Bharati Vidyapeeth Deemed University

College of Engineering, Pune- 411043

The Syllabus of the Curriculum: 2014 Course

Choice Based Credit System (CBCS)

B. TECH. MECHANICAL: SEMESTER- III

Bharati Vidyapeeth University

College of Engineering, Pune

Department of Mechanical Engineering

Vision of the Bharati Vidyapeeth (Deemed to be University) College of Engineering is:

To be a World Class Institute for Social Transformation through Dynamic Education

Missions of the Bharati Vidyapeeth (Deemed to be University) College of Engineering are:

- *To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet needs of profession & society.*
- *To provide an environment conducive to innovation, creativity, research and entrepreneurial leadership.*
- *To practice and promote professional ethics, transparency and accountability for social community, economic & environmental conditions.*

Goals of the Bharati Vidyapeeth (Deemed to be) University College of Engineering are:

- *Recruiting experienced faculty.*
- *Organizing faculty development programs.*
- *Identifying socio-economically relevant areas & emerging technologies.*
- *Constant review &up gradation of curricula.*
- *Up gradation of laboratories, library & communication facilities.*
- *Collaboration with industry and research & development organizations.*
- *Sharing of knowledge, infra-structure and resources.*
- *Training, extension, testing and consultancy services.*
- *Promoting interdisciplinary research.*

Vision of the Mechanical Engineering Department is:

To develop, high quality Mechanical Engineers through dynamic education to meet social and global challenges.

Mission Statements of the Mechanical Engineering Department are:

- *To provide extensive theoretical and practical knowledge to the students with well-equipped laboratories and ICT tools through motivated faculty members.*
- *To inculcate aptitude for research, innovation and entrepreneurial qualities in students.*
- *To acquaint students with ethical, social and professional responsibilities to adapt to the demands of working environment.*

Program Educational Objectives (PEOs) of the B. Tech. Mechanical are:

Graduates will be able,

- *To fulfill need of industry and society with theoretical and practical knowledge.*
- *To engage in research, innovation, lifelong learning and continued professional development.*
- *To fulfill professional ethics and social responsibilities.*

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. ***Engineering knowledge****: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*

2. ***Problem analysis****: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*

3. ***Design/development of solutions****: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*

4. ***Conduct investigations of complex problems****: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*

5. ***Modern tool usage****: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*

6. ***The engineer and society****: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*

7. ***Environment and sustainability****: Understand the impact of the professional engineering solutions in*

societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. ***Ethics****: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*

9. ***Individual and team work****: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.*

10. ***Communication****: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*

11. ***Project management and finance****: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.*

12. Life-long learning*: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

Statements of Programme Specific Outcomes (PSOs)

PSO1: Apply the knowledge of thermal, design, manufacturing engineering and computational sciences to solve Mechanical Engineering problems.

PSO2: Apply Mechanical Engineering principles for research, innovation and develop entrepreneurial skills.

PSO3: Apply concepts of mechanical engineering to asses' societal, environmental, health and safety issues with professional ethics.

Department of Mechanical Engineering

SOLID MECHANICS

(Course Code :- C 201)

Designation of Course	**Solid Mechanics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 04Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/Week	Unit Test	20 Marks	Theory:- 04
	Assignments	10 Marks	Practical:- 01
	Internal Evaluation	10 Marks	
	Term Work / Oral	00 Marks	
	Total	100 Marks	05

Course Prerequisites:-	Student should have knowledge of 1. Engineering Mathematics 2. Engineering Mechanics 3. Engineering Science
Course Objectives:-	To provide the knowledge of 1. To acquire basic knowledge of stress, strain due to various types of loading. 2. To draw Shear Force and Bending Moment Diagram for transverse loading. 3. To determine Bending, Shear stress, Slope and Deflection on Beam. 4. To solve problems of Torsional shear stress for shaft and Buckling for the column. 5. To apply the concept of Principal Stresses and Theories of Failure.
Course Outcomes:-	Students should be able to 1. **Understand** the concept of various types of stresses and strain developed in materials and **analyze** stress strain. 2. **Understand** the concept of principal stresses and theories of failure to **analyze** determine stresses. 3. **Understand** the concept of SFD and BMD and **evaluate** the forces acting on components. 4. **Understand** the concept of Torsional, bending and axial force acting on the shaft and **evaluate** torsional shear stress in shaft and buckling on column. 5. **Understand** the concept of Bending stresses and shear stresses and analyze bending stress distribution and shear stress distribution for various cross sections of beam. 6. **Understand** the basic concept of Design process and **apply** it to design a simple machine components

Course Contents

Unit 1	**Simple stresses & strains**	**(08 Hrs)**
Revision of Concept of stresses & strains (linear, lateral, shear, thermal & volumetric). Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus. Stress-strain diagrams for ductile & brittle		

materials. Various strengths of material- Yield strength, Ultimate tensile strength etc, Concept of 3D stress state. Interrelation between elastic constants, Proof stress & True stress & strain. Axial force diagrams, stresses and strains in determinate & indeterminate homogeneous & composite bars under concentrated loads & self weight. Temperature stresses in simple & composite members. Strain energy due to axial load (gradual, sudden & impact), strain energy due to self weight.

Unit 2	**Principal stresses & strains**	**(08 Hrs)**

Normal & shear stresses on any oblique plane. Concept of principal planes derivation of expression for principal stresses & maximum shear stress, position of principal planes & planes of maximum shear, graphical solution using Mohr's circle of stresses, combined effect of axial force, bending moment & torsional moment on circular shafts (solid as well as hollow) **Theories of elastic failure:** Maximum principal stress theory, maximum shear stress theory, maximum distortion energy theory, maximum strain theory – their applications & limitations.

Unit 3	**Shear Force & Bending Moment Diagrams**	**(08 Hrs)**

Shear forces & bending moments of determinate beams due to concentrated loads, uniformly distributed loads, uniformly varying loads & couples, relation between SF & BM diagrams for cantilevers, Simply supported beam. Maximum bending movement & positions of points of contra flexure, construction of loading diagrams & BMD from SFD & construction of loading Diagram & SFD from BMD. Slope & deflection of beams - relation between BM & slope, slope & deflection of determinate beams, double integration method (Macaulay's method), derivation of formula for slope & deflection for standard cases

Unit 4	**Torsion and Buckling of columns**	**(08 Hrs)**

Stresses, strain & deformations in determinate shafts of solid & hollow, homogeneous & composite circular cross section subjected to twisting moment, derivation of torsion equation, stresses due to combined torsion, bending & axial force on shafts .Concept of buckling of columns, derivation of Euler's formula for buckling load for column with hinged ends, concept of equivalent length for various end conditions. Limitations of Euler's formula, Rankine's formula, safe load on columns

Unit 5	**Stresses in Machine Elements**	**(08 Hrs)**

Bending stresses :

Theory of simple bending, assumptions, derivation of flexural formula, second moment of area of common cross sections(rectangular, I,T,C) with respective centroidal & parallel axes, bending stress distribution diagrams, moment of resistance & section modulus calculations.

Shear stresses :

Concept, derivation of shear stress distribution formula, shear stress distribution diagrams for common symmetrical sections, maximum and average shears stresses, shear connection between flange & web

Unit 6	**Design Process**	**(08 Hrs)**

Machine Design, Traditional design methods, Basic procedure of Machine Design, Forming Design specifications, Design for:- 1) functional requirement, 2) customer orientation 3) Safety requirement & 4) Analysis for use.

Requisites of design engineer, Design of machine elements, Sources of Design data, Use of Design data book, Use of standards in design, Selection of preferred sizes, Design Synthesis, Creativity in design. Use of internet for gathering information & Consideration of energy requirement, product life cycle & design for environment.

Design of Simple Machine parts:

Factor of safety, Service factor, Design of simple machine parts - Cotter joint, Knuckle joint and Levers, Eccentric loading , Stresses in curved beams (for circular cross-section only).

Assignments:

1. Minimum five to six theory questions on simple stresses and strains.
2. Minimum five to six problems on simple stresses and strains
3. Minimum five to six theory questions of principle stresses and strains.
4. Minimum five to six problems of principle stresses and strains.
5. Minimum five to six problems on shear force and bending moment diagrams.
6. Minimum five to six theory questions on shear force and bending moment diagrams.

7. Minimum five theory questions on torsion and deflection of beam.
8. Minimum five problems on torsion and deflection of beam.
9. Minimum five to six problems on bending stresses and shear stresses.
10. Minimum five theory questions on bending stresses and shear stresses.
11. Minimum five to six problems on design of simple machine parts.
12. Minimum five to six theory on design of simple machine parts.

Text Books/ Reference Books

1. Timoshenko & Young, Engineering Mechanics, Tata McGraw Hill Book Publishing co. Ltd. 1981.
2. James Gere, Mechanics of Materials, Thomson Learning
3. S Ramamrutham, Strength of Materials
4. V. B. Bhandari, Design of Machine Elements, Tata McGraw Hill Publication
5. J. E. Shigley, Mechanical Engineering Design, McGraw Hill

Unit Tests

Unit Test-I	Unit-I,II, III
Unit Test-II	Unit-IV, V, VI

Fluid Mechanics

(Course Code :- C 202)

Designation of Course	**Fluid Mechanics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 04Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/Week	Unit Test	20 Marks	Theory:- 03
	Assignments	10 Marks	Practical:- 01
	Internal Evaluation	10 Marks	
	Term Work / Oral	50 Marks	
	Total	150 Marks	04

Course Prerequisites:-	Student should have knowledge of 1. Basic knowledge of Fundamentals of Mechanical Engineering. 2. Basic knowledge of Physics and Engineering Mechanics. 3. Basic knowledge of Calculas.
Course Objectives:-	To provide the knowledge of 1. To provide knowledge of fluid properties and hydrostatic law 2. To teach about fluid kinematics and dynamics. 3. To provide knowledge of laminar and turbulent fluid flows 4. To explain about flow through pipes, flow over immersed bodies and dimensional analysis.
Course Outcomes:-	Students should be able to 1. **understand** the concepts of fluid kinematics and **analyze** related phenomena. 2. **understand** the concepts of fluid statics; and **analyze** related phenomena. 3. **understand** the concepts of fluid dynamics; and **analyze** related phenomena. 4. **understand** the concepts of laminar fluid flows and flow around immersed bodies; and also **analyze** related phenomena. 5. **understand** the concepts of fluid flow through pipes; and also **analyze** head losses through pipes. 6. **understand** the concepts of turbulent fluid flows, boundary layer theory and dimensional analysis; and also **analyze** related phenomena.

Course Contents

Unit 1	**Fluid Kinematics:**	**(10 Hrs)**
Types of flow- steady, unsteady, uniform, non-uniform, laminar, turbulent, One, Two and Three dimensional, compressible, incompressible, rotational, Irrotational. Stream lines, path lines, streak lines, velocity components, convective and local acceleration, velocity potential, stream function, continuity equation in Cartesian co-ordinates, flow net.		
Unit 2	**Fluid Statics:**	**(06 Hrs)**
Hydrostatic law, Pascal's law, Pressure at a point, Total Pressure, Centre of pressure, Liquid pressure on a plane(Horizontal, Vertical, Inclined) & Curved surfaces, Archimedes Principle, Buoyancy and stability of floating and submerged bodies, Metacentric height.		
Unit 3	**FluidDynamics:**	**(08 Hrs)**
Introduction to Navier-Stoke's Equation, Euler equation of motion along a stream line, Bernoulli's equation,		

application of Bernoulli's equation to Pitot tube, Venturimeter, Orifices, Orifice meter, Triangular Notch & Rectangular Notch .(Without considering Velocity of Approach)		
Unit 4	**Laminar Flow & Flow around Immersed Bodies:**	**(08 Hrs)**
Definition, relation between pressure and shear stresses, laminar flow through round pipe, fixed parallel plates. Introduction to CFD Methodology (Elementary Treatment).Lift and Drag, Classification of Drag, Flow around circular cylinder and Aerofoil, Development of lift on Aerofoil.		
Unit 5	**Flow through Pipes:**	**(08 Hrs)**
TEL, HGL , Energy losses through pipe, Darcy-Weisbach equation, Moody diagram, Minor losses in pipes, pipes in series and parallel, Syphon, Transmission of power, Water hammer in pipes ,		
Unit 6	**Turbulent Flow, Boundary Layer** & Dimensional Analysis**:**	**(08 Hrs)**
Turbulent Flow, Velocity Distribution, Development of Boundary Layer on a flat plate, Laminar and Turbulent Boundary Layers, Laminar sub layer, Separation of Boundary Layer and Methods of Controlling. Dimensions of physical quantities, dimensional homogeneity, Buckingham pi Theorem, Important dimensionless numbers, Model analysis (Reynolds, Froude and Mach).		

Assignment

1. At least Five theory questions on Fluid Kinematics.
2. At least theory questions on Fluid Statics.
3. At least Five theory questions on Fluid Dynamics.
4. At least Five theory questions on flow and flow around immersedbodies.
5. At least Five theory questions on flow though Pipes.
6. At least Five theory questions on turbulent flow.
7. At least Five numerical questions on Fluid Kinematics.
8. At least Five numerical questions on Fluid Statics.
9. At least Five numerical questions on Fluid Dynamics.
10. At least Five numerical questions on flow and flow around immersed bodies.
11. At least Five numerical questions on flow though Pipes.
12. At least Five numerical questions on turbulent flow.

Text Books/ Reference Books

1. Dr. P.N. Modi and Dr. S.M. Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard
2. Book House.
3. Dr. R.K. Bansal, "Fluid Mechanics and Hydraulic Machines – l", Laxmi Publication Pvt. Ltd., New Delhi.
4. Streeter V. L. and Wylie E. B. Fluid Mechanics McGraw Hill International Book Co.
5. Garde R. J. and Mirajgaonkar,Engineering Fluid Mechanics, Nem Chand & Bros, Roorkee, SCITECH, Publication
6. (India) Pvt. Ltd.
7. Cengel & Cimbla Fluid Mechanics, TATA McGraw-Hill.
8. Irving Shames, "Mechanics of Fluid", McGraw Hill Publication.

Unit Tests-

Unit Test-I	Unit-I, II, III
Unit Test-II	Unit- IV, V, VI

ENGINEERING THERMODYNAMICS

(Course Code :- C 203)

Designation of Course	**Engineering Thermodynamics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	03
	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	
	Term Work / Oral	50 Marks	01
	Total	150 Marks	04

Course Prerequisites:-	Student should have knowledge of 1. Fundamentals of Mechanical Engineering 2. Higher Secondary Physics 3. Engineering Mathematics
Course Objectives:-	To provide the knowledge of 1. laws of thermodynamics and their applications 2. steam generators and their performance analaysis. 3. reciprocating and rotary compressors. 4. fuels, combustion and introduce availability.
Course Outcomes:-	Students should be able to 1. **understand** concepts of second law of thermodynamics and entropy 2. **understand** construction and working of steam generators; and **analyze** their performance. 3. **apply** the knowledge of properties of steam for different vapour processes and power cycles. 4. **understand** construction and working of reciprocating air compressors and **analyze** their performance. 5. **understand** operations of rotary air compressors and **analyze** their performance. 6. **understand** the concept of availability and **analyze** exhaust gas composition.

Course Contents

Unit 1	**Second Law of Thermodynamic and Entropy:**	**(06Hrs)**
Second Law of Thermodynamics: Limitations of first law of thermodynamics, heat engine, refrigerator and heat pump, Kelvin-Planck's statement & clausius statement, equivalence of Kelvin-Planck's and clausius statements, perpetual motion machine of second kind, carnot cycle & carnot heat engine. Entropy: Entropy as a property, second law analysis for entropy, clausius inequality, principle of increase of entropy, irreversibility		
Unit 2	**Steam Generators:**	**(06Hrs)**
Classification, constructional details of process and power boiler, boiler mountings and accessories, equivalent evaporation, boiler efficiency, energy balance, boiler controls, boiler draught.		
Unit 3	**Ideal Gas and Properties of Steam and Vapour Power Cycle:**	**(06Hrs)**
Ideal Gas definition, Gas Laws: Boyle's law, Charle's law, Avagadro's Law, Equation of State, Specific Gas		

constant and Universal Gas constant, Ideal gas processes- on P-V and T-S diagrams, Formation of steam, Phase changes, Properties of steam, Use of Steam Tables, Study of P-V, T-S and Mollier diagram for steam,. Non flow and steady flow vapor processes, work transfer & heat transfer, use of P-V, T-S, H-S diagrams for steam, determination of dryness fraction, and study of calorimeters. Vapour Power Cycle: Carnot cycle using steam, ideal rankine cycle, calculation of thermal efficiency, specific steam consumption, work ratio, comparison of carnot and rankine cycle, effect of superheat.		
Unit 4	**Single Stage and Multi stage Reciprocating Air Compressor:**	**(06Hrs)**
Uses of compressed air, classification, constructional details of single stage compressor, computation of work done, isothermal work done, isothermal efficiency, effect of clearance, volumetric efficiency, FAD, theoretical and actual indicator diagrams, method of improving volumetric efficiency. Need of multi staging, multi stage compressor, work done, volumetric efficiency, condition for maximum efficiency, intercooling, actual indicator diagram.		
Unit 5	**Rotary Compressor:**	**(06Hrs)**
Introduction, classification and working principles of different types of compressors, comparison between reciprocating and rotary compressors, positive displacement and rotodynamic compressors, static and total head, work done efficiencies, surging, and choking, stalling, characteristics curves for rotodynamic compressors. selection of compressors for various applications.		
Unit 6	**Fuels and Combustion and Availability:**	**(06Hrs)**
Mass fraction, mole fraction, combustion equation, theoretical air , excess and deficient air, stoichiometric and actual air to fuel ratio, analysis of products of combustion, gravimetric and volumetric analysis and their conversions, method to determine flue gas analysis - CO, CO2, O2, HC, NOx, smoke. Availability: High and low grade energy, available and unavailable energy, loss of available energy due to heat transfer through a finite temperature difference.		

Assignments

1. At least five theory questions based on Second law of thermodynamic.
2. At least five numerical questions based on Second law of thermodynamic.
3. At least five theory questions based on cannot cycle& cannot heat engine.
4. At least five theory questions based on boiler mounting & accessories. boiler mounting & accessories.
5. At least five numerical questions based on equivalent evaporation and boiler efficiency.
6. At least five theory questions based on Ideal gas and properties of steam.
7. At least five numerical questions based on properties of steam.
8. At least five theory questions based on single stage & multistage reciprocating Air compressor.
9. At least five numerical questions based on reciprocating air compressor.
10. At least five theory questions based on rotary compressor.
11. At least five numerical questions based on rotary compressor.
12. At least five theory questions based on fuels and combustion.
13. At least five theory questions based on availability.

Term work

1. Determination of calorific value using bomb calorimeter.
2. Demonstration of exhaust gas analysis by using any commercially available test rig.
3. Test on reciprocating air compressor to determine volumetric efficiency, isothermal efficiency and FAD.
4. Determination of dryness fraction using any commercial available test rig.
5. Study of boiler mounting and accessories
6. Study of package boiler / modern boiler
7. Report on visit to any process industry, which uses boiler.
8. Performance test on rotary air compressor/ blower.
9. Trial on boiler to determine boiler efficiency, equivalent evaporation and energy balance sheet.
10. Study of rotary type positive displacement compressor.

Text Books

1. P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications
2. P. L. Ballany, Thermal Engineering, Khanna Publications
3. V. P. Vasandani and D. S. Kumar, Heat Engineering Metropolitan book Company, New Delhi
4. R.K.Rajput, Engineering Thermodynamics, EVSS Thermo Laxmi Publications
5. Y. Cengel & Boles, Thermodynamics -An engineering approach, Tata McGraw Hill Publications
6. Kothandarman & Domkundwar, Thermodynamics & Heat Engines
7. Rayner Joel, Engineering Thermodynamics, ELBS Longman
8. Hawkins G. A., "Engineering Thermodynamics", John Wiley and Sons.

Unit Tests-

Unit Test-I	Unit-I,II ,III
Unit Test-II	Unit-IV,V,VI

Engineering Mathematics -III

(Course Code :- C 204)

Designation of Course	**Engineering Mathematics -III**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	03
	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	
	Total	100 Marks	03

Course Prerequisites:-	Student should have knowledge of 1. Student should have Basic Knowledge of differential and Integral calculus 2. Student should have Basic Knowledge of statistics and Probability
Course Objectives:-	To provide the knowledge of 1. Effectively formulate mathematical model using PDE 2. Analyze numerical data using statistical methods 3. Obtain z- score of normal distribution
Course Outcomes:-	Students should be able to 1. **Understand** the mathematical modeling of systems using differential equations and ability to solve linear differential equations with constant coefficient. imaginary points using argand diagram. 2. **Understand** the concepts of Laplase Transform and **Apply** to formulate mathematical model using PDE. 3. **Understand** various forms of Partial differential equation 4. **Understand** Statistical methods and **Apply** to analyze the numerical data 5. **Understand** the concept of Correlation and Regression coefficient. 6. **Understand** the concept of Normal distribution

Course Contents

Unit 1	**Linear Differential Equations (LDE):**	**(06Hrs)**
LDE with constant coefficients, Method of variation of parameters, Homogeneous Equations, Cauchy's and Legendre's DE. Simultaneous & Symmetric Simultaneous DE. Application to mechanical systems.		
Unit 2	**Transforms:**	**(06Hrs)**
Laplace Transform (**LT**): LT of standard functions, properties and theorems, Inverse LT, method of finding Inverse LT , Application of LT to solve LDE. Fourier Transform (**FT**): Fourier Integral theorem, Fourier transform Fourier Sine &Cosine transform, Inverse Fourier Transform.		
Unit 3	**Partial Differential Equations (PDE):**	**(06Hrs)**
Basic concepts, modeling: Vibrating String, Wave equation. Method of separation of variables, Use of Fourier series, Heat equation: one and two dimensional heat flow equations, Solution by Fourier Transforms, modeling of two dimensional wave equation		
Unit 4	**Measures of central value:**	**(06Hrs)**
Arithmetic mean , median and mode, geometric mean and harmonic mean, dispersion, mean deviation, standard deviation, skeweness, Moments and kurtosis.		

Unit 5	Correlation and Regression:	(06Hrs)
Significance of the study of correlation, types of correlation, coefficient of correlation, difference between correlation and regression . Regression euations, standard error of estimate.		
Unit 6	**Probability and Distribution :**	**(06Hrs)**
Basics of probability, conditional probability, bayes theorem, mathematical expectations, random variable and Binomial, Poisson , normal probability distribution. Testing of hypothesis- Z test, chi square test and goodness of fit, F test.		

Assignment

1. At least Five numerical questions on Linear Differential Equations
2. At least Five numerical questions on Transforms.
3. At least Five numerical questions on Partial Differential Equations
4. At least Five numerical questions on Measures of central value
5. At least Five numerical questions on Correlation and Regression
6. At least Five numerical questions on Probability and Distribution

Text Books

1. Advanced Engineering Mathematics by Peter V. O'Neil (Cengage Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).
3. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
5. S. P. Gupta: statistical methods- schand and sons.
6. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
7. Applied Mathematics (Volumes I and II,III) by P. N. Wartikar& J. N. Wartikar (Pune VidyarthiGrihaPrakashan, Pune).

Unit Test

Unit Test-I	Unit-I,II ,III
Unit Test-II	Unit-IV,V,VI

COMPUTER PROGRAMMING & SIMULATION

(Course Code :- C 205)

Designation of Course	**Computer Programming & Simulation**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory : 03
Practical:- 02 Hours / Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	
	Term Work / Oral	50 Marks	Practical:-01
	Total	150 Marks	04

Course Prerequisites:-	Student should have knowledge of 1. Engineering Mathematics II
Course Objectives:-	To provide the knowledge of 1. To provide the fundamental knowledge of modeling, system and simulation 2. To provide the knowledge of monte carlo methods of simulation 3. To provide knowledge of random variable and distributions 4. To provide knowledge of time and event based simulation with real life applications
Course Outcomes:-	Students should be able to 1. **Understand** the fundamental knowledge of Programming, modeling, system and simulation 2. **Understand** monte carlo methods of simulation and **apply** them in real life problems 3. **Understand** concept of random variable, distributions and **apply** them in probalistic engineering models 4. **Understand** concepts of time based simulation and **apply** them in real life problems 5. **Understand** concepts of event based simulation and **apply** them in real life problems 6. **Understand** concept of simulation experiments

Course Contents

Unit 1	**Concept of System and Type of Models**	**(08 Hrs)**
Physical model, Mathematical model, Types of mathematical model, Dynamic Versus Static Models, Continuous-Time Versus Discrete-Time, Dynamic Models, Quantitative Versus Qualitative Models, Mechanical system modeling examples.		
Unit 2	**Concept of Simulation**	**(08 Hrs)**
Simulation Basics, When Simulation Is the Appropriate Tool, when Simulation Is Not Appropriate, Advantages and Disadvantages of Simulation, Areas of Application, Steps in a Simulation Study Simulation and analytical methods, Basic nature of simulation, The simulation process, Types of system simulation, Generation of random numbers .Monte Carlo Simulation.		
Unit 3	**Probability Used in Simulation**	**(08 Hrs)**
Basic Probability Concepts, Discrete Random Variable, Expected Value and Variance of a Discrete Random Variable, Measure of Probability Function, Continuous Random Variable, Exponential Distribution, Mean and Variance of Continuous Distribution, Normal Distribution.		

Unit 4	Continuous an Discrete Systems Simulation	(08 Hrs)
Introduction, Simulation of Pure pursuit problem, exponentional growth model, simulation of water reservoir system, Trajectory simulation, suspension system, simulation of pendulum.		
Unit 5	**Simulation of Queuing Systems and Inventory Systems and inventory systems**	**(08 Hrs)**
Discrete Simulation, Continuous System Simulation. Simulation of Queuing Systems, Inventory Control Models		
Unit 6	**Design of Simulation Experiments**	**(08 Hrs)**
Introduction, development of simulation experiments, principles of verification, validation and accreditation, Simulation experimentation, classical experimental design, validation of simulation experiments, evaluation of simulation experiments. Simulation Languages		

Term work

Following assignment using MATLAB

1. Creating a One-Dimensional Array (Row / Column Vector) Creating a Two-Dimensional Array
2. Performing matrix manipulations – Concatenating, Indexing, and Sorting Normal Distribution
3. Simulation of water reservoir system
4. Trajectory simulation
5. Suspension system
6. Simulation of pendulum
7. Simulation of any one Discrete Simulation, Continuous System Simulation, Simulation of Queuing Systems, Inventory Control Models.

Assignments

1. At least five theory questions on basics of simulation.
2. At least five theory questions on Monte-Carlo simulation.
3. At least five theory questions on various distributions.
4. At least five simulation questions on various continuous models.
5. At least five simulation questions on various discrete models.
6. At least five theory questions on advanced simulation and simulation language.
7. At least five numerical questions on Monte-Carlo simulation.
8. At least five numerical questions on various distribution
9. At least five numerical questions on various continuous models.
10. At least five numerical questions on various discrete models.
11. At least five MATLAB programs on continuous models.
12. At least five MATLAB programs on discrete models.

Text Books/ Reference Books

1. Robert E. Shannon, “System Simulation The art and science”, Prentice Hall, New Jersey, 1995.
2. D.S. Hira, “System Simulation”, S. Chand and company Ltd, New Delhi, 2001.
3. Geoffrey Gordon, System Simulation; Prentice Hall.
4. Robert E. Shannon ; System Simulation: The Art and Science ;Prentice Hall
5. J. Schwarzenbach and K.F. Gill Edward Arnold; System Modelling and Control
6. M Close and Dean K. Frederick; Modeling and Analysis of Dynamic Systems ;Houghton Mifflin

Unit Tests-

Unit Test-I	Unit-I,II
Unit Test-II	Unit-III,IV

PROFESSIONAL SKILLS DEVELOPMENT-III

(Course Code :- C 206)

Designation of Course	**Workshop Technology**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 4 Hours/ Week	End Semester Examination	100 Marks	Theory: 04 Practical: 00
Practical:- -- Hours/ Week	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
	Term Work	-- Marks	
	Total	100 Marks	04

Course Prerequisites:-	Student should have knowledge of 1. Knowledge of basic Math and reasoning 2. Awareness of phrasal verbs 3. Basic knowledge of writing techniques taught to them in the earliear semester 4. Basic knowledge of self awareness 5. Awareness about leadership skills and presentation skills
Course Objectives:-	To provide the knowledge of 1. To develop students' skills in aptitude and reasoning whereby enhancing employability skills. 2. To flourish the skills of learning advance vocabulary and use them for professional communication 3. To promote grooming skills in graduates and make them competent to excel in business communication and presentation
Course Outcomes:-	Students should able to understand 1. **Understand** short tricks of the aptitude and reasoning and **apply** them in recruitment and competitive examinations 2. **Understand** the advance idioms, phrases and **apply** them to present themselves with finesse for corporate ventures 3. **Understand** the process conversion of thoughts and ideas into written communication in an effective coherent and logical way 4. **Understand** the self appraisal process and **apply** the techniques of SWOT to accelerate conversion of weaknesses into strengths 5. **Understand** the kinds of leaderships and **apply** them to groom themselves into potential leader 6. **Understand** the trick and techniques of power point presentation and **apply** them in designing an effective business presentation

Course Contents		
Unit I	**Aptitude (Maths, Logical Reasoning, English)**	**(18 Hours)**

	• Maths ▪ Enjoy maths + Number system ▪ Number system ▪ Percentage, profit and loss • Logical Reasoning ▪ Coding, Decoding, Number series, ▪ Blood relation Directions, cubes & dices • English ▪ Vocabulary-1 ▪ Confusing words-1(Homonyms)	
Unit II	**Essential Grammar - III**	**(6 Hours)**
	• Idioms and phrases • Usage of Idioms & phrases in daily conversation • Activities • Academic word list- Words to be used in business communication	
Unit III	**Written Communication- II**	**(4 Hours)**
	• Essay writing • Mnemonics to develop ideas and write essays • Structure of essays • Technical writing • Report writing	
Unit IV	**SWOT Analysis**	**(6 Hours)**
	• Introduction to SWOT • Importance to SWOT • Individual & Organizational SWOT Analysis • Identifying strengths, weaknesses, threats & opportunities • Short term goals& Long term goals, Career planning	
Unit V	**Interpersonal Skills - III**	**(4 Hours)**
	• Introduction to leadership skills • Importance of leadership skills • Types of leadership skills • Are leaders born or made?	
Unit VI	**Presentation Skills**	**(4 Hours)**
	• Introduction to PowerPoint presentation • Structure & flow of presentation • Importance of body language • Presentation by students-evaluation& feedback by trainers	

Text Books/ Reference Books

1. **APAART:** Verbal Ability.
2. **APAART:** Logical Reasoning.
3. **APAART:** Quantitative Aptitude.
4. **APAART:** Speak Well 1 (English Language and Communication).
5. **APAART:** Speak Well 2 (Soft Skills).
6. **APAART:** Verbal Ability

PRODUCTION PRACTICE-II

(Course Code :- C 207)

Designation of Course	**Production Practice-II**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- -- Hours/ Week	End Semester Examination	-- Marks	
	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
Practical:- 4 Hours/ Week	Term Work	50 Marks	Practical:- 01
	Total	50 Marks	01

Course Prerequisites:-	Student should have knowledge of 1. Basic knowledge of Engineering Graphics 2. Basic knowledge of workshop Technology and Production practice I
Course Objectives:-	To provide the knowledge of 6. To acquire the skills of TIG/MIG and arc welding process. 7. To acquire the skills of pattern making. 8. To acquire the skills of sand testing. 9. To acquire the skill of sand moulding.
Course Outcomes:-	Students should able to understand 1. **Understand** the TIG, MIG and arc welding processes and **apply** for welding joints. 2. **Understand** the pattern making operations to **create** the patterns using wood turning operation. 3. **Understand** the different core making practices and **apply** them in pattern making. 4. **Understand** the properties of sand by caring out sand testing and **apply** them for sand molding processes. 5. **Understand** the sand moulding processes and **create** a sand mould. 6. Apply the moulding process to **create** the sand casting.

Course Contents

Term Work

Each candidate shall be required to complete and submit the following jobs:

1. Welding-TIG / MIG OR Arc Welding (One Job)
2. Pattern making: A solid pattern consisting of wood turning or a core box. (One Job)
It should follow the colour code in pattern making..
3.Sand Testing.(Any Two)
3.Sand Moulding.. (One Job)

Note

Practical examination of 3 hours duration based on above term work will be
Conducted at the end of semester.