



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Four Year B. Tech. Programme

Scheme of Teaching and Examination of B. Tech. Second Semester

(Common to all branches of Engineering)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2022-23)

S. No.	Course Code	Course Title	Hours/Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	BT201T	Mathematics-II	3	1	-	4	30	70	100	3
2	BT202T	Engineering Chemistry	3	1	-	4	30	70	100	3
3	BT202P	Engineering Chemistry	-	-	2	1	15	35	50	-
4	BT203T	Programming for Problem Solving	2	1	-	3	30	70	100	3
5	BT203P	Programming for Problem Solving	-	-	2	1	15	35	50	-
6	BT204T	Basic of Civil Engineering	3	1	-	4	30	70	100	3
7	BT205T	Basic of Mechanical Engineering	3	1	-	4	30	70	100	3
8	BT206T	Engineering Mechanics	3	1	-	4	30	70	100	3
9	BT206P	Engineering Mechanics	-	-	2	1	15	35	50	-
10	BT207P	Workshop Practices	-	-	2	1	15	35	50	-
11	BT208T	Indian Culture & Constitution (Audit)	-	-	2	-	-	-	-	-
						27			800	



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Mathematics-II

Subject code: BT201T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. To compute the function over its entire domain. It has the ability to predict the world around us.
2. Come to know about the ordinary differential equations and its applications also able to develop a mathematical model of linear differential equations. And also students learn about how to find the solution of designed model.
3. Ability to determine the shape of building constructions or length of power cable required to connect the two substations etc.
4. Vector analysis, deals with the differentiation and integration of vector field, especially in the three-dimensional Euclidean space.
5. Ability to understand the study of algebraic equations which are equations defined by a polynomial.

Unit-I

Complex Numbers:

De Moivre's theorem, roots of complex numbers; separation into real & imaginary parts of circular, hyperbolic, logarithmic & exponential function; summation of trigonometric series by C+iS method.

Unit-II

Differential Equations of higher order:

Linear differential equations of higher order with constant coefficients, method of variation of parameters; Cauchy's & Legendre's linear equations; simultaneous linear equations with constant coefficients.

Unit-III

Multiple Integrals:

Double & triple integrals, change of order of integration; Beta & Gamma functions; application to area & volume.

Unit-IV

Vector Calculus:

Vector operator ∇ ; directional derivative, gradient, divergence & curl; line, surface & volume integrals, Green's, Gauss's & Stoke's theorem (without proof) & applications.

Unit-V

Theory of Equations:

Roots of polynomial equations, relations between roots and coefficients; transformation of equations, removal of terms; solution of cubic & biquadratic equations-Cardon's & Ferrari's methods.

Text Books:

1. Higher Engg. Mathematics by B.S. Grewal (38th edition)-Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig (8th edition) – John Wiley & Sons.

Reference Books:

1. Higher algebra by H.S. Hall & S.R. Knight – A.I.T.B.S. Publishers.
2. Integral Calculus by Gorakh Prasad – Pothishala Private Limited.
3. Advanced Engg. Mathematics by R.K. Jain & S.R.K. Iyengar – Narosa Publishing House.
4. Applied Mathematics by P.N. Wartikar & J.N. Wartikar Vol. (I&II) – Pune Vidhyarthi Griha Prakashan, Pune.
5. Applied mathematics for Engineers & Physicists by Louis A. Pipes – Mc Graw Hill.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Engineering Chemistry

Subject code: BT202T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
3. Design economically and new methods of synthesis nano materials.
4. Apply their knowledge for protection of different metals from corrosion.
5. Convert solar energy into most needy electrical energy efficiently and economically to reduce the environmental pollution.

Unit-I

Water

Specifications for water, analysis of water alkalinity, hardness. Water for domestic use, water softening processes – Lime – Soda process, Zeolite and ion exchange method, boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic embitterment and corrosion, their causes and prevention, removal of silica, removal of dissolved gases, carbonate and phosphate conditioning, colloidal conditioning, calgon treatment, Numerical problems on Lime-Soda process, Zeolite and Ion exchange method.

Unit-II

Fuels: Classification, combustion and chemical principles involved in it, calorific value: gross and net calorific values and their determination by bomb calorimeter.

Solid Fuels: Proximate and ultimate analysis of coal and their importance, High and low temperature carbonization, Coke. Its manufactures by Otto Hoffman oven.

Liquid Fuels: Petroleum: its chemical composition and fractional distillation, knocking and chemical structure, octane number and cetane number and their significance, power alcohol, Analysis of flue ases by Orsat's apparatus, Numerical on calorific value, combustion, proximate and ultimate analysis of coal.

Unit-III

Corrosion: Types of corrosion (dry, wet, atmospheric, galvanic and concentration corrosion), theories of corrosion, protective measures against corrosion, factors affecting corrosion, pitting corrosion, water line corrosion, underground corrosion, stress corrosion, micro biological corrosion, corrosion fatigue.

Batteries and Battery Technology: Primary cells, secondary batteries reserve batteries, fuel cells, solar cells.

Unit-IV

Cements: Portland Cements Introduction, types of Portland Cement, methods of manufacturing (dry and wet process), properties of cement, _haracterization of constitutional compounds of cement, ISI specification.

Lubricants: Classification of lubricants and mechanisms of lubrication.

Polymers: Industrial applications of thermoplastic, thermosetting, polymers, properties and applications of the major polymers viz polyethylene, Teflon, PVC, nylon, phenol formaldehyde. Elastomers, Natural Polymers.

Unit-V

Introduction to Important Industrial Chemicals:

Industrial Method of preparation (one each), properties and major industrial uses of following chemicals: Ammonium Chloride, Ammonium Nitrate, Ammonium Sulphate, Bromine, Calcium Phosphate (Monocalcium Phosphate, Super phosphate), Chromic Acid (Chromium trioxide, Chromic anhydride), Acrylonitrile, Benzene (Benzol), Butyl Acetate, Caprolactam, Carbon Tetrachloride, Cellulose Acetate, Cresol (Cresylic Acid), Chloroform (Trichloromethane), Ether (Ethyl Ether), Ethyl Alcohol (Ethanol, Industrial Alcohol), Glycerine (glycerol), and Melamine. Explosives and Propellants: Characteristics of Explosives, Oxygen Balance, Classification of Explosives: Primary or Initiating Explosives or Detonators; Low Explosives or Propellants; High Explosives, Preparation and Applications of Explosives, Rocket Propellants, Characteristics of a Good Propellant, Classification of Propellants.

Text Books:

1. A Textbook of Engineering Chemistry by S.S. Dara (S. Chand and Company)
2. Engineering Chemistry by P.C. Jain (Dhanpat Rai publishing company)

Reference Books:

1. Chemistry in Engineering and Technology (Vol-2) by J. C. Kuriacose, J. Rajaram (Tata McGraw Hill).
2. Engineering Chemistry by M.M. Uppal, Revised by S.C. Bhatia (Khanna Publishers), Engineering Chemistry by B. K. Sharma (Krishna Prakashan).



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Engineering Chemistry Lab

Subject code: BT202P

ESE Duration: --

Max Marks:--

Minimum number of Sessional Exam to be conducted: --

Course Outcomes:

After successful completion of this course, the students should be able to:

1. To appreciate the need and importance of engineering chemistry for industrial and domestic use.
2. Students are able to estimate the impurities present in water.
3. To provide an insight into latest (R&D oriented) topics, to enable the engineering student upgrade the existing technologies and pursue further research.

List of Experiments: (All the experiments are to be performed by each student)

1. To determine the percentage composition of a mixture of Sodium Hydroxide and Sodium Chloride.
2. To determine the amount of Sodium Carbonate in the given mixture of Sodium Carbonate and Sodium Bicarbonate.
3. Determine the amount of Oxalic Acid and Sulphuric Acid/Hydrochloric Acid in one litre of solution given standard Sodium Hydroxide and Potassium Permanganate.
4. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.
5. Argentometric titration one each of Vohlard's method and of Mohr's method.
6. Complexometric Titrations Ca & Mg.
7. Determination of dissolved Oxygen in given sample of water.
8. Determination of calorific value of fuel by Bomb Calorimeter.
9. Determination of Flash Point and Fire Point of lubricant by Abels and Pensky Martin apparatus.

Text Books:

1. Laboratory manual on Engineering Chemistry by Dr. Sudha Rani (S. Chand and Company).
2. A Textbook on Experiments and Calculations in Engineering Chemistry by S.S. Dara (Dhanapat Rai Publishing Company Pvt. Ltd.).

Reference Books:

1. Vogel's Textbook of Quantitative Chemical Analysis (Latest ed.), Revised by G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney.
2. Applied Chemistry: Theory and Practice (Latest ed.), by O.P. Vermani and A. K. Narula.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Programming for Problem Solving

Subject code: BT203T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. To develop simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs & execution (in C language).
3. To implement conditional branching, iteration and recursion.
4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
5. To use arrays, pointers and structures to develop algorithms and programs.

Unit-I

Introduction to components of a computer system:

Computer System, Computer System Architecture, Software, Hardware and Firmware, Memory, processor, I/O Devices, storage, operating system, Concept of assembler, compiler, interpreter, loader and linker. Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code.

Unit-II

Introduction to HTML :

What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, and HTML Tags.

Elements of HTML :

Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit-III

Introduction to Cascading Style Sheets(CSS) :

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute selector), CSS Color, Creating page Layout and Site Designs.

Unit-IV

C Programming Basics :

Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, Fundamental data types, Variables and memory locations, Storage classes.

Unit-V

Arithmetic expressions and precedence :

Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

Conditional Branching :

Applying if and switch statements, nesting if and else, use of break and default with switch.

Iteration and loops:

Use of while, do while and for loops, multiple loop variables, use of break and continue statements.

Text Books:

1. A beginner's guide to HTML, NCSA, 14th May, 2003.
2. HTML, XHTML, and CSS Bible, 5ed, Steven M. Schafer, Wiley India.
3. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill.

Reference Books:

1. Web Technologies: HTML, Javascript, Kogent Learning, Wiley India.
2. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Programming for Problem Solving
Lab

Subject code: BT203P

ESE Duration: --

Max Marks:--

Minimum number of Sessional Exam to be conducted: --

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
2. Explain the history of the internet and related internet concepts that are vital in understanding web development.
3. Control the sequence of the program and give logical outputs.
4. Manage I/O operations in your C program.
5. Explain the uses of pre-processors and various memory models.

List of Experiments: (At least Ten experiments are to be performed by each student)

HTML

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.
3. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.
5. Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credentials.
6. Bankers Algorithm for Deadlock Avoidance.
7. Write an HTML code to illustrate the usage of the following:
 - a) Ordered List
 - b) Unordered List
 - c) Definition List
8. Write an HTML code to create a frameset having header, navigation and content sections.
9. Write an HTML code to demonstrate the usage of inline CSS.
10. Write an HTML code to demonstrate the usage of internal CSS.
11. Write an HTML code to demonstrate the usage of external CSS.

C Programming

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.

2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP to calculate the area and circumference of a circle.
4. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5=(F-32)/9$.
5. WAP that swaps values of two variables using a third variable.
6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.
10. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.

Text Books:

1. A beginner's guide to HTML, NCSA, 14th May, 2003.
2. HTML, XHTML, and CSS Bible, 5ed, Steven M. Schafer, Wiley India.
3. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill.

Reference Books:

1. Web Technologies: HTML, Javascript, Kogent Learning, Wiley India.
2. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Basics of Civil Engineering

Subject code: BT204T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Introduction to what constitutes Civil Engineering.
2. Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering.
3. Understand the concepts of Geotechnical & Transportation Engineering.
4. Understand the concepts of Hydraulic & Water Resource Engineering.
5. Identify and describe various elements of water supply, sewerage and air & noise pollution.

Unit-I

Introduction of Civil Engineering

Introduction and scope of civil engineering. Role of engineers in the infrastructure development.

General Concept Related to Building

Selection of site. Basic functions of buildings. Types of buildings-Residential, Public, Commercial and Industrial.

Principles of planning, orientation of buildings, introduction to bye –laws regarding

Building line, Height of building, open space requirement, F.S.I., Carpet area, build up area, setbacks, ventilation.

Components of Buildings

Introduction to types of loads on buildings.

Substructure- Types of soil, rocks, foundations strata, concept of bearing capacity, types of foundation and their suitability.

Super structure- Types of construction, load bearing, framed and composite.

Unit-II

Building Materials & Surveying

Introduction to basic construction materials: cement, bricks, stones, aggregates, reinforcing steels, structural glazing, And structural steel: concrete types: PCC, RCC, Pre-stressed, Precast, and Ready mix concrete.

Use of various eco-friendly materials in construction.

Surveying:

Object, Principles & Types of Surveying; Site Plans, Plans & Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols

Unit-III

Transportation & Geotechnical Engineering

Role of transportation in national development; Various modes of Transportation. Classification of Highways: Expressways, NH, SH, MDR, ODR, VR; Types of Pavements, Traffic Signs, signals, Parking System, and Causes of Accidents.

Origin of soil – Phases of soil, index properties – bearing capacity of soil – Types of foundation

Unit-IV

Hydraulic/Fluid/ Water Resource Engineering

Introduction to Hydraulic structures of storage; water conveyance systems; watershed management: Definition Necessity and methods;

Roof top rain water harvesting and Ground water recharge: relevance and methods.

Unit-V

Environment and Sustainable Development

Water supply- Sources, drinking water requirements, impurities in water and their effects; Purification of water, modern purification processes; Standards of purified water.

Waste Management:

Collection and Disposal methods of Liquid, solid and gaseous wastes. Role of Engineers in Sustainable Development. Concept of green buildings and LEED Certification.

Text Books:

1. Elements of Civil Engineering: By S.S. Bhavikatti
2. Concrete Technology: By M.S. Shetty
3. Surveying and Levelling: By Kanetkar and Kulkarni
4. Irrigation and Hydraulic Structures: By S.K. Garg
5. Water Supply and Sanitary Engineering: Including Environmental Engineering, Water and Air Pollution Laws and Ecology: G.S. Birdie, J.S. Birdie
6. Building Construction: By Sushil Kumar
7. Transportation Engineering: By Khanna & Justo
8. Building Drawing Design: By Shah and Kale
9. Construction Planning, Equipments and Methods: Robert Peurifoy, Clifford J. Schexnayder, Aavid Sharpira and Ropert Schmitt.

Reference Books:

1. Basic Civil Engineering: By Dr. B.C. Punamia, Ashok Kumar Jain, Arun Kumar Jain.
2. G K Hiraskar, (1st Edition, 2004), "Basic Civil Engineering", Dhanpat Rai Publication
3. Surveying Vol .I & II by Dr. B. C. Punamia Publication Laxmi Publication Delhi
4. Title: Surveying Vol. I and II, Author : S. K. Duggal, Publisher : Tata Macgraw hill Publication New Delhi
5. Title: Building Construction, Author: Dr. B. C. Punamia, Publisher: Laxmi Pub. Delhi
6. Title : Highway Engineering, Author: Khanna S. K. and Justo C. E.G., Publisher :Nemchand and Brothers
7. Title : Irrigation Engineering and Hydraulic Structures, Author :Santosh kumar Garg, Publisher :Khanna Publishers Delhi.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Basic of Mechanical Engineering

Subject code: BT205T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Apply basic concepts and first laws of thermodynamics to analyze thermodynamics system.
2. Apply the concepts of second law of thermodynamics and entropy to analyze thermodynamics system.
3. Define basic mechanical properties of materials & explain the theories of deformation.
4. Apply the concept of stress and strain to analyze various types of structures.
5. Manufacturing Technology (Vol. – I & II) – P.N. Rao – Tata McGraw Hill Pub. Company, New Delhi.

Unit-I

(a)Introduction to Engineering Thermodynamics-Macroscopic vs microscopic view point, Thermodynamic System, properties, process, cycle, thermodynamic equilibrium, Quasistatic Process, Zeroth Law of thermodynamics, concept of continuum. Exact & Inexact differentials. Work- electrical, magnetic, gravitational, spring and shaft work, Displacement work, flow work , free expansion, work done in various quasistatic process.

(b) First Law of thermodynamics-Joule's experiment, internal energy as property of system, first law applied to various quasistatic process, PMMI , Limitations of the First Law, control volume, Steady flow energy equation, Applications of SFEE.

Unit-II

Properties of Pure substances: Thermodynamic properties of pure substances in solid, liquid and vapor phases, Phase Transformations, dryness fraction, Triple point, critical state, p-v, p-T, T-s, h-s diagrams, p-v-T surfaces, Properties and Processes in ideal vapor, use of steam tables and Mollier diagram in determination of steam properties, energy interaction and Entropy calculations, measurement of steam quality.

Unit-III

Mechanical Properties of Materials: Stress-strain diagrams for engineering materials, Young's modulus, Yield strength, Tensile strength, Elasticity, Plasticity, Ductility, Malleability, Brittleness, Toughness, Stiffness, Hardness, Hardenability, Fatigue and Creep.

Deformation of Metals: Elastic deformation: Elastic after effect, Plastic deformation: deformation by slip (shear deformation)-Critical resolved shear stress, Deformation by twinning, Differences between slip and twinning. Dislocation theory - edge dislocation, screw dislocation. Strain hardening, Seasons cracking, Bauschinger effect, Yield point phenomena and related effects, Cold and hot working processes, Effect of cold work, recovery, recrystallization, grain growth on properties of crystalline materials.

Unit-IV

Welding: Introduction: Principle, classification based on application of filler material & without filler material, source of energy, fusing and pressure welding processes, application of welding processes. Arc welding: Principle,

power source and equipment's, welding electrodes- types' composition & specification, Metal Arc welding (MAW), flux Shielded Metal Arc Welding (FSMAW), Inert Gas Welding (TIG & MIG) Submerged Arc Welding (SAW) and Atomic Hydrogen Welding processes. (AHW). Gas Welding: Principle, Oxy-Acetylene welding, Reaction in Gas welding, Flame characteristics, Gas torch construction & working, forward and backward welding.

Unit-V

(a) Simple stress & strain: elasticity, Hooke's law, factor of safety, stress-strain diagram for ductile and brittle materials, Analysis-bar of varying sections, tapered bar, composite sections, bar of uniform strength, elongation of bar due to self-weight. Thermal stresses-composite bars.

(b) Elastic constants: Longitudinal strain, lateral strain, Poisson's ratio, volumetric strain, bulk modulus, relation between Young's modulus and bulk modulus, complementary shear stress, relation between modulus of elasticity and modulus of rigidity, stresses in the components subjected to multi-axial forces.

Text Books:

1. Engineering Thermodynamics – P.K. Nag – TMH.
2. Thermodynamics- An Engineering Approach – Cengel & Boles – McGraw Hill.
3. Elements of Strength of Material – Timoshenko & Young- EWP press.
4. Manufacturing Engineering and Technology – S. Kalpakjian & S.R. Schmid – Addison Wesley Longman, New Delhi.
5. Manufacturing Science – A. Ghosh & A.K. Mallik – East West Press Pvt. Ltd., New Delhi

Reference Books:

1. Fundamental of engineering thermodynamics- R.Yadav-CPH.
2. Strength of Materials – R.K. Rajput – Dhanpat Rai & Sons.
3. Elements of Strength of Material – Timoshenko & Young- EWP press



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Engineering Mechanics

Subject code: BT206T

ESE Duration: 3 Hr

Max Marks: 70

Minimum number of Sessional Exam to be conducted: 02

Course Outcomes:

After successful completion of this course, the students should be able to:

1. (a) Ability to understand draw the free body diagrams of mechanical components and systems, knowledge of mathematics and mechanics with logics in resolution and composition of force systems.
(b) Define and describe various parameters related to static and dynamic behavior of the rigid bodies.
(c) To understand the phenomenon of friction and ability to solve problem related to the same.
2. Ability to understand the analysis of truss and forces finding at the members.
3. Understand the different properties of surfaces in relation to moment of inertia.
4. Analyse and solve different problems of kinematics and kinetics.
5. Understand and describe physical phenomenon with help of various theories.

Unit-I

Fundamental of Engineering Mechanics:

Fundamental of Engineering Mechanics, axiom's of mechanics, resultant of concurrent force system. Moment of a force, couples, resultant of non-concurrent force system.

Equilibrium of force system:

Equilibrium of concurrent & non-concurrent force system, General numerical applications.

Friction

Static, dynamic and limiting friction, Law of limiting friction, Angle of friction, Angle of Repose, Laws of friction and its applications in solving problems on

- i) Wedge,
- ii) Belt and rope drive
- iii) Rolling friction,
- iv) Screw jack, vehicles, etc.

Unit-II

3D Force System:

Moment of a force about a point and about an axis, resultant of spatial concurrent and Non concurrent force system, wrench, Equilibrium of concurrent and non-concurrent force system.

Analysis of Plane Trusses:

Analysis of forces in structural members: Method of joint and method of section, Analytical and graphical methods, General numerical applications.

Unit-III

Properties of Surfaces:

Centre of Gravity, Second moment of area, determination of second moment of area by integration, polar moment of inertia, radius of gyration of area, Parallel axis theorem and perpendicular axis theorem; product of inertia; Moment of inertia about an inclined axis; Principle axis of moment of inertia and position of principle axis.

Virtual work method:

Virtual work principle, application of Virtual work principle.

Unit-IV

Kinematics & kinetics of the particles:

- a) D'Alembert's principle applied to bodies having linear and angular motion; Equation of dynamic equilibrium; Maximum acceleration and retardation of vehicles running on inclined planes.
- b) Principle of work and Energy: General numerical applications.
- c) Principle of Impulse and momentum: General numerical applications.

Unit-V

Collision of Elastic Bodies:

Principle of conservation of momentum, impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies.

Text Books:

1. B. Prasad : A text book of Applied Mechanics, Khanna Pub., Delhi
2. A. K. Tayal : Engineering Mechanics (Statics and Dynamics); Umesh Pub., Delhi
3. S. Tomoshenko and D.H. Youngh : Engineering Mechanics

Reference Books:

1. Engineering Mechanics: F. L. Singer, Harper & Row Publication
2. Bear F. P. & Jonston F.R. : Mechanics for Engineers; McGraw Hills
3. Engineering Mechanics (Statics and Dynamics): R.C.Hibbeler, Pearson
4. Engineering Mechanics:Meriam and Kreige ,John Wiley and sons
5. Engineering Mechanics: Basudeb Bhatyacharya , Oxford



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Engineering Mechanics Lab

Subject code: BT206P

ESE Duration: --

Max Marks:--

Minimum number of Sessional Exam to be conducted: --

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Ability to understand the equilibrium of a particle in space using principle of laws of mechanics.
2. Knowledge of the equilibrium of rigid bodies in two dimensions and in three dimensions.
3. Ability to understand the equation of motions and analyze impact of elastic bodies on collision.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To verify the Law of Polygon of Forces.
2. To obtain the Stiffness of Helical Spring.
3. To find the position of Centre of Gravity and Moment of Inertia a Connecting Rod.
4. To verify the Forces in member of a Jib Crane.
5. To obtain Velocity Ratio, Mechanical Advantage and Efficiency of a Winch Crab.
6. To obtain the efficiency of a Screw Jack.
7. To verify Newton's First Law of Motion using Inclined Plane & Rolling Cylinder.
8. To verify ratio of Tensions using Belt and Pulley Apparatus.
9. To find Coefficient of Friction Using Inclined Plane.
10. To verify the reactions in a simply supported Beam.
11. To draw Bending Moment and Shear force Diagram. Includes exercises on Force Polygon and Funicular Polygon
12. Graphical Analysis of Trusses.

Note: Students must use computers for solving problems

1. EXCEL has a very power calculation capacity.
2. AUTOCAD "CAL" is a Geometrical Calculator and very easily be used for solving problems on Vector.
3. MATHCAD makes calculations the way we write on our note books



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Workshop Practices

Subject code: BT207P

ESE Duration: --

Max Marks:--

Minimum number of Sessional Exam to be conducted: --

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Ability to design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.
2. Ability to design and model various basic prototypes in the trade of fitting such as Straight fit, V- fit.
3. Ability to make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder.
4. Ability to design and model various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint.

List of Experiments: (At least Ten experiments are to be performed by each student)

Carpentry:

Timber, Definition, Engineering Application, Types of Wood, Seasoning and Preservation, PlyWood, PlyBoards.

Practical Work: T Lap Joint End Lap Joint

Foundry:

Moulding Sands, Constituents and Characteristics, Pattern, Definition Material, Types, Core Prints, Role of Gate runner, riser, core, casting defects like blow holes & cavities.

Practical Work: Mould of any pattern Casting of simple pattern

Welding:

Welding , Brazing and soldering process and their applications. Oxy-acetylene gas welding process, Type of flame & their application. Manual & Metal arc welding technique and equipment, AC & DC welding, Constituents and functions of electrode coating, welding positions, type of weld joints, Common welding defects.

Practical Work: 1. Lap Joint by Gas Welding 2. Square butt joint Arc welding 3. Lap joint by Arc welding 4. Demonstration of brazing.

Metal Cutting:

Introduction to machining and common machining operations. Cutting tool material, Definition of machine tools, specification and block diagram of lathe, Shaper Drilling machine and grinder. Common lathe operations such as turning, parting, chamfering and facing. Quick return mechanism of shaper, Difference between drilling and boring, Files-Material classification.

Practical Work –

FITTING 1. Preparation of step cutting Job, out of 5mm thick strip. 2. Preparation of ‘V’ notch ‘V’ groove, out of 5mm thick strip. 3. Preparation of Male-Female joint out of 5 mm thick strip.

TURNING 1. Job on Lathe with one plane turning chamfering operations. 2. Job on Lathe with one step turning 3. Job on shaper for finishing two sides of a Job. 4. Drilling two holes of size 5mm and 12mm diameter on job used / to be used for shaping.

Forging:

Forging principle, Material, Operations like drawing, upsetting, bending and forge welding, use of forged parts.

Exposure to High Tech Area:

Exposure to High Tech Area like Plastic Injection Moulding, Die Casting, Diamond Cutting PCB Manufacturing, CNC manufacturing Latest Techniques in Welding etc. Should be imparted through factory visit and audio-visual means. Latest Techniques in Welding.

Text Books:

1. Chapman, W.A.J. and Arnold E., "Workshop Technology" Vol. I & III, Viva Low price student Edition, 1998.
2. Chaudhary, Hajra, "Elements of Workshop Technology" Media Promoters & Publishers, 1997.
3. Raghuwanshi, B.s., "Workshop Technology" Vol I 7 II, Dhanpat Rai and Sons 1998.



Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering

Course Title: B. Tech.

Semester: 2nd

Subject : Indian Culture & Constitution
(Audit)

Subject code: BT208T

ESE Duration: --

Max Marks:--

Minimum number of Sessional Exam to be conducted: --

Course Outcomes:

After successful completion of this course, the students should be able to:

1. Students will become aware of Indian culture and civilization and their role in development of society.
2. Student will understand industrial work culture.
3. Students will be sensitized towards professional ethics.
4. Student will understand Indian constitution and governance of the country.
5. Students will be able to understand the structure and system of work organizations.

Unit-I

Concept of culture and civilization, Vedic civilization and Indus valley civilization, introduction to Vedas, ashram system, Varna system, concept of social engineering.

Unit-II

Meaning and scope of industrial psychology and industrial sociology, recruitment, selection and training of workers, fatigue in industry, motive for work in industry.

Unit-III

Sustainable development, social charge, professional ethics, concept and styles of leadership in industry.

Unit-IV

Indian constitution and federal system, fundamental rights and directive principles of state policy, role of bureaucracy in modern society, socio-legal awareness: right to information, public interest litigation (PIL)

Unit-V

Industrial democracy, work organization: formal and informal organization, concept of power, authority and status system, industrialization, urbanization and study of slums in India.

Text Books:

1. A new look into social science- Shabbie, Sheik and dwadashiwar
2. An introduction to sociology-Vidya bhushan and sachdeva
3. Social science: the Indian scene-Yogesh atal
4. A histry of world civiliazation-J. E. Swain

Reference Books:

1. Human Resouce Development and management-Dr. A. M. Sheikh
2. The economics of sustainable development- Surender Kumar
3. Applied humanities-Rajni Tandon
4. Introduction to constitution of India-Durga das basu