Rashtrasant Tukadoji Maharaj Nagpur University

Structure & Syllabus of 7th and 8th Semester B. Tech. (Chemical Engineering)
## SCHEME OF EXAMINATION
RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
SEVENTH SEMESTER B.TECH (CHEMICAL ENGINEERING)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Code</th>
<th>Theory (T)</th>
<th>Practical (P)</th>
<th>Subject</th>
<th>Board</th>
<th>Teaching Scheme, hr. per week</th>
<th>Credits</th>
<th>MARKS</th>
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**Elective**

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**Elective-II**

|-----------------------|--------------------------------|-------------------|--------------|

2
# SCHEME OF EXAMINATION
RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
EIGHTH SEMESTER B.TECH (CHEMICAL ENGINEERING)

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### Scheme of Absorption for 7th semester B.Tech. Old Pattern to CBS Pattern of 7th Semester B. Tech. (Chemical Engineering)

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<tr>
<th>Sr. No.</th>
<th>Sub Code Theory/Practical</th>
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### As Per Rashtrasant Tukadoji Maharaj Nagpur University (Old Semester Pattern)

<table>
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<tr>
<th>7th Semester B. Tech (Chemical Engineering)</th>
<th>Theory/Practical</th>
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<td>BTCHE 701T Transport Phenomena</td>
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<td>BTCHE 702T Process Control and Instrumentation$</td>
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<tr>
<td>BTCHE 708P Project/Dissertation- Stage I</td>
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Students will have to appear in University theory and practical examination as per the new scheme.

# Students have to attend the classes and practicals and appear in University examination (Theory & Practical) of the subject Separation Processes of Sixth semester B. Tech (Chemical Engineering) (CBS) which is equivalent to Mass Transfer-II (Theory) and Mass Transfer (Practical) of Seventh Semester B.Tech (Chemical Engineering) old Semester pattern respectively.

$ Students are exempted if they have cleared the Process Control –I (Theory) of Sixth Semester B. Tech (Chemical Engineering) old semester pattern.
<table>
<thead>
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<th>Sr. No.</th>
<th>Sub Code Theory/Practical</th>
<th>Subject</th>
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<td>1</td>
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<td>Mathematical Methods and Computer Aided Design in Chemical Engineering</td>
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<td>Process Control- II</td>
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<td>Project Management &amp; Industrial Economics</td>
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<td>BTCHE 801T</td>
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<td>BTCHE 802T</td>
<td>Process Dynamics and Control</td>
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<td>BTCHE 803T</td>
<td>Entrepreneurship and Project Management</td>
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<td>BTCHE 804T</td>
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<tr>
<td>BTCHE 807P</td>
<td>Project/Dissertation-Stage II</td>
<td>Practical</td>
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Students will have to appear in University theory and practical examination as per the new scheme.

Unit 2: Shell momentum balances for momentum flux & velocity distribution for flow of Newtonian fluids for various situations. Navier-Stokes equation and its applications.


Unit 4: Shell mass balance for concentration distribution in solids & in laminar flow conditions, General equation for Mass transfer and its applications. Diffusion with chemical reaction.

Unit 5: Momentum, Heat and Mass transfer in boundary layers. Analogies of momentum, heat & mass transfer.

Unit 6: Introduction to turbulent transport phenomena. Theories of mass transfer. Introduction to transport phenomena in Bio-systems.

Books Recommended:
UNIT 1: Control system representation using block diagram, Control configuration representation, Block diagram algebra, Forcing functions, First order system, Examples of first order system, Transfer functions of continuous stirred tank reactor, mercury thermometer, mixing process, liquid level tank, stirred tank heater, pure capacitive system, response equations of first order system to various forcing functions, step response, ramp response, impulse response, sinusoidal response, Dynamic error, time lag.


UNIT 3: Dynamics of second order systems, response equations of second order system to various forcing functions for under damped. Critically damped and over damped systems. Overshoot, Decay ratio, response time, rise time, period of oscillation, natural period of oscillation.

UNIT 4: Working mechanism and transfer functions of flapper-nozzle Pneumatic, Hydraulic and Electronic proportional, proportional-integral, proportional derivative and proportional-integral – derivative controllers, Functions of different modes of control, On-off two position controller, Working principle and dynamic behaviour of pneumatic control valve, applications of control valve, hysteresis of control valve.

UNIT 5: Microprocessor based digital control system, Hardware elements of control configuration, Transmission lines hold element, multiplexer, Supervisory control, Programmable logic controller, Distributed control system, Direct digital feedback control, examples of direct digital feedback control, stirred tank heater, heat exchanger, continuous stirred reactor with exothermic and endothermic reactions, distillation column, drum boiler, level unit, jacketed kettle, evaporator, extraction column.

Unit 6: Classification of measurement, Classification of instruments, Characteristics of instruments, Classification of transducers, primary and secondary, analog, digital, active and passive transducers Temperature measurement instruments, glass thermometer, pressure thermometer, liquid in metal thermometer, platinum resistance thermometer, thermistors, Thermocouples, Radiation and Optical pyrometer, pressure measurement instruments, Ionization gauge, Pirani gauge, Bell differential pressure gauge, Pneumatic pressure meter, Level measurement instruments, float and shaft, float and tape, linear and rotary potentiometer, radiation and laser level unit.

Books Recommended:
Subject  :  BTCHE 703T (BCHE)  Chemical Reactor Design (Theory)
Lecture :  3 Hours  Tutorial: 1 Hour  No. of Credits : 4
University :  80 Marks  College Assessment : 20 Marks
Duration of Examination: 3 Hours

Unit 1:  Fluid-Particle Reactions (Non-Catalytic Systems)
Selection of a model for gas-solid non catalytic reaction, Un-reacted core model, Shrinking core model, Rate controlling resistances, Determination of the rate controlling steps, Various contacting patterns and their performance equations, Application of models to design problems.

Unit 2:  Fluid-Fluid Reactions (Non-Catalytic Systems)
Introduction to heterogeneous fluid - fluid reactions, Rate equation for instantaneous , Fast and slow reaction, Equipment used in fluid- fluid contacting with reaction, Application of fluid -fluid reaction rate equation to equipment design, Towers for fast reaction, Towers for slow reactions

Unit 3:  Solid Catalyzed Reactions

Unit 4:  Gas-Liquid Reactions on Solid Catalyst
Trickle Beds, Slurry Reactors, Three Phase Fluidized Beds, The General Rate Equation, Performance Equations under various conditions, selection of various types of Contactor, Applications

Unit 5:  Polymerization Reaction Systems
Pseudo-Steady-State Hypothesis (PSSH), Searching for a Mechanism, Step Polymerization, Free-Radical Polymerization, Development of Rate Laws for the Net Rate of Reaction, Modeling a Batch Polymerization Reactor, Molecular Weight Distribution and Properties of Distribution, Design Aspects

Unit 6:  Steady State Non-isothermal Reactor Design
The Energy Balance, Non-isothermal continuous flow reactors, equilibrium conversion, non-adiabatic reactor operations, multiple steady states, non-isothermal multiple chemical reactions

Books Recommended:
<table>
<thead>
<tr>
<th>Subject</th>
<th>BTCHE 704T (BCHE)</th>
<th>Elective-II: Non Newtonian Flow (Theory)</th>
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<td>Lecture</td>
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<td>University</td>
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<td>No. of Credits: 4</td>
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<td>Duration of Examination</td>
<td>3 Hours</td>
<td>College Assessment: 20 Marks</td>
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**Unit 1: Non-Newtonian fluids**

Introduction, Classification of fluid: Time-independent, Time-dependent, Visco-elastic. Dimensional considerations for visco-elastic fluids.

**Unit 2: Rheometry for non-Newtonian fluids**

Introduction, Various viscometers, Yield stress measurements, Normal stress measurements, Oscillatory shear measurements, High frequency techniques, The relaxation time spectrum etc.

**Unit 3: Flow in pipes**

Introduction, Laminar flow in circular tubes, Criteria for transition from laminar to turbulent flow, Friction factors for transitional and turbulent conditions, Laminar flow between two infinite parallel plates, Laminar flow in a concentric annulus. Gas-non Newtonian liquid two phase flow.

**Unit 4: Particulate systems**


**Unit 5: Heat transfer characteristics of non-Newtonian fluids in pipes**

Introduction, Thermo-physical properties, Laminar flow in circular tubes, Fully-developed heat transfer to power-law fluids in laminar flow, Isothermal tube wall, Constant heat flux at tube wall, etc.

**Unit 6: Mixing of Liquids.**


**Books Recommended:**

Subject : BTCHE 704T (BCHE)    Elective-II: Chemical Hazards and Safety
(Theory)                          
Lecture : 3 Hours    Tutorial: 1 Hour    No. of Credits : 4
University : 80 Marks    College Assessment : 20 Marks
Duration of Examination: 3 Hours

Unit 1: **Introduction**
Chemical Process Classification, Process Design and Safety parameters, Chemicals and their hazards, importance of safety consciousness etc.

Unit 2: **Chemical Hazards**
Hazards in Chemical Process plants, Hazards code, explosive limits, electrical safety, static electricity hazards. LEL, UEL of various compounds, hazards due to leakages, flammable liquid hazards, fire ball hazards. Safety in handling gases, liquids and solids. Case studies.

Unit 3: **Disasters and Detectors**
Disaster in Chemical process plants, emergencies, explosion, BLEVE, UVCE, On-site and off-site emergency plan, fire detectors, smoke detectors, heat detectors, instruments for monitoring toxic and flammable process areas.

Unit 4: **Hazard Assessment and Control**
Hazard assessment, F & EI, Safety audit, safety equipments, HAZOP, FTA and ETA, FMEA, Combating Chemical fires, fire fighting foams dry chemical systems etc.

Unit 5: **Risk Assessment**
Risk assessment, objectives, FAFR, risk identification and analysis, role of communication, crisis communication, systematic maintenance, risk management plan etc.

Unit 6: **Personal Safety & Legal Aspects**
Personal safety, importance of plant layout, safety checklist, general safety rules, safety checklist during start up and errors, importance of training, role of human errors, protective devices, safety management. Role of Government, safety organizations. Management and trade Unions in promoting Industrial safety..

**Books Recommended:**
1. S.D. Dawande, Chemical Hazards and Safety, Denett & Co. 2007
Subject : BTCHE 704T (BCHE)  Elective-II: Nanotechnology (Theory)
Lecture : 3 Hours  Tutorial: 1 Hour  No. of Credits : 4
University : 80 Marks  College Assessment : 20 Marks
Duration of Examination: 3 Hours

Unit 1: Introduction
Nano Scale, history and Scope of Nano Technology., Nanomaterials, Morphology. Enhanced properties at nano scale. Comparison with bulk materials.

Unit 2: Fabrication of Nanomaterials

Unit 3: Introduction to Instrumentation and characterization
Instrumentation Fractionation principles of Particle size measurements, Particle size and its distribution, XRD, Zeta potential, SEM, TEM, AFM, STM, DLS, Spectroscopy. etc.

Unit 4: Kinetics at Nanoscale
Nucleation and growth of particles, Issues of Aggregation of Particles, Oswald Ripening, Stearic hindrance, Layers of surface Charges, Zeta Potential and pH

Unit 5: Carbon Nanomaterials
Synthesis of carbon buckyballs, List of stable carbon allotropes extended fullerenes, metallofullerenes solid C60, bucky onions nanotubes, nanocones Difference between Chemical Engineering processes and nanosynthesis processes.

Unit 6: Applications of Nano Technology.
Applications in Chemical Engineering like nanocatalyst, bio analytical tools, nano/micro arrays, nanodevices, lab-on-a-chip.

Books Recommended:
7. Internet resources.
Subject: BTCHE 704T (BCHE)  Elective-II: Catalysis (Theory)
Lecture: 3 Hours  Tutorial: 1 Hour  No. of Credits: 4
University: 80 Marks  College Assessment: 20 Marks
Duration of Examination: 3 Hours

Unit 1:
Introduction to Catalysis. Biocatalysts – enzymes, lipases and microbes as catalysts, Application to industrial processes – one example from various Chemical and allied industries. Types of catalysts.

Unit 2:
Heterogeneous Catalysis: Introduction, Phase transfer and tri-phase catalysis, liquid – liquid and solid – liquid catalysis, mechanism. Mechanism of participation of enzymes in a few typical reaction, engineering problems, mass transfer considerations. Reactor types etc.

Unit 3:
Gas – solid catalytic reactions. Adsorption theories and concept of active site, Adsorption isotherm and Langmuir – Hinshelwood approach, Diffusion effect, Michaelis – Menten Kinetics for biocatalyst

Unit 4:
Preparation of catalysts – Supported metal and metal oxide catalyst. Major steps involved in catalysts preparation and formation. Physical methods of catalyst characterization for determination of surface area, pore volume and average pore size. BET equation, Inhibition. Reactions and denaturation of two biopolymers

Unit 5:
Zeolites – Structural considerations. Templeted molecular sieves, size and shape selectivity, 4 – 5 industrial applications of zeolites. Modification of zeolites

Unit 6:
Recent developments in catalytic processes. Case studies.

Books Recommended:
7. Internet sources.
With a view to meet the trained human resource requirements of the Chemical Process and allied industries, students of B.Tech Chemical Engineering will go through Finishing Techniques. The training of students will be conducted in order to improve their personality. This course has an objective of helping them to find suitable jobs by inculcating soft skills components through appropriate training.

Art of Communication, Importance of internal and external communication. General Communication process, verbal & Non-verbal Communication. Effective Listening skills.

Interpersonal Skills, Effective presentation skills, Self awareness. Dealing with emotions. Team work. Leadership qualities.


Books Recommended:
LIST OF EXPERIMENTS

Required to perform minimum 8 practicals from the list given below:

1. To calculate value of rate constant ‘k’ for the saponification of ethyl acetate with NaOH in a batch reactor – I (Where M=1)
2. To calculate value of rate constant ‘k’ for the saponification of ethyl acetate with NaOH in a batch reactor – II (Where M=2)
3. Verification of Arrhenius law.
4. To study the kinetics of selected reaction in CSTR
5. To study the kinetics of selected reaction in PFR
6. To study the performance of mixed flow reactor/PFR
7. Study of various combinations of PFR and CSTR in series.
8. Residence time Distribution in CSTR.
9. Residence time Distribution in PFR.
10. RTD studies in a packed Bed reactor.
Subject: BTCHE 707P (BCHE)  Seminar (Practical)
Practical: 3 Hours  No. of Credits: 2
College Assessment: 100 Marks

Each student has to select the topic of Seminar in Chemical Engineering in consultation with his/her guide. The student will make an oral presentation for 10 to 15 minutes followed by question and answer session in front of an internal assessment committee. Two neatly typed copies of seminar report along with its soft copy should to be submitted.

Reading: Journals, Books, Magazines & Internet sources, etc
<table>
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<th>Subject</th>
<th>Project/Dissertation – Stage I (Practical)</th>
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<tbody>
<tr>
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Each student will undertake an independent project/dissertation. The student is required to choose the topic in consultation with his/her Guide. Student should undertake dissertation/project concerning Chemical Engineering applications such as production of chemical, design and development, experimental work, industry based problems, generation of new ideas and concept, modification in the existing process/system, development of computer programs, modelling and simulation etc. A preliminary work is to be carried out in this stage of the project/dissertation. Two neatly typed copies of the Report on the completed work at stage I should be submitted at end on the 7th semester and internal assessment marks will be awarded for this stage of the project/dissertation based on the work and presentation made by them in front of Departmental committee.
Rashtrasant Tukadoji Maharaj Nagpur University
Faculty of Engineering & Technology

Syllabus for

Eighth Semester B.Tech. Chemical Engineering

**Subject**: BTCHE 801T (BCHE)  Computational Chemical Engineering (Theory)

**Lecture**: 3 Hours  
**Tutorial**: 1 Hour  
**No. of Credits**: 4

**University**: 80 Marks  
**College Assessment**: 20 Marks

**Duration of Examination**: 3 Hours

**Unit 1**: Introduction to Modeling and simulation, different types of models, application of mathematical modeling, principles of model formulation, chemical system modeling

**Unit 2**: Numerical methods of solution, (Bisection, False position, Newton-Raphson, Secant method etc.) of non-linear algebraic and transcendental equations applied to Chemical Engineering problems.

**Unit 3**: Methods of solution of simultaneous linear (Gauss elimination, Gauss-Jordon, Gauss-Seidal etc.) and non-linear algebraic equations. Application to chemical engineering problems

**Unit 4**: Curve fitting techniques: Least squares regression (linear, polynomial, multiple linear etc.). Interpolation. Application to Chemical Engineering problems.

**Unit 5**: Formulation and numerical solution of ordinary differential equations with emphasis on chemical process systems. Initial Value Problems (Euler’s method, modified Euler’s method, 4th order Runge Kutta Method etc), boundary value problems (Shooting Method, Finite Difference method etc.)

**Unit 6**: Formulation and numerical solution of partial differential equations (Finite difference method, Crank-Nicholson method, methods of lines etc.). Application to chemical engineering problems.

**Books Recommended:**

UNIT 2: Control system design by frequency response, Bode diagram for controllers and for control systems, Bode stability criterion, Phase and Gain margins, Ziegler- Nichols optimum controller settings, Applications of control system design.

UNIT 3: Discrete time control systems, Block diagram algebra, Routh’s stability criterion and root-locus diagram in Z-domain for discrete time control, Transfer functions of Zero order hold, First order hold, Exponential hold, Effect of hold element on root locus diagram and stability of discrete time control.

UNIT 4: Nyquist stability criterion, Nyquist diagram for control systems, Direct digital ratio control, Examples of ratio control, Integral of square error, Integral of absolute value of error, Integral of time weighted absolute value of error, Transportation lag compensation.

UNIT 5: Feed forward control configuration, applications of direct digital feed forward control of stirred tank heater, heat exchanger, continuous stirred tank reactor for exothermic and endothermic reactions, distillation column, drum boiler, level control unit, jacketed kettle, evaporator, extraction column.

UNIT 6: Cascade control configuration, Functions and tuning of primary and secondary controllers, Applications of microprocessor based digital cascade control of stirred tank heater, heat exchanger, continuous stirred tank reactor for exothermic and endothermic reactions, distillation column, level control unit, jacketed kettle, evaporator, furnace.

Books Recommended:
Subject : BTCHE 803T (BCHE) Entrepreneurship and Project Management (Theory)
Lecture : 3 Hours    Tutorial: 1 Hour    No. of Credits : 4
University : 80 Marks    College Assessment : 20 Marks
Duration of Examination: 3 Hours


Unit 3. Identification and Selection of good business opportunity (Business opportunity guidance), Searching for an opportunity and selecting the right Product/Project. Market survey and research. Technoeconomic feasibility assessment: Preliminary and detailed Project Report. Location & Layout.


Unit 5. Material, management: Classes of materials, Purchasing, objectives of purchasing. Functions of purchase department. Inventory management and control. Economic Order Quantity (EOQ), ABC analysis.


Books Recommended:

Subject : BTCHE 804T (BCHE)  
Elective –III: Computational Fluid Dynamics (Theory)

Lecture : 3 Hours  Tutorial: 1 Hour  No. of Credits : 4
University : 80 Marks  College Assessment : 20 Marks
Duration of Examination: 3 Hours

Unit 1: Introduction to CFD
Introduction and basic concepts, overview of CFD, basic transport equations, Application of CFD

Unit 2: Discretization methods
Nature of numerical methods, Methods of deriving the discretization equations, Control volume formulation. Discretization 1-D, 2-D and 3-D equations for steady state and unsteady state conduction. Various methods, Over-relaxation, Under-relaxation, Discretization of convection and diffusion terms, Upwind Scheme, Exact solution, Exponential scheme, Hybrid scheme, Power law scheme, other schemes etc. False diffusion.

Unit 3: Calculation of the Flow Field
Difficulties related pressure gradient term and continuity equation, Staggered grid, Momentum equation, Pressure and velocity correction, Pressure correction equations, SIMPLE, SIMPLER algorithms.

Unit 4: Turbulence Modeling
Introduction to turbulence, Mean flow equations, Nature of turbulence, Classification, Zero order equation models, One equation models, Two-equation models, Turbulent stress models, other models, Problems.

Unit 5: Reactor Engineering and Flow Modelling
Introduction to reactor engineering and flow modelling, Reactive flow processes, Multiphase flow processes, Reactor Engineering Methodology, Introduction to various CFD softwares.

Unit 6: CFD Case Studies
Design of stirred tank reactor, jet mixed tanks, bubble column, fluidized bed, submerged jets, flow in curved pipe, turbulent flow and heat transfer in finned tubes, melting around a vertical pipe, transient combined mixed convection and radiation from vertical aluminium fin, heat transfer in rotary kiln reactors, heat transfer in metal and alloy solidification, membrane reactors etc.

Books Recommended:
Subject: BTCHE 804T (BCHE)       Elective –III: Piping Engineering (Theory)
Lecture: 3 Hours       Tutorial: 1 Hour       No. of Credits: 4
University: 80 Marks       College Assessment: 20 Marks
Duration of Examination: 3 Hours


Unit 2: Line size calculation; details and types of pressure relief valve / safety valve; control valves, gaskets, Pipe fittings and pipe connectors. Desirable properties of Material of Construction (MOC) for pipe, valves, flanges, gaskets etc.

Unit 3: Unit plot plan, process P&ID, utility P&ID, equipment layout and utility layouts within battery limits. Isometrics (2D, 3D), material-take-off (MTO), piping spool drawings, Piping insulation, colour codes and hazardous area classification details.

Unit 4: Common ASME, ASTM and IS specifications for seamless/ ERW pipes, pipe fitting flanges and fasteners, gasket, and valve materials, types of gaskets and their selection etc.

Unit 5: Design of flanges and gaskets; design of nuts & bolts; applications of NFPA codes in piping system design; Standards for piping insulation (detail engineering). Gas Pipe stress analysis (internal and external pressure). Selection & codes for pipe supports.

Unit 6: Design of piping systems and accessories: Crude oil, natural gas, pressurised steam, condensate, hazardous chemicals etc.

Books Recommended:

Subject : BTCHE 804T (BCHE)  
Elective –III: Polymer Engineering (Theory)

Lecture : 3 Hours  
Tutorial: 1 Hour  
No. of Credits : 4

University : 80 Marks  
College Assessment : 20 Marks

Duration of Examination: 3 Hours

Unit 1:  
Introduction to polymers, Molecular Weight Determination

Introduction and Classification of Polymers. Thermosets, Thermoplastics, Linear Branch, Cross Linked Polymers. Factors influencing the polymer properties. Monomers used for polymer synthesis.

Molecular Weights, Mn, Mw, Mv, Polydispersity Index. Different Methods of determination of Molecular weight. Effect of Molecular weight on Engg. Properties of Polymers, Numerical based on theory

Unit 2:  
Polymerization Processes and Techniques

Addition & Condensation polymers, Polymerization Techniques, Bulk, Solution, Emulsion, Suspension, Interfacial Polymerization with their merits & Demerits.

Unit 3:  
Kinetics and Mechanism of Polymers Synthesis


Unit 4:  
Polymerization reactors

Polymerization reactors, types and mode of operation. Polymerization reactor design, control of polymerization, Post polymerization unit operations and unit processes High Performance and Specialty Polymers, Polymer additives, compounding. Fillers plastisizers lubricants colourants Different moulding methods of polymers,

Unit 5:  
Polymers Testing and Waste Management


Unit 6:  
Manufacturing of polymers with flow-sheet, properties & applications

PE, PP, Polysterer, Nylons, Polystyrene, ABS, Thermosets like Epoxies, unsaturated polyesters, phenolics.; etc.

Books Recommended:

Subject: BTCHE 804T (BCHE)  
Elective –III: Chemical Process synthesis and Design (Theory)

Lecture: 3 Hours  
Tutorial: 1 Hour  
No. of Credits: 4

University: 80 Marks  
College Assessment: 20 Marks

Duration of Examination: 3 Hours

Unit 1: Introduction of Chemical Process and Product Design
Introduction, Approach to Process Development, Different Considerations, development of Particular Process, Overall Process design, Onion Model, Case studies of product design.

Unit 2: Choice of Reactor
Reaction Path, Types of Reaction Systems, Performance of Reactor, Idealized Reactor Models, Effect of various process variables.

Unit 3: Choice of Separator
Separation of Homogeneous and Heterogeneous Mixtures, Distillation, Azeotropic Distillation, Absorption, Evaporation, Drying etc.

Unit 4: Heat Exchanger Networks

Unit 5: Distillation Sequencing
Distillation Sequencing using simple columns, Heat Integration of Sequences of Simple Distillation Columns, Distillation Sequencing using thermal coupling, Optimization of Reducible Structure reactions

Unit 6: Safety and Health Considerations

Books Recommended:
BTCHE 805P (BCHE)  Computational Chemical Engineering (Practical)

Practical : 3 Hours  No. of Credits : 2
University : 25 Marks  College Assessment : 25 Marks
Duration of Examination: 6 Hours

Before starting the practical sessions students will be made acquainted with theoretical aspects of mathematical softwares and commercial simulators.

Students have to perform minimum eight practicals using MS-Excel, MATLAB/Scilab, POLYMATH, Mathcad, ASPEN PLUS/HYSYS/ CHEMCAD software for design/simulation of chemical engineering problems.
LIST OF EXPERIMENTS

Required to perform minimum 8 practicals from the list given below:

List of experiments:

1. To determine the time constant of mercury in glass thermometer.
2. To determine the time constant of thermocouple sensor.
3. To determine the time constant of RTD (PT100) sensor.
4. To determine the time constant of thermistor sensor
5. To determine damping coefficient, decay ratio, overshoot and characteristics time for step response of mercury manometer.
6. To study the dynamic response of liquid level in single tank system.
7. To study the dynamic response of liquid level in two tanks non-interacting liquid level system and to compare experimental and theoretical responses.
8. To study the dynamic response of liquid level in two tank interacting liquid level system and to compare experimental and theoretical responses.
9. To study the characteristic of PID controller by estimating time required to reach PV and to estimate the offset.
10. To study the transient response of a P control.
11. To study the transient response of a P +D control.
12. To study the transient response of a P+I control.
13. To study the transient response of a P+I+D control.
14. To determine the characteristics pneumatic control valve.
15. To study the tuning of PID controller by open loop method, using Zeigler-Nichols tuning rule.
16. Use of MATLAB/Scilab for control Experiments.
Project/Dissertation-Stage II (Practical)

Subject: BTCHE 807P (BCHE)  
Practical: 6 Hours/week  
University: 150 Marks  
No. of Credits: 3

Project/dissertation work undertaken in the first stage in Seventh semester will be continued and completed at the end of Eighth semester. Two neatly typed and bound copies of the report consisting of stage I and Stage II combined together along with its soft copy should be submitted at the end of Eighth semester. Assessment would be made on the basis of the submitted report and the presentation cum viva-voce examination conducted by the board of examiners.