Rashtrasant Tukadoji Maharaj Nagpur University

Faculty of Engineering & Technology

Syllabus for

Third Semester B.Tech. Chemical Engineering

Subject : BTCHE 301T (BGE) **Strength of Materials (Theory)**

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

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Simple Stresses and Strains**:** Introduction; Definition of stress and strain; tensile and compressive stresses; shear stress, Elastic limit, Hooke's law, poission's ratio, modulus of Elasticity, modulus of Rigidity, Bulk Modulus; stresses in composite sections; Volumetric strain; Temperature stresses. Strain Energy Stresses due to different types of axial loading; Gradually applied loads, Suddenly applied loads, Impact loads.

Unit II Shear Forces and Bending moments Definitions; Concept of Shear force and Bending moment; Sign conventions; Shear force and Bending moment diagrams for cantilevers, simply supported beams and beams with overhang; point of contra flexure; member subjected to couples. **Stresses in Beams** Definition; Pure or simple bending, theory of simple bending; Neutral layer, Neutral axis, Moment of resistance, assumptions in the theory of simple bending; Section modulus for rectangular, circular, I section and T section. Flitched Beams Definition; Equivalent section, modular ratio, moment of resistance in flitched beams. Shear stress distribution in Beams sections Shear stress distribution on rectangular, circular, I section and T section.

Unit III Deflection of Beams Member bending into a circular arc; Slope, deflection and radius of curvature; Cantilevers and simply supported beams. Macaulay's method for slope and deflection in cantilevers, simply supported beams and beams with overhang.

Unit IV **Direct and Bending Stresses** Stress distribution of the section of an eccentrically loaded rectangular column; Core of Kern of the section, Circular and hollow sections. **Columns and Struts** Introduction; axially loaded compression members; crushing load; Buckling or critical load, Euler's theory of long columns, assumptions made in Euler's theory; Empirical formulae; Rankine's formula.

Unit V Torsion of Shafts Pure Torsion; Theory of pure torsion; Torsional moment of resistance; assumptions in the theory of pure torsion; Polar modulus; Power transmitted by circular and hollow shafts; Torsional rigidity. Close coiled helical springs Stiffness, deflection, shear stress and Strain energy.

Unit VI Thin Cylinders and Spheres Thin cylinders; Circumferential and Longitudinal stresses; Thin spherical shells. Riveted Connections Types of joints; Lap and Butt joints; Failure of riveted joints; Tearing strength, shearing strength and bearing strength; Efficiency of a joint.

Books Recommended :

1. Strength of Materials by S. Ramamrutham.
2. Strength of Materials by B. C. Punmia
3. Strength of Materials by R S. Khurmi.

Subject : BTCHE 302T (BGE) **Plant Utilities (Theory)**

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

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Thermodynamics**:** Laws of perfect gases, thermodynamics processes, First and Second Law of thermodynamics, Entropy, The clausius inequality, Steady Flow Processes, carnot Cycle. PROPERTIES OF STEAM**:** Use of steam tables, measurement of dryness fraction, entropy of steam, temperature entropy and mollier charts, clausius clapeynon equation, Rankine Cycle.

Unit II Steam Generators**:** General Description, Boiler Mounting and Accessories, Natural and Artificial Draught, Equivalent Evaporation and Thermal efficiency. Fuels use in boilers – liquids, gaseous and hydrocarbon

Unit III Turbine**:** Theory and working of impulse, reaction and gas turbine. Bleeding and reheating.

Unit IV: Internal Combustion Engine**:** Cycle of operation, two and four stroke cycle, general description of S.I and C. I. engines, ignition, injection and governing.

Unit V: Water: Sources, conditioning and management of water for cooling of hot gases, cooling towers, cooling ponds. Design of chimney. Constructional details and design aspects.

Unit VI: Introduction to refrigeration, various cycles, coefficient of performance. Applications of refrigeration

Books Recommended :

1. Fundamental of Engineering Thermodynamics – John and Howel
2. THERMODYNAMICS An Engineering Approach – Y.A. Cengel and M.A. Boles
3. Applied Thermodynamics – Aestop
4. Applied Thermodynamics – R N Joel

Subject : BTCHE 303T (BGE) **Engineering Mathematics – III (Theory)**

Lecture : 4 Hours Tutorial : 1 Hour No. of Credits : 5

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Laplace Transforms: Important Formulae, Properties of Laplace Transforms, Laplace Transform of Unit Step Function, Impulse Function, Periodic Function, Dirac Delta Function, Bessel Function, Error Function, Inverse Laplace Transforms, Important Formulae of Inverse Laplace Transforms, Properties of Inverse Laplace Transforms, Partial fraction method for Inverse Laplace Transforms, Convolution Theorem, Solutions of ordinary differential equations, simultaneous ordinary differential equations, partial differential equations and evaluation of Integrals using Laplace Transform method.

Unit II Z-Transforms: Properties of Z-Transforms, Inverse Z-Transforms, , Convolution, Convolution property of casual sequence, Transforms of important sequences, Inverse of Z-Transforms by division, solutions of difference equations.

Unit III Partial Differential Equations**:** Solution of first order linear and non-linear Partial Differential Equations, Solution of higher order linear homogeneous Partial Differential Equations and linear non-homogeneous Partial Differential Equations.

Unit IV Applications of Partial Differential Equations: Method of separation of variables for Partial Differential Equations and its use in solving the Partial Differential Equations representing (i) One dimensional wave equation, (ii) One dimensional heat conduction equation in Cartesian co-ordinates and polar co-ordinates and (iii) Two dimensional steady state heat conduction equation.

Unit V Numerical solution of Partial Differential Equations**:** Numerical solution of parabolic, elliptic and hyperbolic Partial Differential Equations using finite difference technique.

Unit VI Calculus of Functions of Complex variables **:** Analytic functions, Cauchy –Riemann conditions in Cartesian co-ordinates and polar co-ordinates, methods for finding conjugate functions, Integration of function of complex variables, Cauchy's integral theorem and integral formula, Residue theorem and its use for evaluating Integrals of function of complex variables, evaluation real definite integrals by contour integration; conformal transformations and bilinear transformations.

Books Recommended :

1. Advanced Engineering Mathematics by H.K. Dass
2. A T Book of Engineering Mathematics by N.P. Bali, Manish Goyal
3. Higher Engineering Mathematics by B.S. Grewal
4. Higher Engineering Mathematics by B.V. Ramana

Subject : BTCHE 304T (BGE) **Numerical Methods & Computer Programming (Theory)**

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

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Introduction to programming, programming languages, algorithm, flowcharts, C Language: Features of C, data types, Identifiers, Constants, Variables, expressions, Console I/O statement, Selection statements: if-else, switch, Iteration Statements: For, while, do-while, Jump statements: return, go to, break, and continue, comments, and program using these features.

Unit II Macros, Function and Recursion, Structure and Union, Pointers, String, Basics of File handling

.**Unit III** Concept of Array, Matrix operations in C and Searching, Sorting: Linear search, Binary search, Bubble sort, Insertion sort, Selection Sort.

Unit IV Program to obtain roots of polynomial Equation: Newton-Rapson method, Regular Falsi Method, Muller method, Bisection method, false position method. Programs for interpolation and extrapolation using numerical methods.

Unit V Numerical Integral and Differential equations using: Initial value problems by Euler's method, modified Euler's, Taylor series, Runge-kutta methods, Regression analysis.

Unit VI Optimization techniques, integer programming, Simplex method, dynamic programming, programs for implementation of these method and case study.

Books Recommended:

1. Numerical methods for Scientific and Engg. Computations by M.K. Jain, Srk Iyengar, R.K. Jain, Wiley Eastern Ltd.
2. Numerical methods for Science & Engg. By Stanton R.G., PHI.
3. The C Programming Language: Dennis Ritchie & Brain Kernighan [Pearson].
4 ANSI C: By E Balagurusamy

Subject : BTCHE 305T (BGE) **Applied Physical Chemistry – II (Theory)**

Lecture : 3 Hours No. of Credits : 3

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Thermodynamics I: The chemical potential, Gibb's Duhem equation, Fugacity, Activity, Determination of fugacity,Chemical equilibria only for Homogeneous system- Reaction Isotherm, Relation between Kp,Kc,Kx, The Van't Hoff equation

Unit II Thermodynamics II: The Clausius Clapeyron Equation, The Phase Rule and its derivation, its application to water system and CO_2 system, Simple Eutectic system- Lead Silver system, Nernst distribution law, its applications- Solvent extraction theory and principle

Unit III Thermodynamics of solutions I : Raoult's Law, Vapour Pressures of ideal solutions, Activity of ideal solution, chemical potential of ideal solution, Gibb- Duhem- Margules Equation, Free energy, entropy, and enthalpy of mixing

Unit IV Thermodynamics of solutions II : Vapour Pressures of real solutions, Vapour Pressure-composition and Boiling Point composition Curves of completely Miscible Binary Solutions, Distillation method of immiscible liquids : Fractional distillation and steam distillation, Colligative properties-vapour pressure lowering, Osmotic pressure, Elevation of boiling point, depression of freezing point

Unit V Electrochemistry I : Specific, Equivalent and Molecular conductance, effect of temperature on conductivity, Transport Number, their determination- Hittorf's method and Moving Boundary Method, Kohlrausch's Law, its applications, Debye Huckel Theory of strong electrolytes

Unit VI Electrochemistry II : Reversible electrodes, Reference electrodes, standard electrode potential, Thermodynamics of reversible electrodes, The Nernst Equation, Concentration cells with and without transference, liquid junction potential, Applications of Emf measurements, Hydrolysis of salts

Books Recommended:

1. Thermodynamics for Chemists : S.Glasston, D Van Nostrand Co,New York,USA
2. An Introduction to Thermodynamics : R P Rastogi and R R Mishra
3. Introduction to Electrochemistry : S.Glasston, D Van Nostrand Co,New York,USA
4. Physical Chemistry : G Barrow, Benjamin Publisher, New York,US

5. Physical Chemistry : Vemupalli, Wiley East West
6. Principles of Physical Chemistry : Puri Sharma and Pathania

Subject : BTCHE 306P (BGE) **Numerical Methods & Computer Programming (Practical)**

Practical : 2 Hours No. of Credits : 1

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 4 Hours

LIST OF EXPERIMENTS

1. Write a simple program in C for Addition, multiplication and division of two numbers.
2. Write a program in C to find whether given year is Leap year or not.
3. Write a program in C for Fibonacci sequence using function.
4. Write a program in C for Factorial Function.
5. Program to illustrate the uses of Array.
6. Write a program in C to demonstrate the use of Selection Statement (If, Else, Switch).
7. Write a program in C to demonstrate the use of Iterative Statement (For While Do While.).
8. Write a program in C for Transpose of matrix.
9. Write a program in C for Matrix Addition and Multiplication.
10. Write a Program in C for Binary Search.
11. Write a Program in C for Linear Search.
12. Write a Program in C for Bubble Sort.
13. Write a Program in C for Insertion Sort, Selection sort.
14. Write a program in C to find a root of non-linear equation by using Newton Raphson method.
15. Write a program in C to implement Euler modified method.
16. Write a program in C to find a root of a quadratic equation using Muller method.
17. Write a program in C to implement Runga-Kutta method.
18. Write a program in C to implement Gauss-Seidal method.
19. Write a program in C to find out equation dy/dx=x+y by using Euler method.
20. Write a program in C to implement Taylor's series.
21. Write a program in C to calculate coefficient of regression.
22. Write a program in C to implement Regula Falsi method.
23. Write a program in C to implement Simpson's 1/3 rd rule.
24. Write a program in C to implement Bisection Method.

Subject : BTCHE 307P (BGE) **Applied Physical Chemistry – II (Practical)**

Practical : 3 Hours No. of Credits : 2

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1. To study the $KI_3 \rightarrow KI + I_2$ equilibrium in aqueous solution.
2. To study the ternary system of Toluene-Acetic acid-water

3. To study the adsorption of acetic acid on charcoal and verify the Freundlich adsorption isotherm
4. To determine the heat of crystallization of $CuSO_4$. $5H_2O$.
5. To determine the integral and differential heats of solution of a salt.
6. To determine the thermometric titration curve in the neutralization of strong and weak acids against a strong base.
7. To find the constant of conductivity cell and hence determine the dissociation constant of a weak acid.
8. To determine the solubility of sparingly soluble salts conductometrically
9. To find the pH of buffers and the dissociation constant of an acid using Quinhydrone electrode.
10. To determine the transport number by the e.m.f. method.
11. To study the kinetics of saponification of methyl acetate by sodium hydroxide by conductometry.

Subject: BTCHE 308P (BGE) **Machine Drawing (Practical)**

Practical : 3 Hours No. of Credits : 3

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1 ISI Conventions covering the standard practice in Machine Drawing and also use of ISI specifications for limits and fits.

2 Simple exercise in converting pictorial and isometric views into other graphic projections. Sectional views and missing views preparation details and assembly drawing of simple machine parts from actual models.

3 Preparation of free hand proportionate dimensioned sketches of various machine elements such as:

a. Screw threads and fasteners such as nuts, bolts, studs, locking arrangements, foundation bolts, etc.
   i. Rivets and riveted joints, welded joints.
   ii. Keys, cotters and couplings.
   iii. Cottered joint and knuckle joint
   iv. Engine and machine bearing mounts
   v. Bearings and bearing mountings
   vi. Different types of valves.

4 Preparation of working drawings, part lists and assembly drawings of simple machine assemblies.

Fourth Semester B.Tech. Chemical Engineering

Subject : BTCHE 401T (BCHE) **Process Calculations (Theory)**

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

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Basic principles, the concept of gram atom and gram mole, conversion of units from one system to another, concept of excess reactant, conversion and yield, Selectivity and degree of completion of reaction.

Unit II Ideal gases, partial pressure, vapor pressure, application of ideal gas laws, volume changes with changes of composition, dissociating gases, humidity and saturation, solubility and crystallization.

Unit III Material balance without chemical reaction, recycle, purge and bypass calculations, material balance with chemical reaction.

Unit IV Energy balance without chemical reaction, combined material and energy balances.

Unit V Energy balance with chemical reaction, combined material and energy balances.

Unit VI Fuels and combustion, types of fuels, heating values of fuels, theoretical and excess air, heat and combustion problems

Books Recommended :

1. Stoichiometry and Process Calculation by Narayana K.V., Laxmikutty B. , Prentice Hall of India 2006.
2. Basic Principles and Calculations in Chemical Engineering by Himmalblau D.M. & Riggs, J.B. Prentice Hall of India 6th Edition (2011)
3. Stoichiometry by Bhatt B.I. , Vora S.M. Tata-McGraw-Hill 4th Edition 2004
4. Chemical Process Calculation by Hougen A., Watson, M. John Wiley & Sons, Third Edition 2000

Subject: BTCHE 402T (BGE) **Electronics & Instrumentation (Theory)**

Lecture : 3 Hours No. of Credits : 3

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Engineering materials: Classification & requirement of engineering materials and their applications, Selection of materials, Physical and mechanical properties of ceramic & composite materials, Polymers, Addition & Condensation polymerization, Copolymerization, Structure & properties of polymers, Plastic.

Unit II Magnetic materials: Classification of magnetic materials, Magnetic dipole, Dipole moment, Magnetic field strength, Magnetization, Magnetic permeability, Magnetic domains, B-H curve, Hard and Soft magnetic materials, Ferrites and its applications.

Unit III Band theory of solids: Energy gap in solids, Classification of solids, Intrinsic and extrinsic semiconductors, Conductivity of semiconductor materials and its temperature dependence, semiconductor devices: photo diodes, LED, Photo Cell.

Unit IV Dielectric and Ferroelectric materials**:** Dipole moment, Dielectric polarization, Dielectric constant, Types of polarization, Temperature and frequency dependence of dielectric constant, Dielectric loss, Dielectric strength, Dielectric breakdown, Ferroelectric properties of materials, Ferroelectric domains, P-E curve, Applications of dielectric and ferroelectric materials.

Unit V Conducting materials: Resistivity & Conductivity of metals, Physical and Mechanical properties of metals, Corrosion, Superconductivity, Types of superconductor, Applications of superconductivity.

Unit VI Measuring Instruments: Number systems, Logic gates, D to A and A to D converters. Working and uses of CRO, Cyclotron, Bain bridge mass spectrograph, Binocular and Research microscopes, Transducers: LVDT, Strain gauge, Thermistor, Thermocouple.

Books Recommended :

1. Material science & Engineering: V. Raghavan (Prentice-Hall of India Pub., 4th edition)
2. Advances in Material Science: R. K. Dogra & A. K. Sharma (S. K. Kataria & Sons)
3. Material Science: Khurmi and Sedha (S. Chand Pub.)
4. Science and Engineering Materials: C. M. Srivastava and C. Srinivasan (New Age International, New Delhi)
5. Material Science: I. P. Singh (New Age International, New Delhi)
6. Digital Electronics: Millman & Halkias
7. Electrical & Electronics Measurements and Instrumentation: A. K. Sawney (Dhapat Rai Pub.)

Subject : BTCHE 403T (BCHE) **Mechanical Operations (Theory)**

Lecture : 3 Hours No. of Credits : 3

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hr.

Unit I Solids: Properties of solids, screening, screening equipments, effectiveness of screens, sieve analysis, average diameter and specific surface. Size reduction, types of equipments used in the various stages of reductions. Laws of crushing & grinding power requirements.

Unit II Handling of solids: Belt conveyer, screw conveyer, flight conveyers, bucket conveyer, pneumatic conveyers. Capacity and power requirements of conveyers. Flow of solids through fluids, terminal settling velocity & hindered settling.

Unit III Classification: Principles of classification, and jigging, equipments, tabling, magnetic and electrostatic separation, cyclone separation, theory, principle and their design. Flotation cells and calculations for flotation process.

Unit IV Filtration: Filtration theory, equipment for filtration, constant pressure and constant rate filtration, filter calculations, optimum cycle time & filter aids.

Unit V Sedimentation: laboratory batch sedimentation Kynech theory , calculation of area and depth for continuous thickeners. Centrifugation principles of a centrifuge, sedimentation, equipments and calculations.

Unit VI Mixing and Agitation: theory of mixing nd agitation, types of equipment, mixing characteristics, power consumption, mixing index, rate of mixing.

Books Recommended :

1) Unit operation by Brown G.G., CBS Publishers First Edition 1995, Reprint 2005.
2) Unit operations for chemical engineers by McCabe W.L. and Smith J.C. Mc Grow Hill International Edition Seventh Edition 2005.
3) Chemical Engineering by Coulson J.N. and Richardson R.F., Butterworth Heinemann Vol. I Sixth Edition1999.

4) Chemical Engineering by Coulson J.N. and Richardson R.F., Elsevir Publication Vol. II Fifth Edition 2002.
5) Introduction to Chemical Engineering by Badger W.L. and Banchero J.T. McGraw-Hill 1955.
6) Unit Operations of Chemical Engineering by Hiramath R.S., Kulkarni A.P. Everest Publications 3rd Edition 2004.
7) Transport Processes and Separation Process Principles by Christe John Geankoplis, PHI Learning, Fourth Edition 2003

Subject : BTCHE 404T (BGE) **Inorganic Process Technology (Theory)**

Lecture : 3 Hours No. of Credits : 3

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Industrial gases**:** Manufacture of CO, CO_2, H_2, N_2 & O_2, rare gases C_2H_2, and their industrial applications

Unit II Industrial acids: Manufacture of nitric acid, sulphuric acid, Phosphoric acid and their industrial applications

Unit III Industrial Carbon & Inorganic pigments: Manufacture & applications of, Lamp black, Carbon black, Activated carbon, Graphite, Industrial diamond. Manufacture, properties & uses of white pigments- white lead, zinc oxide, titanium dioxide and Lithophone.

Unit IV Marine chemicals & Nuclear industries: Manufacture of common salt from Sea water, by-product from bitterns, Bromine. Nuclear fission reactions, Feed materials, extraction of Uranium, uranium enrichment, nuclear reactor, reprocessing of nuclear materials, protection from radioactivity.

Unit V Chloro-Alkali & Electrolytic and Electrochemical industries**:** Manufacture of Soda ash, caustic soda &chlorine - Diaphragm cells, Mercury cathode & Mercury cells &Membrane cell. Manufacture of potassium chlorate & per- chlorate. Artificial abrasives: Calcium carbide, Silicon carbide.

Unit VI Fertilizers: Classification of fertilizers, manufacture & applications of ammonia, urea, ammonium nitrate, ammonium sulphate, Super phosphates & triple super phosphates, monoammonium and Diammonium phosphate, Potassic, compound & complex fertilizers.

Books Recommended :

1. Industrial Chemistry by B.K.Sharma, Goel Pub. House, Meerut.
2. Dryden, C. E. “Outlines of Chemical Technology” (Edited and Revised by M.Gopal Rao and Sittig .M) East West Press. Pvt. Ltd, New Delhi, 3rd Edition (1997).
3. Austin G. T,”Shreve’s Chemical Process Industries”, 5th ed., McGraw Hill.(1984).
4. G.N.Pandey, "Text book of Chemical Technology", Vol. I, 2nd revised edition, (1994).
5. A Text Book of Engineering Chemistry, by S.S.Dara, S.Chand & Co., New Delhi

Subject : BTCHE 405T (BGE) **Organic Process Technology (Theory)**

Lecture : 3 Hours No. of Credits : 3

University : 80 Marks College Assessment : 20 Marks

Duration of Examination : 3 Hours

Unit I Hydrolysis reaction introduction, types of hydrolysis, mechanism of hydrolysis. Technical preparations involving hydrolysis, e.g, preparation of fatty acid, preparation of furfural from carbohydrates, preparation of glycerol .

Unit II Alkylation: introduction and type of alkylation, alkylating agents, equipments for alkylation. Technical preparation of Anisole, Tetraethyl Lead, Dimethyl Aniline.

Unit III Oxidation liquid and vapor phase oxidation, thermo chemistry of oxidation, Technical preparation of citric acid,oxalic acid, vanillin from eugenol, adipic acid mgf. from cyclohexane using green route.

Unit IV Esterification mechanism of esterification, types of esterification, technical preparation of Bio-diesel(methylesters of higher fatty acid), vinyl acetate, methyl methacrylate.

Unit V Hydrogenation, types of hydrogenation reaction, production of hydrogen from various sources, scope of hydrogenation reaction. Technical hydrogenation processes, petroleum hydrogenation, Tar hydrogenation, coal hydrogenation.

Unit VI Polymers. General introduction, types of polymerization. Study of bio-degradable polymers like polylactic acid, polyvinyl esters, polybutyric hydride. Conducting polymers like poly(acetlynes), poly(phenylenes)

Books Recommended :

1. P.H.Groggins “Unit Processes In Organic Synthesis”
2. Industrial Chemistry by B.K.Sharma,
3. Drydens “Outlines Of Chemical Technology”(edited and revised by M.Gopal Rao and Sittig) east west press New Delhi
4. Polymer Science by V. Gowarikar and Vishwanathan
5. Text book of Engineering chemistry by Khan and Khan
6. A Text book of Engineering chemistry by S. S. Dara, S. Chand Publication ,New Delhi
7. Material Chemistry by V.K. Walekar and A. Bharti, Tech-Max Publication, Pune.

Subject: BTCHE 406P (BGE) **Electronics & Instrumentation (Practical)**

Practical : 3 Hours No. of Credits : 2

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1. Measurement of Magnetic susceptibility.
2. Measurement of resistivity and conductivity.
3. To determine the cut-in-voltage of LED.
4. A study of P-E curve on CRO.
5. A study of basic & universal logic gates.

6. A study of A to D & D to A convertor.
7. Determination of activation energy of a thermistor
8. A study of cathode ray oscilloscope.
9. To study the characteristic of a photo cell.
10. Measurement of displacement by LVDT.

Subject : BTCHE 407P (BCHE) **Mechanical Operations (Practical)**

Practical : 3 Hours No. of Credits : 2

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1. To study the relationship between the Drag Coefficient and modified Reynolds number for body falling through fluid. (C_d vs N_{RE})
2. To carry out the batch Sedimentation test and to use the results to design a thickener.
3. To evaluate the Specific Surface of a packing material.
4. To establish the Filtration equation for the leaf filter system and to evaluate the compressibility of the cake.
5. To study the power consumption of an Agitator with Reynolds and Froud number.
6. To verify the laws of Crushing and Grinding.
7. To determine the Mean Arithmetic Diameter, Mean Surface Diameter and Mean Volume Diameter.
8. To determine the size distribution in a given sample. (Elutriation).
9. To determine the effectiveness of Vibrating Screen.
10. To separate the various size fractions in a mixture on the basis of their settling velocities in a fluid. (Size Separation).
11. To study the efficiency of a cyclone separator.

Subject : BTCHE 408P (BGE) **Inorganic Process Technology (Practical)**

Practical : 3 Hours No. of Credits : 2

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1. To Prepare the Crystals of Chrome alum.
2. To estimate the amount of impurities in a given sample of common salt.

3. To purify the given sample of Common salt.
4. To Prepare Mohr's salt.
5. To Prepare Cuprous Chloride .
6. To estimate the % available Chlorine in a given sample of Bleaching powder.
7. To Prepare the Crystals of Sodium Thiosulphate.
8. To analyse the pigment Red Oxide.
9. To Prepare the Crystals of Ferrous Sulphate from Kipp's apparatus waste.
10. To estimate Sulphate in a given Solution by EDTA method.
11. To estimate the amount of MnO_2 and available Oxygen in the given sample of Pyrolusite.

Subject: BTCHE 409P (BGE) **Organic Process Technology (Practical)**

Practical : 3 Hours No. of Credits : 2

University : 25 Marks College Assessment : 25 Marks

Duration of Examination : 6 Hours

LIST OF EXPERIMENTS

1. Quantitative estimation of Phenol
2. Quantitative estimation of Aniline
3. Quantitative estimation of Formaldehyde
4. Quantitative estimation of Acetone
5. Quantitative estimation of Acids
6. Preparation of Biodiesel
7. Preparation of Oxalic acid from sucrose
8. Preparation of Benzoic acid from benzamide
9. Preparation of meta-dinitrobenzene from nitrobenzene
10. Preparation of para-nitroacetanilide from acetanilide