Applications |
| 5 | 5 | Membrane separation technique: Principles, mechanisms, cross flow, membrane materials and various membrane modules used in membrane separation processes, Classification, application & advantages of membrane separation processes. |
| 6 | 8 | Reverse Osmosis: Concept of osmosis and reverse osmosis, different types of membrane modules and membrane material for R.O., Advantages and commercial applications of R.O |

Reference Book:

1. "Membrane separation Processes" by Kaushik Nath, PHI pvt. Ltd., 2008
2. "Introduction to process Engineering & Design" by S.B. Thakore & B.I Bhatt, Tata McGraw-Hill Ltd.,2007

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Name of Faculty: Dr. Dipak Deore

Subject Code: 2160501

Subject Name: MASS TRANSFER OPERATION-II

| Sr. No. | Unit | Topics |
|---------|------|---|
| 1 | 1 | <p>Distillation: Introduction: Vapor-liquid Equilibria, P-x-y T-x-y diagrams, concept of relative volatility and effect of P and T on equilibrium data, Ideal solutions, Raoult's Law as applied to distillation operations, Deviation from ideality, Minimum and maximum boiling Azeotropic mixtures. Types of Distillations- Flash distillation, steam distillation, simple distillation, Rayleigh's Equation for simple distillation, continuous rectification, Binary systems, Batch fractionation. Determination of number of stages by McCabe -Thiele method, Various Feed conditions, Plate and feed line equation (q-line) Concept of minimum, total and optimum reflux ratio. Problems based on Rault's Law, Rayleigh's equation, Flash Distillation and Continuous Rectification.</p> |
| 2 | 4 | <p>Drying: Equilibrium relationship & hysteresis, various types of moisture in drying, Batch drying, rate of drying, time of drying, Cross-circulation drying, concept of NoG and HoG, Drying at low temperature, Freeze drying etc. Batch & continuous drying equipments-Tray dryer, Tunnel dryer, Rotary dryers, Spray dryers, Fluidized bed dryer, etc.</p> |

Reference Books:

1. "Mass transfer operation" by R. E. Treybal, Mc-Graw Hill international, 3rd edition
2. "Chemical Engineering", Volume-2, by Coulson & Richardson, 4th edition

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Name of Faculty: Dr Jigar Gurjar

Subject Code: 2160506

Subject Name: Chemical Reaction Engineering - I

| Sr. No. | Unit | Topics |
|---------|------|---|
| 1 | 1 | Introduction to Reaction Engineering: Classification of reactions, definitions of reactions rate, variables affecting reaction rate, speed of Chemical reactions. |
| 2 | 2 | Kinetics of homogenous reactions: Simple reactor types, the rate equation, concentration dependent term of rate equation. Molecularity and order of reaction. Rate constant k, representation of an elementary and nonelementary reaction. Kinetic models for nonelementary reactions. Testing kinetic models. Temperature dependant term of rate equations from Arrhenius theory and comparison with collision and transition state theory. Activation energy and temperature dependency. Predictability of reaction rate from theory. |
| 3 | 3 | Interpretation of Batch reactor data Constant volume batch reactor, analysis of total pressure data, Integral and differential methods of analysis of data for constant volume and variable volume cases. Temperature and reaction rate, search for a rate equation |
| 4 | 4 | Introduction to reactor design & Ideal reactors for single reaction: Mass and energy balances around a volume element. Ideal batch reactor, Steady state mixed flow reactor, steady state plug flow reactor, holding and space time for flow reactors, space velocity |

Reference Book:

1. Octave Levenspiel, Chemical Reaction Engineering, 3rd Edition, Wiley India Pvt Ltd.
2. H. Scott Fogler, Elements of Chemical Reaction Engineering
3. J.M. Smith, Chemical Engineering Kinetics, 2nd Ed

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Name of Faculty: Dr Jigar Gurjar

Subject Code: 2160504

Subject Name: Pollution Control and Safety Management

| Sr. No. | Unit | Topics |
|---------|------|---|
| 1 | | <p>Safety Management: Development of safety movement, Need for safety 1. General Introduction Historical Background and Growth of Safety Science, Aims of Safety Science, Safety and the Organization, safety audit 2. Basic Concepts of Safety Science. Hazard, Risk, Nature of the accident process, Use of Engineering Fundamentals in safety science. 3. Risk Assessment & Hazard Identification Checklist procedure, Preliminary hazard analysis, What if analysis, Failure mode effect analysis, Hazard and operability (HAZOP) studies, Hazard analysis techniques: Fault tree analysis, Event tree analysis,</p> |
| 2 | | <p>4. Fault and Event Tree Analysis for Risk Prediction 5. Source Models Models of Accidental Release of Toxic/Flammable liquids and vapors, Models of flow of liquids and vapors through pipes. 6. Dispersion Models: Mathematical Models for prediction of Dispersion patterns for toxic/flammable materials released into atmosphere, various types of "plume" and "puff" models of dispersion. 7. Nature of fires and explosion Calculation of Blast damage due to over-pressure, prevention of fires and explosions. 8. Control of Major Chemical Hazards, Emergency Control and disaster planning, On-site and Off-site emergency preparedness. 9. Introduction to various personal protective equipments 10. Instruments for safety : Pressure safety valve, Rupture disc , interlocks etc.</p> |
| 3 | | <p>Industrial Laws and Act:: Introduction to Industrial laws, Industries Factory act, Energy audit, Environment Audit, Trade union, Labour laws and acts. Industrial Electricity rules, Industrial Dispute Acts, Workmen compensation Act, ESIC Act, Payment and Wages act, Minimum Wages act, Payment of Bonus act</p> |

Reference Book:

Environmental Pollution Control Engineering by C.S.Rao