

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

SCHEME OF TEACHING AND EXAMINATION

B.E. VIII SEMESTER MECHANICAL ENGINEERING

S. No.	Board of Study	Sub. Code	SUBJECT	PERIODS PER WEEK			SCHEME OF EXAM Theory/Practical			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Mech. Engg	337831(37)	Robotics	4	1	-	80	20	20	120	5
2.	Mech. Engg	337832(37)	Finite Element Methods	4	1	-	80	20	20	120	5
3.	Mech. Engg	337833(37)	Industrial Engineering & Management	4	1	-	80	20	20	120	5
4	Refer Table - III		Professional Elective-III	4	1	-	80	20	20	120	5
5	Refer Table - IV		Open Elective-IV	4	1	-	80	20	20	120	5
6	Mech. Engg	337861(37)	Robotics Lab	-	-	2	40	-	20	60	1
7	Mech. Engg	337862(37)	Finite Element Methods Lab	-	-	2	40	-	20	60	1
8	Mech. Engg	337863(37)	Industrial Engineering & Management Lab	-	-	2	40	-	20	60	1
9	Mech. Engg	337864(37)	Major Project	-	-	6	100	-	80	180	3
10	Mech. Engg	337865(37)	Report Writing & Seminar	-	-	2	-	-	40	40	1
11			Library	-	-	1	-	-	-	-	-
Total				20	5	15	620	100	280	1000	32

L – Lecture,

ESE – End Semester Exam,

T – Tutorial,

CT – Class Test,

P – Practical,

TA – Teacher’s Assessment

**Table – III
Professional Elective - II**

S.No.	Branch	Subject Code	Subject
1	Mechanical	337841(37)	Mechatronics
2	Mechanical	337842(37)	Vibration & noise control
3	Mechanical	337843(37)	Optimization Techniques
4	Mechanical	337844(37)	Computational Fluid Dynamics
5	Mechanical	337845(37)	Soft Computing Techniques
6	Mechanical	337846(37)	Environment Pollution & Control
7	Mechanical	337847(37)	Mechanical Handling System & Equipments

Note: (1) 1/4th of total strength of students subject to minimum strength of 20 students is required to offer and elective in the college in a particular academic session.

Note: (2) Choice of elective course once made for an examination cannot be changed in future examinations.

Table - IV

Open Elective –IV		
S.No. Board of Studies	Code	Name of Subject
1 Management	300851(76)	Enterprise Resource Planning
2 Information Technology	300852(33)	E-Commerce & strategic IT
3 Management	300853(76)	Technology Management
4 Information Technology	300854(33)	Decision Support & Executive Information system
5 Computer Science & Engg.	300855(22)	Software Technology
6 Management	300856(76)	Knowledge Entrepreneurship
7 Management	300857(76)	Finance Management
8 Management	300858(76)	Project Planning, Management & Evaluation
9 Mechanical Engg.	300859(37)	Safety Engineering
10 Computer Science & Engg.	300801(22)	Bio Informatics
11 Mechanical Engg.	300802(37)	Energy Conservation & Management
12 Nanotechnology	300803(47)	Nanotechnology
13 Management	300804(76)	Intellectual Property Rights
14 Mechanical Engg.	300805(37)	Value Engineering
15 Civil Engg.	300806(20)	Disaster Management
16 Civil Engg.	300807(20)	Construction Management
17 Civil Engg.	300808(20)	Ecology and Sustainable Development
18 Chem. Engg.	300809(19)	Non Conventional Energy Sources
19 Electrical Engg.	300810(24)	Energy Auditing and Management
20 Mechanical Engg.	300811(37)	Managing Innovation & Entrepreneurship
21 Information Technology	300812(33)	Biometrics
22 Information Technolgy	300813(33)	Information Theory & Control
23 Computer Science & Engg.	300814(22)	Supply Chain Management
24 Computer Science & Engg.	300815(22)	Internet & Web Technology
25 Electrical Engg.	300816(24)	Electrical Estimation and Costing
26 Electrical& Electronics Engg.	300817(25)	Non Conventional Energy Sources

Note (1)-1/4th of total strength of students subject to minimum

Note -1/4th of total strength of students is required to offer an elective in the college in a particular academic session.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Robotics**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337831(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To acquire the knowledge of basics of robotics and their importance.
- Understand fundamental theory of robot design.
- To acquire the knowledge on advanced algebraic tools for the description of motion.
- To develop the ability to analyze and design the motion for articulated systems.
- To acquire the knowledge of sensors, actuators and vision system used in robotics.

UNIT – I : Introduction

Fixed & flexible automation, evolution of robots and robotics, laws of robotics, progressive, advancement in robots, manipulator anatomy, arm configuration & work space, human arm characteristics, design and control issues, manipulation and control, actuators, sensors and vision, programming of robots, applications – material handling, processing applications, assembly applications, inspection applications etc, the future prospects, notations.

UNIT – II : Coordinate Frames, Mapping and Transforms

Coordinate frames, description of objects in space, transformation of vectors, inverting a homogeneous transform, fundamental rotation matrices. mechanical structure and notations, description of links and joints, kinematic modeling of the manipulator, Denavit – Hartenberg notation, kinematic relationship between adjacent links, manipulator transformation matrix.

UNIT – III : Kinematic Modeling of Robots

Position analysis - direct and inverse kinematic models of robotic manipulators, various examples. velocity analysis – Jacobian matrix, introduction to inverse kinematic model.

UNIT – IV : Robotic Sensors and Vision

Introduction regarding sensing technologies, sensors in robotics, classification, characteristics, internal sensors – position, velocity, acceleration sensors, force sensors, external sensors – proximity, touch and slip sensors. robotic vision, process of imaging, architecture of robotic vision systems, image acquisition, components of vision system, image representation, image processing.

UNIT – V : Motion Planning and Control of Robot Manipulators

Trajectory planning of robotic manipulator: joint space and Cartesian space techniques. open and close loop control, linear control schemes, examples of control models.

Robot applications

Industrial applications, material handling, processing applications, assembly applications, inspection application, principles for robot application and application planning, justification of robots, robot safety, non-industrial applications, robotic application for sustainable development.

Text Books:

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications.
2. Introduction to Robotics Analysis, Systems Applications - Saced B. Niku, Pearson

Reference Books:

1. Principle of Robot Motion- Choset – PHI, Delhi
2. Kinematics and Synthesis of linkages – Hartenberg and Denavit – McGraw Hill.
3. Robotics Control Sensing - Vision and Intellgence – K.S. Fu, McGraw Hill.
4. Robotic Engineering – An Integrated Approach - R.D. Klafter – PHI. Delhi.
5. Introduction to Robotics - S.K. Saha – Mc Graw Hill.
6. Introduction to Robotics – Mechanics and Control - John J. Craig

Course Outcomes:

- Apply knowledge of robotics for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development robots
- Demonstrate creativeness in designing and development of robotics.
- Identify, analyze and design of robots useful to the society.
- Work effectively with multidisciplinary robots.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Finite element methods**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337832(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course objective

- Understand the fundamental concepts of FEM.
- Understanding the use and knowledge of fundamental stiffness matrix.
- Know the behaviour and usage of each type of elements covered in this course.
- Be able to prepare a suitable FE model for structural mechanical analysis problems.
- Can interpret and evaluate the quality of the results
- Be aware of the limitations of the FEM.

Unit-I : Formulation of Finite Element Equation starting from governing differential equation, Domain residual and minimization, Weighted residual method, Weak form of weighted residual method, solution of weak form using trial function, piecewise continuous trial function solution, formulation of one dimensional bar element using weak form of weighted residual element

Minimization of potential energy, Rayleigh-Ritz method, Piece-wise continuous trail function, finite element form of Rayleigh-Ritz method, finite element formulation derived from a functional, formulation of bar element and heat transfer element using Rayleigh-Ritz method

Unit-II : One dimensional finite element analysis, generic form of total potential for one dimensional case, determination of shape functions for linear bar finite element and quadratic bar finite element, stiffness matrix, one dimensional problems of structure mechanics and heat conduction

Unit-III : Stiffness matrix formulation for beam and frame element, Determination of shape functions and element matrices, Application problems

Unit-IV : Two dimensional finite element analysis, simple three node triangular elements, four node rectangular element, six node triangular element, natural coordinates, coordinate transformation, simple two dimensional problems, Gauss Quadrature Technique

Unit-V : Finite element analysis for plane stress and plane strain problem, Strain displacement matrix for 2-D elements, two-dimensional integrals. Application problems, Scalar field problems including heat conduction and flow problems.

TEXT BOOKS

1. Textbook of Finite Element Analysis – Seshu P – Prentice Hall of India.
2. Fundamentals of Finite Element Analysis - David Hutton – TMH, Delhi

REFERENCE BOOKS

1. Finite Element Method: Basic concepts & Applications- Alavala – PHI, Delhi
2. Finite Element in Engineering - T.R. Chandrupatla and Belegundu, Pearson, Singapore
3. Concepts and Applications of Finite element analysis - Cook, Robert – John Wiley
4. The Finite Element Method, A Practical Course - Liu and Quek. – McGraw Hill
5. The Finite Element Method in Engineering - S.S. Rao.
6. An Introduction to the Finite Element Method – J.N. Reddy – TMH, Delhi
7. Finite Element Method – Zienkiewicz. O C - TMH, Delhi
8. Finite Element Analysis: Theory And Programming – Krishnamoorthy C.S.- TMH, Delhi
9. Finite Element Procedure – K.J.Bathe – Prentice Hall of India
10. A First Course in The Finite Element Method – Logan – Cengage Learning

Course Outcome

- Apply knowledge of finite element method for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts finite element method in the analysis of structural and thermal systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Industrial Engineering & Management**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337833(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To impart capability of successfully planning, controlling, and implementing projects.
2. Understand and apply the principles of maths, science, technology and engineering, involving industry-relevant problems.
3. Contribute to the profitable growth of industrial economic sectors by using IE analytical tools, effective computational approaches, and systems thinking methodologies.
4. Maintain high standards of professional and ethical responsibility.
5. Flourish and work effectively in diverse, multicultural environments emphasizing the application of teamwork and communication skills.
6. Practice life-long learning to sustain technical currency and excellence throughout one's career.

Unit-I : Introduction

History & development, objective, place of Industrial Engineering in an organization, relation with other department, system approach

Plant Location

Need for a suitable location, Plant location problems factors affecting location, quantitative method for evaluation of plant location.

Plant Layout

Objective & Principles, factors affecting layout, types of layout.

Unit-II : Work Study

Purpose, objectives and applications of work study, Productivity and work study.

Method Study

Introduction, procedure, flow process charts, Multiple activity chart, motion economy principles, Therbligs, cycle graph and chronocyclegraph.

Work Measurement

Definition, types, Time Study- selection & timing the job, rating, allowances, Numerical on Normal and standard time calculation.

Unit-III : Job Evaluation and Merit Rating

Definition, objectives, methods.

Wages and Incentives

Terminology, characteristics, factors, types of incentives, wage incentive plan, Rowan plan, Taylor's differential piece rate system, Emerson's efficiency plan, Halsey's 50-50 plan, Bedaux plan, Group task & Bonus system.

Unit-IV : Basic concepts and Functions of management

Nature, Purpose and Objectives of basic functions of management, Authority and Responsibility, social responsibility of manager, ethics and management.

Human Resource Management

Nature and Scope of Human Resource Planning, Recruitment and Selection, Training and Development, Career Growth, Grievances, Motivation – needs and types, Maslow hierarchy of needs theory, Herzberg two factor theory, Need-want-satisfaction chain, Quality of working life, job enrichment and job enlargement.

Unit-V :

Marketing Management

Marketing Environment, Marketing Mix, Advertising and Sales Promotion, Channels of Distribution.

Financial Management

Book keeping, financial statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.

TEXT BOOKS

1. Industrial Engineering and Production Management -Martand Telsang - S.Chand.
2. Industrial Engineering & Management - S. Dalele & Mansoor Ali - Standard Publishers.

REFERENCE BOOKS

1. Industrial Engineering & Management ,A new perspective- Philip E Hicks - Mcgraw Hill
2. Company Essential of Management - H. Koonz and H. Wehrich – Mcgraw Hill
3. Marketing Management- Kotler Philip- Prentice Hall of India
4. Flexibility in Management - Sushil, Vikas publication - New Delhi
5. Human Resource Management - Luthans Fred - McGraw Hill, Inc.
6. Financial Management - M.Y. Khan and P.K. Jain - Tata Mc-Graw Hill
7. Fundamentals of Business Organizations and Management -Y.K. Bhusan - S. Chand
8. Industrial Management - K.K. Ahuja - Khanna Publishers
9. Introduction of work study - ILO, Geneva - Universal Publishing Corporation, Bombay
10. Motion and Time Study - Ralph M. Bannes - John Wiley & Sons
11. Work Study and Ergonomics - H.S. Shan - Dhanpat Rai & Sons

Course Outcomes:

- Ability to apply mathematics and science in Industrial engineering.
- Ability to design and conduct experiments, as well as to analyze and interpret data
- Ability to identify, formulate, and solve engineering problems
- Ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice
- Ability to design, develop, implement and improve integrated systems that include people, materials, information, equipment, and people

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Mechatronics**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337841(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To acquire the knowledge of basics of mechatronics and their scope.
- To acquire the knowledge of sensors and transducers.
- Understand fundamental of hydraulic and electrical actuators.
- To acquire the knowledge of data acquisition system and control system.
- To develop the ability to analyze and design mechatronics system.

UNIT – I : Introduction about Mechatronics, scope of Mechatronics, application, process control automation and N/c Machines.

UNIT – II : Sensors and Transducers

Introduction, classification, specification, characteristics of transducers, type of transducers displacement, strain, vibration pressure, flow, temperature, force & torque, tactile.

UNIT – III : Hydraulic Pneumatic & Electrical actuators

Pumps & Compressors, control valves & accessories, actuators, fluid power symbols, fluid power systems, switching devices, solenoids, motors.

UNIT – IV : Data Acquisition and Control System

Introduction, Quantizing theory, Analog to Digital Conversion, Digital to Analog (D/A) conversation, transfer function, transient response & frequency response & frequency response, stability criteria.

UNIT – V : Design of Mechatronics systems

Introduction, Automatic front and back and cutting in steel rolling mill, lift control system, CNC lathe, temperature control of a heat treatment furnace, EOT crane control panel, Grey grain separators, electrode arm control in electric arc furnace.

TEXT BOOKS

1. Mechatronics – N. Shanmugam – Anuradha Agencies
2. Mechatronics – HMT Limited – Tata McGraw hill, New Delhi

REFERENCE BOOKS

1. Mechatronics - Singh and Joshi – PHI New Delhi
2. Mechatronics :A Multi Disciplinary Approach– W. Bolton – Pearson Education - Singapore
3. Mechatronics System Design - Shetty D, Kolk Ra – PWS Publications, Boston
4. Mechatronics - Kamm, Lawrence J – Prentice Hall Of India
5. Mechatronics & Measurement Systems – Alciator David & Histan Michael – TMH Dehi
6. Mechatronics - Necsulescu D – Pearson, Singapore
7. Mechatronics Source Book – N.C.Braga – Cenegage Learning, Delhi
8. Mechatronics System Design – Devdas Setty & Richrd Kolk - Cenegage Learning, Delhi
9. Analytical Robotics and Mechatronics - Stadler W – McGraw Hill, New Delhi
10. Mechatronics: Electronics in Products & Processes- Bradley, D A; Dawson, D And Burd, N C Loader, A J - Taylor And Francies - Boca Raton

Course outcomes:

- Apply knowledge of mechatronics for understanding and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of mechatronics in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analyze and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

Chhattisgarh Swami Vivekanand Technical University, Bilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Vibration & Noise Control**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337842(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objective:

- Introduce students to the Fundamentals of vibrations.
- Introduce students how to mathematical model the vibration and acoustics system.
- Introduce students to vibration system with single degree of freedom
- Introduce students to vibration system with multi-degree of freedom
- Enable students to analysis and measurements of sound.
- Introduce students to the noise and noise control.

UNIT- I : Fundamentals of vibrations

Simple harmonic motion, combination of two simple harmonic motions, beats, Fourier analysis Single degree of freedom system: Free un-damped vibrations: Equivalent systems linear and torsional, natural frequency estimation, energy methods
Damped vibrations : Damping models, structural, coulomb, and viscous damping, critically, under and over-damped system, logarithmic decrement

Forced vibrations : Harmonic excitation, support motion, vibration isolation, critical speeds of shafts in bending

UNIT- II : Two degree of freedom system

Free vibrations of spring coupled system, general solution, torsional vibrations, two degree of freedom mass coupled system, bending vibrations in two degree of freedom system, forced vibrations of an undamped two degree of freedom system, dynamic vibration absorber, forced damped vibrations

UNIT- III : Multi-degree of freedom system

Free un-damped analysis.

Numerical methods: Dunkerley's, Rayleigh, Holzer methods.

Experimental methods in vibration analysis:

Vibration measurement devices and analyzers, balancing of rigid rotors

UNIT- IV :Analysis and measurement of sound

One dimensional wave in a gas, sound perception and the decibel scale, the ear, combining sound levels in decibels, octave bands, loudness, weightings, directionality of acoustic sources and receivers, directivity index

UNIT- V : Noise control

Noise criteria, sound absorption and insulation, noise barriers, acoustic enclosures, silencers

TEXT BOOKS

1. Mechanical Vibrations –Thomson W T- Prentice Hill of India
2. Theory & Practice of Mechanical Vibrations – J.S. Rao, Gupta - New Age International.

REFERENCE BOOKS

1. Mechanical Vibrations and Noise Engineering – A G Ambekar – PHI, Delhi
2. Mechanical Vibrations – G.K. Grover - S. Chand & CO.
3. Acoustics for Engineers - Turner & Pretlove - Macmillan
4. Acoustics and Noise Control - Smith, Peters & Owen - Addison-Wesley-Longman.
5. Industrial Noise Control: Fundamentals and Applications - Bell and Bell, Marcel-Dekker
6. Vibration And Noise For Engineers – Kewal Pujara – Dhanpat Rai, Delhi
7. Environmental Noise Pollution and its Control – G R Chhatwal – Anmol Publications, Delhi
8. Noise Pollution and Control – Singal S P – Narosa Publications, Delhi
9. Mechanical Vibrations and Noise Controls – Sadhu Singh – Khanna Publisher, New Delhi
10. Fundamentals of Noise and Vibration - Fahy FJ, Walker JG - E&Fnspon – New York

Course Objectives:

- Apply knowledge of Vibration & Noise Control for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Optimization Techniques**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337843(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

This course aims to introduce students to use advanced quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems.

UNIT – I : Optimization Technique

Classification of optimization, problems, single variable and multivariable optimization with equality constraints and Inequality constraints. Convex programming problem.

UNIT – II : Linear Programming - II

Duality in Linear programming, dual simplex method, decomposition principle, sensitivity analysis, quadratic programming, changes in cost coefficient, golden section method.

UNIT – III : Non-Linear Programming – I

Rate of convergence, Design variables, Random search methods, Chrivariate methods, Powell's method, Newton's method, Marquard Method, Test function.

UNIT – IV : Geometric Programming

Unconstrained minimization problem, primal dual relationship, geometric programming with mixed Eerie quality, application and complementary function.

UNIT- V : Dynamic Programming

Multistage Decision processes. principles of optimality, continuous dynamic programming.

TEXT BOOKS

1. Optimization Techniques – C.S. Rao – Dhanpat Rai & Sons, New Delhi
2. Optimization methods for Engineering Design – R.L. Fox - Addison Wesley

REFERENCE BOOKS

1. Engineering Optimization Theory and Practice – S.S. Rao – New Age Publishers.
2. Introduction to optimum Design – J.S. Arora – Mc. Grawhill publishers
3. Optimization Methods for Engineering – Raju – PHI, Delhi
4. Foundation of Mathematical optimization – Pallaschke – Kluwer Academic Publishers
5. Optimization Methods in Operations Research and System Analysis–K V Mittal–Wiley, Delhi
6. Engineering Optimization: Theory And Practice - Singiresu S Rao – New Age
7. Optimization For Engineering Design- Deb, Kalyanmoy-Prentice Hall
8. Optimization Methods – Mohan & Deep- New Age, Delhi
9. An Introduction to Optimization- Chang, Edwin& Zak Stanislaw -John Wiley, New York
10. Optimization Concepts And Applications In Engineering – Belegundu & Chandrupatla-Pearson, Singapore

Course Objectives:

- Ability to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively.
- Knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry.
- Skills in the use of Operations Research approaches and computer tools in solving real problems in industry.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Computational Fluid Dynamics**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337844(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objective:

1. To introduce the student to widely used techniques in the numerical solution of fluid equations, issues that arise in the solution of such equations, and modern trends in CFD.
2. To acquire core knowledge of the fundamentals of CFD for engineers, and an introduction to the methods and analysis techniques used in CFD.
3. By studying a variety of flow situations students will develop a better intuition of fluid mechanics more quickly than is possible with traditional analytical approaches.
4. Quantify and analyze the numerical error in CFD discretization schemes.
5. Develop finite difference and finite volume forms of the CFD equations and important model systems
6. Formulate explicit and implicit algorithms for solving the Navier-Stokes equations..
7. Understand and apply verification strategies for evaluating CFD code.

UNIT I

Fundamental Concepts

Introduction- Governing Equations of Fluid Dynamics. Mathematical Behavior of Partial Differential Equations - Elliptic, Parabolic and Hyperbolic equations. Physical Classification of fluid dynamics problems, Well-posed problems.

UNIT II

Finite Element and Finite Difference Method

Overview of Finite Element and Finite difference Techniques in Computational Fluid Dynamics. Strong and Weak Formulations of a Boundary Value Problem.

UNIT III

Finite Volume Schemes

General Discretisation Methodologies: Cell Centered Formulation- Lax-Vendoroff Time Stepping, Runge-Kutta Time Stepping, Multi-stage Time Stepping. Cell Vertex Formulation - Multistage Time Stepping. Discretisation of convective fluxes: Flux-vector splitting formulation, Flux-difference splitting formulation. Up-wind formulation.

UNIT IV

Discretization

Boundary layer Equations and methods of solution -Implicit time dependent methods for inviscid and viscous compressible flows - Concept of numerical dissipation --Stability properties of explicit and implicit methods - Conservative up-wind discretization for Hyperbolic systems - Further advantages of upwind differencing.

UNIT V

Principles of Grid Generation

Structured grid: C-, H- and O-Grid topology. Algebraic, Elliptical and Hyperbolic Grid Generation, *Unstructured grid:* Delaunay Triangulation, Advancing-Front Method, Generation of Anisotropic Grids, Mixed-Element/Hybrid Grids, Assessment and Improvement of Grid Quality,

TEXT BOOKS

1. Introduction to computational fluid dynamics: the finite volume method - Versteeg, & Malalasekera - Addison-Wesley.
2. Introduction to Computational Fluid Dynamics – Niyog & Chakraborty – Pearson ,Singapore

REFERENCES

1. Computational Techniques for Fluid Dynamics, - Vols. I and II - Fletcher C.A.J. – Springer, Verlag, Berlin, 1988.
2. Computational Fluid Dynamics:An Introduction - John F. Wendt (Editor) – Springer, Verlag, Berlin.
3. Numerical Computation of Internal and External Flows, Vols. I and II - Charles Hirsch - John Wiley & Sons, New York.
4. Computational Fluid Dynamics for Engineers, Vols. I & II - . Klaus A Hoffmann and Steve T. Chiang - Engineering Education System, W. Wichita, K.S., 67208 – 1078 USA.
5. Fundamentals of Aerodynamics - Anderson, Jr.D - McGraw Hill.

Contribution to Outcome:

- Develop an understanding for the major theories, approaches and methodologies used in CFD.
- Build up the skills in the actual implementation of CFD methods for mechanical engineering design, analysis and application.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Soft computing techniques**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337845(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To familiarize with concepts of soft computing
- To introduce the ideas of neural networks, fuzzy logic and use of heuristics based on human experience.
- To introduce the concepts of Genetic algorithm and its applications to soft computing using some applications.

UNIT – I : Introduction - Introduction to soft computing; introduction to biological and artificial neural network, introduction to fuzzy sets and fuzzy logic systems.

UNIT – II : Artificial neural networks and applications - Different artificial neural network models, learning in artificial neural networks, neural network applications in control systems.

UNIT – III : Fuzzy systems and applications - Fuzzy sets; fuzzy reasoning, fuzzy inference systems, fuzzy control, fuzzy clustering, applications of fuzzy systems.

UNIT – IV : Neuro-fuzzy systems - Neuro-fuzzy modeling, Neuro-fuzzy control.

Genetic Algorithms- Simple GA, crossover and mutation, genetic algorithms in search and optimization.

UNIT – V : Applications- Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Analysis language processing.

TEXT BOOKS

1. Fuzzy Logic And Soft Computing – Chen, Guoging, Ving, Mingsheng & Cai, Kai Yuan Ed - Kluwar Academic Publications, Usa
2. Soft Computing and Intelligent Systems Design Theory Tools and Applications – Karray F O & Desilva C – Pearson, New Delhi

REFERENCE BOOK

1. A Computational intelligence: principles, techniques, and applications - Konar - Springer.
2. Introduction to pattern recognition: statistical, structural, neural, and fuzzy logic approaches: Friedman, M & Kandel, A. - World Scientific.
3. Neuro-fuzzy and soft computing: a computational approach to learning and machine intelligence - Jang, J S R, Sun, C T, & Mizutani E - Prentice Hall.
4. An introduction to genetic algorithms- Mitchell M - MIT press.
5. Fuzzy Logic with Engineering Applications - Ross T J - John Wiley & Sons

Course Outcomes:

- Identify and describe soft computing techniques and their roles in building intelligent machines
- Recognize the feasibility of applying a soft computing methodology for a particular problem
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
- Apply genetic algorithms to combinatorial optimization problems
- Apply neural networks to pattern classification and regression problems
- Effectively use existing software tools to solve real problems using a soft computing approach
- Evaluate and compare solutions by various soft computing approaches for a given problem.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Environmental Pollution & Control**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337846(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To provide an introduction to Environmental Pollution.
- To develop an understanding of the causes, chemistry and effects of pollution.
- To build awareness of the strategies used to control and manage pollution.
- To make aware of Environmental Laws & Acts

UNIT-I

Environmental Pollution – Introduction & Classification

Sources and classification of air pollutants, aerosols, primary and secondary air pollutants, effect of air pollution on human health, effect of SO₂, CO₂, NO₂ H₂S and lead, economic effect of air pollution, mechanism of deterioration in polluted atmosphere. Factors influencing atmospheric deterioration, effect of air pollution on building materials, paints, textiles, rubber, leather, paper and electronic industry.

UNIT – II

Environmental Pollution - Sources

Air pollution due to automobiles, exhaust, Crankcase and evaporative emissions and their control, effect of various parameters of I.C. engines on air pollution, photochemical air pollution, air pollution from ferrous metallurgical operations and thermal power plants.

UNIT – III

Chemistry of Pollution

Definition of pollutant concentrations, mass concentration, volume concentration, mass-volume concentration and relationship between these concentrations, smoke and its control. Ningalmam smoke chart, smoke prevention and control of air pollution by process change, elementary ideas of control of gaseous contaminants for combustion and absorption.

UNIT – IV

Pollution Control

Control of air pollution by equipment, objectives of using control equipment, objectives of using control equipment, settling chambers, inertial separators, cyclones, principle of electrostatic precipitators, descriptive study of the above equipment only, merits and demerits of the equipment, choice of equipment.

UNIT – V

Environmental Laws & Acts

Air pollution indices, definition of air pollution index, type and use of air pollution indices, criteria for a standardized index, acid rain, causes of acid rain and its remedy, green house and its effect, air pollution legislation and regulations, constitution of the Board, functions of the central board and state boards, classification of pollution sources under Air Act 1981 and 1986.

TEXT BOOKS

1. Environmental Chemistry and Pollution Control - S S Dara – S Chand , New Delhi
2. Air Pollution - M.N. Rao and H.V.N. Rao – TMH, New Delhi.

REFERENCE BOOKS

1. Air Pollution Control Theory - Martin Crawford.- TMH, New Delhi
2. Encyclopaedia of Environment Control Technology & Air Pollution Control – Cheremisinott P N – Gulf Publication, London
3. Pollution Control Hand Book - Utility Publication,Securndarabad
4. Environmental Pollution Conservation And Planning - Pashupatinath & Siddh Nath - Chugh Publications, Allahabad
5. Environmental Air Pollution and Its Control - Chhatwal, Mehra & Katyal - Anmol Publications, New Delhi
6. Environmental Pollution Control Engineering – Rao C S –Wiley, New Delhi
7. Environmental Pollution Analysis – Khopkar S M- Wiley, New Delhi
8. Air Pollution Control Technology - R.W. Bethewaven - Van Nostrans.
9. Air Pollution & Control – KVSG Murali Krishnan – Kaushal & Company
10. Air Pollution & Control Technologies – Y. Anjaneyulu – Allied Publishers
11. Water & Air Pollution & Environmental Protection Laws, Vol. - II – M C Mehta – Delhi Law House

Course Outcomes

- Understand contemporary pollution issues.
- Have insight into specific examples of environmental pollution.
- Understand the causes and effects of key types of environmental pollution.
- Appreciate different pollution control strategies.
- Awareness of Environmental Laws & Acts

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Mechanical Handling System and Equipments**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **337847(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To introduce to the importance of proper material handling and storage techniques.
- To introduce to selection of material handling equipment
- To introduce to design considerations of mechanical handling equipment and load lifting attachments

UNIT – I

Elements of Material Handling System

Importance, Terminology, objectives and benefits of better Material Handling, Principles and features of Material Handling System, Interrelationships between material handling and plant layout, physical facilities and other or organizational functions, Classification of Material Handling Equipment.

UNIT – II

Selection of Material Handling Equipment

Factors affecting for selection, Material Handling Equation, Choices of Material Handling Equipment, General analysis Procedures, Basic Analytical techniques, the unit load concept Selection of suitable types of systems for applications, Activity cost data and economic analysis for design of components of Material Handling Systems, functions and parameters affecting service, packing and storage of materials.

UNIT – III

Design of Mechanical Handling Equipment

Design of Hoists, Drives for hoisting, components, and hoisting mechanisms, rail traveling components and mechanisms, hoisting gear operation during transient motion, selecting the motor rating and determining breaking torque for hoisting mechanisms. Design of Cranes, Hand-propelled and electrically driven E.O.T overhead traveling cranes, Traveling mechanisms of cantilever and monorail cranes, design considerations for structures of rotary and cranes with fixed radius, fixed post and overhead traveling cranes, Stability of stationary rotary and traveling rotary cranes.

UNIT – IV

Design of load lifting attachments

Load chains and types of ropes used in Material Handling System, Forged, Standard and Ramshorn Hooks, Crane Grabs and Clamps, Grab Buckets, Electromagnetic Design consideration for conveyor belts, Application of attachments.

UNIT – V

Study of systems and Equipment used for Material Storage

objectives of storage, Bulk material handling, Gravity flow of solid through slides and chutes, Storage in bins and hoppers, Belt conveyors, Bucket-elevators, Screw Conveyors, cabin vibratory Mobile racks etc.

Text Books:

1. Material Handling Equipments - N. Rudenko - Peace Publishers, Moscow.
2. Material handling System Design - James M. Apple, John-Wiley Publication, New York.

Reference Books:

1. Materials Handling Principals and Practice - Allegri T H - CBS Publication, New Delhi
2. Material Handling - John R. Immer - McGraw Hill Co. Ltd., New York.
3. Material Handling in Machine shops - Machinery Publication Co. Ltd., London.
4. Material Handling Equipment - M. P. Nexandr - MIR Publication, Moscow.
5. Bulk Solid Handling - C. R. Cock and J. Mason - Leonard Hill Publication Co. Ltd. U.S.A.
6. Material Handling Hand Book - Kulwiac R. A - John Willy Publication, New York.

Course outcomes

- The students will be able to identify material handling equipment requirements for a specific process and for various locations and working conditions
- The students will be able to understand the benefit of an efficient material handling system
- The students will be able to recognize the importance of material storage equipments.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Safety Engineering**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **300859(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- To Know safety philosophy and principles of accident prevention
- To know the safety rules, regulations, standards and codes
- To achieve an understanding of principles of safety management.
- To learn about various functions and activities of safety department.
- To study various mechanical machines and their safety importance.

UNIT – I

Safety philosophy and principles of accident prevention

Introduction, accident, injury, unsafe act, unsafe condition, reportable accidents, need for safety, break down of accidents, hazardous industries. Theories & principle of accidents casualty, cost of accident, computation of cost, utility of cost data. Accident reporting & Investigation, Identification of the key facts, corrective actions, classification of facts.

Regulation- American (OSHA) and Indian Regulation.

UNIT – II

Safety Management

Division of responsibility, location of Safety function, size of safety department, qualification, for safety specialist, safety committee – structure and functions.

UNIT – III

Safe working condition and their development

Standard Operating Procedure (SOP) for various mechanical equipments, incidental safety devices and methods, statutory of provisions related to safeguarding of Machinery and working condition.

UNIT – IV

Safety in Operation and Maintenance

Operational activities and hazards, starting and shut down procedures, safe operation of pumps, compressor, heaters, reactors, work permit system, entry into confined spaces.

UNIT – V

Safety in Storage and Emergency Planning

Safety in storage, handling of chemicals and gases, storage layout, ventilation, safety in chemical laboratories, emergency preparedness on site plan, off site plan, toxic hazard control.

TEXT BOOKS

1. Safety Management : Strategy And Practice - Pybus R - Butterworth Heinmann, Oxford
2. Safety and Accident Prevention in Chemical Operation – H.H. Fawcett and Wood

REFERENCE BOOKS

1. Industrial Safety Management- Trafdar N K, Tarafdar K J – Dhapat Rai, New Delhi
2. Safety Management In Industry- Krishna, N V- Jaico Publication House; New Delhi
3. Industrial Safety And Pollution Control Hand Book - Nagraj, J N & Rameshchandar, R V - Associate Publisher, Securdabad
4. Fire and Safety Manual Refineries and Petrochemical Panel - National Safety Council, Bombay
5. Safety in Use of Compressed Gas Cylinders - National Safety Council, Bombay
6. Encyclopaedia of Occupational Health and Safety - Stallman I M, Mccann M, Warshaw L, Brabant C - International Labour Office, Geneva
7. Industrial Safety Environmental Pollution Health Hazard And Nuclear Accidents - A Chand - Mittal Publication, New Delhi
8. Personal Protective Equipment – National Safety Council, Bombay
9. Accident Prevention Manual for Business and Industrial Administration and Programs - Krieger, G R Montgomerji - National Safety Council, Ittenois.
10. Major Hazard Control A Practical Manual – ILO - National Safety Council, Bombay

Course Outcomes:

- Ability to understand the functions and activities of safety engineering department.
- Apply knowledge of safety engineering specialization for hazard identification, risk assessment and control of occupational hazards.
- Communicate effectively on health and safety matters among the employees and with society at large.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Value Engineering**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **300805(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

- The objective of this course is to introduce students with the methodology of Value Engineering and its decision-making process.
- To familiarize students with procedures that provides standards for Value Engineering applications.
- To teach value engineering in a practical, project-based manner.
- During the course student will be engaged in decision-making using Value Engineering tools to ensure quality and value while reducing the cost of projects.
- Student will know about a number of case study applications of the Value Engineering to gain practical experience.

UNIT – I : Basic Concepts

Meaning of the term value, basic kind, reasons for poor value, value addition, origin and history.

Benefits, relevance in Indian scenario.

UNIT – II : Techniques

Different techniques, organizing value engineering study, value engineering and quality.

UNIT – III : Job Plan

Different phases, General phase, Information phase, Functional Phase, Creation Phase, Evaluation Phase, Investigation Phase, Implementation Phase, Audit.

UNIT – IV : Selection of evaluation of VE Projects

Project selection, method selection, value standard, application of methodology.

UNIT – V : Value Engineering Program

VE operations in maintenance and repair activities, VE Cost, life cycle, cost model, training for VE, general value engineering, case studies.

TEXT BOOKS

1. Value Engineering a How to Manul– S.S. Iyer – New Age International Publishers, New Delhi
2. Industrial Engineering & Management – O.P. Khanna – Dhanpat Rai & Sons

REFERENCES

1. Techniques of Value Analysis and Engineering – L.D. Miles – McGraw Hill, New York
2. Value Engineering: A Systematic Approach – A.E. Mudge – McGraw Hill, New York
3. Getting More at Less Cost: The Value Engineering Way - Jagannathan G - TMH, New Delhi
4. Value Engineering a Practical Approach for Owners Designers & Constructors – Zimmerman LW & Gilen HD – CBS, New Delhi.
5. Compendium on Value Engineering – H.G. Tufty – Indo-American Society.

Course Outcome:

- Understand the basics of Value Engineering (VE) to ensure that a standardized method is used for VE applications to projects
- Learn to perform function analysis for projects
- Understand the appropriate time to apply VE for projects

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Managing Innovation & Entrepreneurship**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Semester: **VIII**

Code: **300811(37)**

Total Tutorial Periods: **10**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objective

1. The course will provide a thorough coverage of conceptual framework on Entrepreneurship development.
2. Enhances student's innovation skill.
3. Helps to provide a quick understanding of essential concepts and issues.
4. Enhance the students to have an understanding about international entrepreneurship.
5. Understand the problems and prospects related to setting up of any type of business.

UNIT – I

Introduction to Entrepreneurship

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial growth and development.

UNIT – II

Creativity and Innovation

Creativity and Innovation: Concepts shifting composition of the Economy purposeful innovation and the seven sources of innovative opportunity the innovation process. Innovative strategies: Strategies that aim at introducing an innovation. Innovation and entrepreneurship: Can they together? Planning – innovation and entrepreneurship.

UNIT – III

Entrepreneurial Motivation

Need for continuous learning & relearning Acquiring technological Innovation Entrepreneurial motivation (nAch story) Achievement Motivation in Real life. Case Study.

UNIT – IV

International Entrepreneurship

Concepts and nature of international entrepreneurship. The changing international environment. Ethics and international entrepreneurship. Strategic issues in international entrepreneurship.

UNIT – V

Problem identification and problem solving

Problem identification. Problem solving. Innovation and diversification.

TEXT BOOK

1. Managing innovation and entrepreneurship in technology based firm-Martin M J-John Willey
2. Managing technology innovation- Ettlite I E - John Willey & Sons.

REFERENCE BOOKS

1. discipline of innovation - Drucker P F -The Harvard business school press , May-June1985.
2. The innovator's solution: Creating and sustaining successful growth - Christensen, C. M. and Raynor, M.E. (2003) - Boston, M. A.: Harvard Business School Press.
3. Innovation(Collection of articles) - Drucker, P. F. (1985) - Harvard Business School Press(2001).
4. Harvard Business Review on entrepreneurship(Collection of articles) - Harvard Business School Press
- 5) Diffusion of innovations, 5th edition - Rogers, E. M. (2003) - New York: Simon and Schuster.

Course Outcomes

Work effectively with engineering and science teams

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Robotics Lab**

Total Lab Periods: **24**

Maximum Marks: **40**

Semester: **VIII**

Code: **337861(37)**

Batch Size: **30**

Minimum Marks: **20**

List of Experiments:

1. Demonstration of Cartesian/ cylindrical/ spherical robot.
2. Demonstration of Articulated/ SCARA robot.
3. Virtual modeling for kinematics and dynamic verification any one robotic structure using suitable software.
4. Design, modeling and analysis of two different types of grippers.
5. Study of sensor integration.
6. Two program for linear and non-linear path.
7. Study of robotic system design.
8. Programming for forward kinematics problems.
9. Dynamic analysis of manipulators using software.
10. Study and demonstration of actuators and vision system.
11. Study of various robotic applications.
12. Setting robot for any one industrial application after industrial visit.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Finite Element Methods Lab**

Total Lab Periods: **24**

Maximum Marks: **40**

Semester: **VIII**

Code: **337862(37)**

Batch Size: **30**

Minimum Marks: **20**

Minimum eight assignments are to be completed on following area using appropriate Software.

1. Structural Analysis
2. Thermal Analysis
3. Fluid Flow Analysis
4. Coupled Field Analysis
5. Modal Analysis

Minimum four problems shall be solved with Manual calculations in any of area specified above.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Mechanical Engineering**

Subject: **Industrial Engineering & Management Lab**

Total Lab Periods: **24**

Maximum Marks: **40**

Semester: **VIII**

Code: **337863(37)**

Batch Size: **30**

Minimum Marks: **20**

EXPERIMENTS TO BE PERFORMED (MINIMUM TEN EXPERIMENTS)

1. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -men type flow process chart.
2. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -material type flow process chart
3. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -machine type flow process chart
4. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method – multiple activity chart.
5. Study of principles of fundamentals of hand motion.
6. Study & applications of principles of motion economy.
7. Performance of micro motion study of a job.
8. Problems in assignment of men & machines.
9. Training for a performance rating using walking exercises / audio visual aids.
10. Calculation of allowance for a job.
11. Standard time calculation problems.
12. Problems of wage incentive.
13. Case study of an industrial/service organization using a method study techniques.
14. Stop watch time study of a job.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**
Branch: **Common to all branches**
Subject: **Report Writing & Seminar**
Total Lab Periods: **24**
Maximum Marks: **40**

Semester: **VIII**
Code: **337865(37)**
Batch Size: **30**
Minimum Marks: **24**

Unit -I

Introduction to Technical Writing

How differs from other types of written communication Purpose of technical writing, Correspondence: prewriting, writing and rewriting Objectives of Technical Writing. Audience Recognition: High-tech audience, Low tech audience, Lay audience, Multiple Audience.

Unit - II

Correspondence

Memos, Letters, E-mails, Its differentiation, types of letters, Document Design, its importance, Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.

Unit - III

Summary

Report Strategies, Effective style of technical report writing: Structures: content, introduction, conclusions, references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc. report lay-out.

Unit -IV

Report Writing

Criteria for report writing, Types of Report: Trip report, Progress report, lab report, Feasibility report, project report, incident report, etc. Case studies.

Unit -V

Proposals & Presentation

Title page, Cover letter, Table of Content, list of illustrations, summary, discussion, conclusion, references, glossary, appendix, Case Studies. Oral Presentation/ Seminar:

Text Books:

1. Technical Writing – Process & Product - Sharon J.Gerson & Steven M. Gerson - Pearson.
2. Business Correspondence & Report Writing – Sharma R C & Krishnamohan – TMH

Reference Books:

1. Communication Skills for Engineers - Sunita Mishra - Pearson Education
2. Communication for engineering students - Longman
3. Effective Technical Communication – Eisenbergm- McGraw Hill.
4. Technical Writing & Professional Communication for Non Native Speakers of English – Huckin T N & Olsen L A – Mcgraw Hill
5. Academic Writing: A Guide For Management Students And Researchers - Monippally M M and Pawar B S – Response Books,New Delhi.