

**Chhattisgarh Swami Vivekanand Technical University, Bhilai**

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**B.E. VIII SEMESTER**

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	381831(37)	Robotics	4	1	-	80	20	20	120	5
2.	Mech. Engg	381832(37)	Industrial Automation	4	1	-	80	20	20	120	5
3.	Mech. Engg	381833(37)	Rapid Prototyping	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	381861(37)	Robotics Lab	-	-	2	40	-	20	60	1
7	Mech. Engg	381862(37)	Industrial automation Lab	-	-	2	40	-	20	60	1
8	Mech. Engg	381863(37)	Computer Aided Simulation & Analysis Lab	-	-	2	40	-	20	60	1
9	Mech. Engg	381864(37)	Major Project	-	-	6	100	-	80	180	3
10	Mech. Engg	381865(37)	Report Writing & Seminar	-	-	2	-	-	40	40	1
11			Library	-	-	1	-	-	-	-	-
<b>Total</b>				<b>20</b>	<b>5</b>	<b>15</b>	<b>620</b>	<b>100</b>	<b>280</b>	<b>1000</b>	<b>32</b>

L – Lecturer

T – Tutorial,

P – Practical,

ESE – End Semester Exam,

CT – Class Test

TA – Teacher’s Assessment

Table – III

Professional Elective - III

S.No.	Board of study	Subject Code	Subject
1	Mechanical	337841(37)	Mechatronics
2	Mechanical	381844(37)	Precision Engineering
3	Mechanical	337843(37)	Optimization Techniques
4	Mechanical	381845(37)	Agile Manufacturing
5	Mechanical	381846(37)	Industrial Packaging
6	Mechanical	337842(37)	Vibration and Noise control
7	Mechanical	381847(37)	Maintenance Management

**Chhattisgarh Swami Vivekanand Technical University, Bhilai**  
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<b>Table IV</b>			
<b>Open Electives IV</b>			
<b>S.N.</b>	<b>Board of study</b>	<b>Code</b>	<b>Name of subject</b>
1	Management	300851(76)	Enterprise Resource Planning (Except CSE & IT Branch)
2	Information Technology	300884 (33)	E-Commerce & strategic IT(Except CSE & IT Branch)
3	Management	300853(76)	Technology Management
4	Information Technology	300854(33)	Decision Support & Executive information systems
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 & Management (Except Electrical Engg. Branch)
20	Mechanical Engg.	300811(37)	Managing Innovation & Entrepreneurship
21	Information Technology	300812(33)	Biometrics
22	Information Technology	300813(33)	Information Theory & Coding
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
27	Computer Science & Engg.	300818(22)	Big Data and Hadoop

Note: (1) 1/4<sup>th</sup> 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.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Robotics**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381831(37)**

**Total Tutorial Periods: 12**

#### **UNIT – I**

##### **Introduction to Robotics**

Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, 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

#### **UNIT – III**

##### **Symbolic Modeling of Robots – Direct Kinematic Model**

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. Introduction to Inverse Kinematic model.

#### **UNIT – IV**

##### **Robotic Sensors and Vision**

The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.

#### **UNIT – V**

##### **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. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss, R.N.Nagel, N.G.Odrey
3. Robotics Control Sensing, Vision and Intelligence - K.S.Fu, R.C.Gonzalez, C.S.G.Lee- McGraw Hill Book Co

#### **REFERENCE BOOKS**

1. Robotics for engineers - Yoram Korean- McGraw Hill Co.
2. Kinematics and Synthesis of linkages - Hartenberg and Denavit - McGraw Hill Book Co
3. Kinematics and Linkage Design - A.S. Hall - Prentice Hall
4. Kinematics and Dynamics of Machinery - J.Hirshhorn - McGraw Hill Book Company.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Industrial Automation**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381832(37)**

**Total Tutorial Periods: 12**

#### **Unit I: Basics of Automation and Industrial Hydraulics**

Basics of automation, principle and strategies elements of automated system, level of automation, automation in production system, automated manufacturing system, types and reason for automation.

#### **Unit II: Basics Industrial Hydraulics**

Principles of hydraulics, Hydraulic fluids, Filtration technology, Hydraulic pumps, Hydraulic Valves, and hydraulic actuators, Proportional valves

**Hydraulic Systems**-Design considerations for hydraulic circuit, Standards in circuit diagram representation, Power pack design layout, Basic hydraulic circuits such as regenerative circuits, sequencing circuit, meter in and meter out circuit, Design of reservoir based on heat transfer considerations, Design of accumulators and intensifiers, Selection of standard components for hydraulic circuits.

#### **Unit III: Pneumatic Systems**

**Pneumatics:** Air compressors, types, working, selection criteria; FRL unit , construction and working; Pneumatic cylinders and air motors, construction and working, types, calculation of force and air consumption, Comparison of air, hydraulic and electric motor.

**Pneumatic System Control Elements:** Direction control valves, types, control methods for spool working; Flow control valves, working of variable flow control, quick exhaust, time delay and shuttle valve; Pressure control valves, types and working.

**Pneumatic Circuits:** Basic circuit, impulse operation, speed control, sequencing, time delay circuits and their applications. Pneumatic clamping and braking systems, Pneumatic power tools.

#### **Unit IV: Programmable Automation**

Introduction to microprocessor, Microcontroller, Microcontroller based manufacturing Systems, Logic gate and control, Computer process controls.

##### **Control System**

Data conversion (ADC/DAC), Programmable logic controller, Interfacing circuits, Actuating Signals, relays, contactors, Types of control systems- P, PI, PID , Optimal control system.

#### **Unit V: Factory Automation**

Basic concepts of automated system, Advanced automated functions, Levels of automation, Transfer systems-Continuous, intermittent, Indexing mechanisms, vibratory bowl feeders, nonvibratory feeders, hopper feeders, rotary disc feeder, centrifugal, revolving feeder, assembly systems, Synchronous and non synchronous material transfer, industrial robots, Automated Guided Vehicles and FMS, Automated warehouse.

#### **Text Books:**

1. Kuo B.C., "*Automatic control systems*", Prentice Hall India Pvt. Ltd., New Delhi
2. Peter Rohner, "*Industrial hydraulic control*", Wiley Edition, 1995
3. Mikell P Groover, "*Automation, Production System and Computer Integrated Manufacturing*", Prentice Hall Publications, ISBN 81-203-0618-X.

***Chhattisgarh Swami Vivekanand Technical University, Bhilai***  
**SCHEME OF TEACHING AND EXAMINATION**  
**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

4. Mujumdar S.R., “*Pneumatic System*”, Tata McGraw Hill 2002 Edition.
5. Gopal, “*Control Systems Engineering*”, Willey Eastern Ltd., ISBN 0-85226-605-7.

**Reference Books:**

1. Doebelin E.O, “*Measurement System, Application and Design*”, Tata McGraw Hill Publications Ltd., New Delhi, ISBN 0-07—17338-9.
2. Bolton W., “*Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering*”, Pearson Education (Singapore) Pvt Ltd., ISBN 81-7808-339-6.
3. Rangan C.S., Sharma G.R., Mani V.S., “*Instrumentation - Devices and Systems*”, Tata McGraw Hill Publications Ltd., New Delhi, ISBN 0-07-463350-3.
4. Histan B.H., Alciatore D.G., “*Introduction to Mechatronics and Measurement Systems*”, ISBN 0-07-052910-8.
5. Johnson C.D., “*Process Control Instrumentation Technology*”, Prentice Hall of India Pvt. Ltd., New Delhi, ISBN 81-203-0987-1.
6. HMT *Mechatronics*, HMT, ISBN 0-07-462147-5..
7. Vickers manual on hydraulics
8. G. Boothroyd , C. Poli, L. Murch, “*Automatic Assembly*”, Marcel Dekker Inc. 1982.
9. Werner Deport and Kurt Stool, "*Mechanization by pneumatic control*", Vol. I and II.
10. Date P. P., “*Introduction to Manufacturing Technology, Principles and Practices*”, , Jayco Publishers, Mumbai

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Rapid Prototyping**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381833(37)**

**Total Tutorial Periods: 12**

#### **UNIT - I**

##### **Introduction**

Definition of Prototype, Types of prototype, Need for the compression in product development, Survey of applications, Growth of RP industry, Classification of RP systems.

**Stereolithography Systems:** Principle, Process parameter, process details, Data preparation, data files and machine details, Application.

#### **UNIT - II**

##### **Selective Laser Sintering:**

Type of machine, Principle of operation, process parameters, Data preparation for SLS, Applications, Fusion Deposition Modeling: Principle, Process parameter, Path generation, Applications.

**Solid Ground Curing:** Principle of operation, Machine details, Applications, Laminated Object, Principle of operation, LOM materials, process details, application.

#### **UNIT - III**

##### **Concepts Modelers**

Principle, Thermal jet printer, Sander's model market, 3-D printer, Genisys Xsprinter HP system 5, object Quadra systems, Laser Engineering Net Shaping (LENS).

#### **UNIT - IV**

##### **Rapid Tooling**

Indirect Rapid tooling -Silicon rubber tooling- Aluminum filled epoxy tooling Spray metal tooling, Cast, 3D keltool, Direct Rapid Tooling- Direct, AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, ProMetal, Sand casting tooling, Laminate tooling, Soft Tooling vs. Hard tooling.

#### **UNIT - V**

##### **Software for RP**

STL files, Overview of Solid view, magics, mimics, magic communicator, etc. Internet based software, tools, Rapid Manufacturing Process Optimization: factors influencing accuracy, data preparation errors, Part building errors, Error in finishing, influence of build orientation. Surface digitizing, surface generation from point cloud, surface modification- data transfer to solid models.

#### **TEXT BOOKS**

1. Stereolithography and other RP& M Technologies- Paul F. Jacobs, Society of Manufacturing Engineers, NY
2. Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling- D.T.Fham and S.S.Dimov, Springer Verlag
3. Rapid Prototyping by Dr. A. Ghosh

#### **REFERENCE BOOKS**

1. Rapid Prototyping & Manufacturing- Paul F. Jacobs, McGraw-Hill.
2. Rapid Prototyping: Principles and Applications in Manufacturing- C.C. Kai and L.K.Fai, World Scientific Co.

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Mechatronics**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 337841(37)**

**Total Tutorial Periods: 12**

**UNIT – I**

Introduction about : 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 Mechatronic 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, Revised – N. Shanmugam – Anuradha Agencies , 2004
2. Mechatronics – HMT Limited –8th reprint, 2003

**REFERENCE BOOKS**

1. Mechatronics and Measurement system – David G. Alciatore & Michal B. Histad – TMH – 2nd reprint
2. Mechatronics, 3rd Edn. – W. Bolton – Pearson Education

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Precision Engineering**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381844(37)**

**Total Tutorial Periods: 12**

**Unit I**

Precision Engineering: Micromilling and Microdrilling, MicroElectroMechanical Systems, Microelectronics fabrication methods, Principles of MEMS, mechanical MEMS, Thermal MEMS, Magnetic MEMS..

**Unit II**

Nanotechnology- Carbon nanotubes and Structures, Processing system of nanometre accuracies, mechanism of material processing, Nano Physical processing of atomic bit-units, Nano-chemical and electrochemical atomic-bit processing.

**Unit III**

Nano-Measuring Systems of Sub-Nanometre Accuracy and Resolution: In process or in situ measurement of position of processing point, Post process and on machine measurement of dimensional features and surface, Mechanical measuring systems, Optical measuring systems, Electron beam measuring systems, Pattern recognition and inspection systems..

**Unit IV**

Nano-Positioning System of Nanometre Accuracy and Repeatability: Guide systems for moving elements, Servo control systems for tool positioning, Computer aided digital ultra precision position control, Future development of micro actuators.

**Unit V**

Applications of Nanotechnology: Nano-grating system, Nano lithography, Photolithography, Electron beam lithography, Machining of soft metal mirrors with diamond turning, Mirror grinding of ceramics, Ultraprecision block gauges, balls for rolling bearings, Fabrication CCD's, VCR head assemblies, Optical fibres.

**Texts Books:**

1. Nanotechnology- N. Taniguchi, Oxford University Press.
2. Micromanufacturing and Nanotechnology- N.P.Mahalik, Elsevier.

**Reference Books:**

1. Foundation of MEMS- C.Liu, Prentice Hall.
2. Introduction to Nanotechnology- C.P.Poole and F.J.Owens, Wiley Interscience.



*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Optimisation Technique**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 337843(37)**

**Total Tutorial Periods: 12**

**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 Pub

**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. Foundation of Mathematical optimization – Pallaschke – Kluwer Academic Publishers

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Agile Manufacturing**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381845(37)**

**Total Tutorial Periods: 12**

**Unit -I**

Types of Production- The Agile Production Paradigm- History of Agile Manufacturing- Agile Manufacturing Vs Mass Manufacturing, Agile Manufacturing Vs Mass Customization- Agile Manufacturing Research Centers

**Unit-II**

Agile Practices- Agile practice for product development - Manufacturing agile practices - understanding the value of investing in people, Concept models of Agile Manufacturing- Infusing managerial principles for enabling agility

**Unit-III**

Implementing technology to enhance agility- Implementing new technology – reasons – guidelines preparation for technology implementation - A checklist, technology applications that enhance agility - agile technology make-or-buy decisions.

**Unit-IV**

Performance Measurement and Costing: Measurement of agility – methods – Scoring and Fuzzy approaches – Costing for Agile Manufacturing practices – Activity Based Costing.

**Unit-V**

Creating the learning factory: Imperative for success, factory becoming a learning factory, building a road map for becoming a learning factory - core capabilities, guiding vision, leadership that fits, ownership and commitment, pushing the envelope, prototypes, integration, learning challenges for learning manufacturing business.

**Text books**

1. Gunasekaran A, “Agile Manufacturing, 21st Strategy Competitiveness Strategy”, Elsevier Publications, 2001.
2. Montgomery J C and Levine L O, “The Transition to Agile Manufacturing – Staying Flexible for Competitive Advantage”, ASQC Quality Press, Wisconsin, 1995.

**Reference Books**

3. Goldman S L, Nagal R N and Preiss K, “Agile Competitors and Virtual Organizations”, Van Nostrand Reinhold, 1995.
4. Brian H Maskell, “Software and the Agile Manufacturer, Computer Systems and World Class Manufacturing, Productivity Press, 1993

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: B.E. VIII Sem.**

**Subject: INDUSTRIAL PACKAGING**

**Total Theory Periods: 50**

**Total Marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381846(37)**

**Total Tutorial Period : 12**

**Unit-1**

**Introduction:** Objectives and functions of industrial packaging, different types of industrial packaging, economics of industrial packing.

**Unit-2**

**Materials For Industrial Packaging:** Characteristics of a good packaging material, comparison of materials for industrial packaging, factors affecting the selection of packaging materials, packaging materials for special requirements.

**Unit-3**

**Industrial Packaging Design:** Requirements of a good package design, design considerations for compatibility, separation, enclosure, retention, handling and transportation, package graphic design, package as a means of information & identification, ecological considerations in packaging design Selection and use.

**Unit-4**

**Multiple Function Industrial Packaging:** Concept and objectives of multipurpose-packaging, design considerations, cost analysis of multiple functions industrial packaging, Containers, their types, materials, design factors.

**Unit-5**

**R&D For Industrial Packaging:** Cost reduction techniques, composite material design and development, bio-degradable packaging materials.

**TEXT BOOKS**

1. Sharma, Package Management, Khanna Publishers, New Delhi
2. Daniel A Wren, Management Innovations, Oxford University Press, New York

**REFERENCE BOOK**

3. Michael L, Tushman, Managing Package Changes, Oxford University Press, New York
4. Packaging Hand Book, Indian Institute of Packaging (India)

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Vibration & Noise control**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 337842(37)**

**Total Tutorial Periods: 12**

**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 dampings, 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 analysers, balancing of rigid rotors

**UNIT- IV**

**Analysis and measurement of sound:**

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

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**REFERENCE BOOKS**

1. Mechanical Vibrations – G.K. Grover -S. Chand & CO.
2. Acoustics for Engineers - Turner & Pretlove - Macmillan
3. Acoustics and Noise Control - Smith, Peters & Owen - Addison-Wesley-Longman, 2nd Edition
4. Industrial Noise Control: Fundamentals and Applications - Bell and Bell, Marcel-Dekker

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Maintenance Engineering**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 381847(37)**

**Total Tutorial Periods: 12**

#### **Unit-1**

##### **Principles and Practices Of Maintenance Planning**

Basic Principles of maintenance planning , Objectives and principles of planned maintenance activity, Importance and benefits of sound Maintenance systems, Reliability and machine availability MTBF, MTTR and MWT , Factors of availability, Maintenance organization, Maintenance economics.

#### **Unit-2**

##### **Maintenance Policies – Preventive Maintenance**

Maintenance categories, Comparative merits of each category, Preventive maintenance, maintenance schedules, repair cycle , Principles and methods of lubrication – TPM.

#### **Unit-3**

##### **Condition Monitoring**

Condition Monitoring , Cost comparison with and without CM, On-load testing and offload testing , Methods and instruments for CM , Temperature sensitive tapes , Pistol thermometers , wear-debris analysis.

#### **Unit-4**

##### **Repair Methods for Basic Machine Elements**

Repair methods for beds, slideways, spindles, gears, lead screws and bearings, Failure analysis, Failures and their development, Logical fault location methods , Sequential fault location.

#### **Unit-5**

##### **Repair Methods for Material Handling Equipment**

Repair methods for Material handling equipment - Equipment records –Job order systems -Use of computers in maintenance..

#### **Text Books**

1. Srivastava S.K., “Industrial Maintenance Management”, - S. Chand and Co., 1981
2. Venkataraman .K “Maintenance Engineering and Management”, PHI Learning, Pvt. Ltd., 2007

#### **References**

1. Bhattacharya S.N., “Installation, Servicing and Maintenance”, S. Chand and Co., 1995
2. White E.N., “Maintenance Planning”, I Documentation, Gower Press, 1979.
2. Garg M.R., “Industrial Maintenance”, S. Chand & Co., 1986.
3. Higgins L.R., “Maintenance Engineering Hand book”, McGraw Hill, 5th Edition, 1988.
4. Armstrong, “Condition Monitoring”, BSIRSA, 1988.
5. Davies, “Handbook of Condition Monitoring”, Chapman &Hall, 1996.
6. “Advances in Plant Engineering and Management”, Seminar Proceedings - IIPE, 1996.

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Enterprise Resource Planning**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300851(76)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT-1**

**Conceptual foundation of Business Process reengineering:**

Role of information Technology and BPR; Process improvement and Process redesign, Process identification and mapping; Role/Activity diagrams, Process Visioning, and benchmarking.

**UNIT -2**

**Enterprise Resource Planning:**

Evolution of ERP- MRP and MRP II, structure of ERP- two tier architecture, three tier architecture, Electronic data processing, management information system, Executive information system, ERP as an integrator of information needs at various Levels.

**UNIT -3**

**Typical Business Processes:** Core processes, Product control, Sales order processing, Purchases, Administrative processes, Human resource, Finance support processes, Marketing, Strategic planning, Research and development, Problems in traditional view.

**UNIT -4**

**ERP models/functionality:**

Sales order processing, Production scheduling, forecasting, distribution, finance, features of each of the models, description of data flow across each module, overview of supporting databases & packages

**UNIT -5**

**ERP implementation issues:**

Opportunities and problems in ERP selection, and implementation; ERP implementation: identifying ERP benefits, team formation, Consultant intervention, Selection of ERP, Process of ERP.

**Books:**

1. V.K. GARG & N.K. VENKATKRISHNAN:, ERP, Concepts and Practices, PM
2. Rahul V. Altekar, Enterprise wide Resource Planning-theory and practice, PHI

**References:**

1. ALEXIS LEON: Enterprise Resource Planning, TMH
2. S. SADAGOPAN: MIS, PM
3. V. RAJARAMAN: Analysis and Design of Information Systems, PHI
4. MONK' & BRADY: Concepts in ERP, Vikas pub, Thomson

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: E-Commerce and Strategic IT**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300884(33)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT – I**

Introduction: What is E-Commerce, Forces behind E-Commerce, ECommerce Industry Framework, and Brief History of E-Commerce. Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework.

**Unit – II**

Network Infrastructure : LAN, Ethernet(IEEE standard 802.3) LAN , WAN , Internet, TCP/IP Reference Model, Domain Name Server , Internet Industry Structure,

**UNIT – III**

Electronic payment systems, types of electronic payment systems, digital token-based electronic payment systems, smart cards & electronic payment systems, credit card based electronic payment systems, risk and electronic payment systems, designing electronic payment systems.

**UNIT – IV**

Information Distribution and Messaging: FTP,E-Mail,WWW server,HTTP, Web service implementation, Information publishing , Web Browsers, HTML, Common Gateway Interface.

**UNIT – V**

Mobile & wireless computing fundamentals, mobile computing framework, wireless delivery technology and switching methods, mobile information access devices, mobile data internetworking standards, cellular data communication protocols, mobile computing applications, personal communication service.

**BOOKS :**

1. Frontiers of E-commerce by Kalakota & Whinston (Addison-wesley) Ebusiness roadmap for success by Dr. Ravi Kalakota & Marcia Robinson (addision wesicy)

2. Electronic Commerce By Bharat Bhasker (TMH)



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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Technology Management**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300853(76)**

**Total Tutorial Periods: 12**

**Unit I**

Technology: - Definitions, Types and Characteristics, Management of Technology (MOT), Technological Environment, Parameters of Technological Environment; Science & Technology in India.

**Unit II**

Innovation Management: - Invention v/s Innovation, Definition and components of innovation. Types of innovations: Product, Process and system innovations, Understanding Innovation Process.

**Unit III**

Technology life cycle, Technology evolution and S-curves of Technology Evolution, Technology Diffusion, Dynamics of Diffusion, Mechanism of Diffusion.

**Unit IV**

Technology strategies & Intelligence: Technology Strategy & types, Models for technology strategy formulation Definition of Technology Intelligence, Technology Audit, Process of Technology Intelligence: Technology Scanning, Monitoring, Forecasting and Assessment.

**Unit V**

Acquisition and technology transfer. Over view of - GATT, Intellectual property rights (IPR)

**Texts Books:**

1. V. K. Narayanan, "Managing Technology and Innovation for competitive advantage", Pearson Education.
2. Tarek Khalil, "Management of Technology", McGraw Hill.

**Reference Books:**

1. Lowell Steele, "Managing Technology", McGraw Hill.
2. R. A. Burgelman and M. A. Maidique, "Strategic Management of Technology and Innovation", Irwin.
3. Plsek, Crativity, Innovation and Quality, PHI

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Decision Support and Executive  
Information System**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300854(33)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT-I Decision Support System:**

What is a DSS, Decision Making Rational Decisions, Definitions of Rationality, Bounded Rationality and Muddling Through, The Nature of Managers, Appropriate Data Support, Information Processing Models, Group Decision Making?

**UNIT-II Component OF DSS:**

Data Component: Information and its Usefulness, Characteristics of Information, Databases to Support

Decision Making, Database Management Systems, Data Warehouses, Data Mining and Intelligent Agents  
Model Component-: Models Representation Methodology, Time Model Based Management Systems, Access to Models Understandability of Results, Integrating Models Sensitivity of a Decision, Brainstorming and Alternative Generation, Evaluating Alternatives, Running External Models.

Mail Component: Integration of Mail Management Examples of Use implications for DSS

**Unit-III Intelligence and Decision Support Systems:**

Programming Reasoning, Backward Chaining Reasoning, Forward Chaining Reasoning, Comparison, Certainty Factors, User-Interface Component: User Interface Components, The Action Language, Menus, Command Language, I/O Structured Formats, Free Form Natural Language, The Display or Presentation Language, Windowing Representations, Perceived Ownership of Analyses, Graphs and Bias Support for All Phases of Decision Making, The Knowledge Base Modes of Communication

**Unit-IV Designing A DSS:**

Planning for DSS, Designing a Specific DSS, Interviewing Techniques, Other Techniques, Situational Analysis Design Approaches, Systems Built from Scratch, Using Technology to Form the Basis of the DSS, Evaluating a DSS Generator, Using a DSS Generator, The Design Team, DSS Design and Re-engineering Discussion .

**Unit-V Implementation and Evaluation of DSS :**

Implementation Strategy , Prototypes, Interviewing , User Involvement , Commitment to Change, Managing Change, Institutionalize System, Implementation and System Evaluation, Technical Appropriateness, Measurement Challenges , Organizational Appropriateness.

Name Of Text Books-:

Decision Support System By Vicki I Sauter

Management Information system-Gerald V. Post & David L. Anderson

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**SCHEME OF TEACHING AND EXAMINATION**  
**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**  
**Subject: Software Technology**  
**Total No. of periods: 2 per week**  
**Total marks in End Semester Exam: Nil**  
**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**  
**Code: 300855(22)**  
**Total Tutorial Periods : Nil**  
**Teacher's Assessment: 40 marks**

**UNIT-1**

**ASSEMBLY LANGUAGE PROGRAMMING**

Pentium Assembly languages-Registers, Memory Model, Addressing mode, 1source Link, Installation, Assembler Directives.

**ASSEMBLER DESIGN**

Simple manual Assembler, Assembler Design Process, Load and Go Assembler, Object File Formats.

**UNIT-2**

**LINKERS**

Linking -Combining Object Modules, Pass I, Pass II; Library Linking; Position Independent Code (PIC); Shared Library Linking.

LOADERS- Binary Image; Types of Loaders.

**UNIT 3**

**MACROPROCESSORS**

Macro in NASM- Local Labels in Macro Body, Nested Macros.; Design of Microprocessors- Major Data Structures, Macro processing Technique, Simple microprocessors without nesting, Nested calls & definitions

**UNIT – 4**

**COMPILERS**

Lexical Analysis; Syntax Analysis; Intermediate Code Generation; Target Code Generation; Optimizing Transformation

**UNIT – 5**

**TEXT EDITORS**

Design of a Text Editor ; Data Structures for Text Sequences; Text Document Design; Text view Design

**DEBUGGER**

Features; Breakpoint mechanism; Hardware support; context of Debugger; Check pointing & reverse Execution

**Textbooks**

1. SYSTEM SOFTWARE by Santanu Chattopadhyay ; Prentice Hall of India
2. Software Engineering By Roger S Pressman ; Mc -Graw Hill

**References**

1. Foundations of Software Technology and Theoretical Computer Science, By V.(Venkatesh) Raman: Springer
2. Software Visualization by John Stasko; MIT press
3. Software Engineering By Rajib Mall : PHI

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: VIII**

**Subject: Knowledge Entrepreneurship**

**Total Theory Periods: 50**

**Total marks in End Semester Exam: 80**

**Minimum number of class tests to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300856(76)**

**Total Tutorial Periods: 12**

**Unit – I**

**Introduction:** Entrepreneurship in Knowledge economy, abundant & accessible information, implication, impact & consequence, knowledge based opportunities, aims, scope, and objectives.

**Unit-II**

**Managing knowledge & intellectual capital:**

Knowledge management, loss of knowledge, knowledge implementation, knowledge creation, property intellectual capital.

**Unit-III**

**Contemporary information problems:**

Information overload, winning & losing barrier to entry, emerging issues, customers, investors, myth of inevitable program.

**Unit-IV**

Creating enterprise cultures: Working with employer, organizing for entrepreneurship, unity & diversity, ten essential freedoms, freedom of operation, effective issue monitoring, establish search criteria.

**Unit-V**

**Becoming a knowledge entrepreneur:**

Entrepreneur qualities, knowledge entrepreneur, challenge of launching new product, creating launch support tool, examples of best practice.

**Text & Reference Books**

1. Amrit Tiwana ,The Knowledge Management tool kit, Pearson Education.
2. Lunlin Conlson, Knowledge Entrepreneur, Thomas Press.
3. Catheriue L Mann, Knowledge entrepreneurship, Oxford
4. Heinke Robkern ,Knowledge entrepreneurship,.
5. Bonnie Montano,Knowledge Management, , IRM Press, London

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Finance Management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300857(76)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit I**

Financial Management – an overview: Introduction, finance and other disciplines, objectives and scope of financial management, role and responsibility of finance manager.

**UNIT II**

Working capital management-nature, need, importance and concept of working capital, trade off between profitability and risk, Determining finance mix.

**UNIT III**

Inventory management-Introduction, objectives, ordering cost, carrying cost, lead time, economic order quantity and safety stock, deterministic model.

**UNIT IV**

Management of cash-introduction motives for holding cash, objectives of cash management and technique/process of cash management.

**UNIT V**

Receivables management-introduction, objectives, credit terms, credit policies and collection policies.

**Text books:**

Basic financial management, M Y Khan and P K Jain, TMH

Financial Management, I M Pandey.

**References books:**

Financial management and policy, V K Bhalla, Anmol publications pvt. Ltd.

Financial management, Van Horne.

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Project planning management and Evaluation**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300858(76)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT I**

Identification of projects-generation and screening of idea, monitoring corporate appraisal, preparing project profiles and project rating index.

**UNIT II**

Feasibility studies: Market and demand analysis, technical analysis, financial analysis and economic viability.

**UNIT III**

Project appraisal: Criteria, net present value, internal rate of return, payback period and accounting rate of return method.

**UNIT IV**

Project management and implementation- Project planning, project control, prerequisites of implementation. Network techniques of project management-Project evaluation and review technique (PERT) and critical path method (CPM).

**UNIT V**

Project review and control- Initial review, performance evaluation, abandonment analysis and its behavioral issues.

**Text books:**

Project planning, analysis, selection, implementation and review by Prasanna Chandra, TMH.

**Reference Books:**

Project management- Dr. Harold Kerzner.

Total Project management- Dr. P K Macmillan.

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Safety Engineering**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300859(37)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**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**

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 continued 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**

Safety and Accident Prevention in Chemical Operation – H.H. Faweett and Wood

Personal Protective Equipment – NSC Bombay

**REFERENCE BOOKS**

Ergonomics - P. Krishna Murthy

Fire Prevention Hand Book – Derek James

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**SCHEME OF TEACHING AND EXAMINATION**  
**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Bioinformatics**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300801(22)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT-1**

Bioinformatics-introduction, Application, Data Bases and Data Management, Central Dogma; information search and Data retrieval, Genome Analysis and Gene mapping- Analysis, Mapping, Human Genome Project (HGP).

**UNIT-2**

Alignment of Pairs and Sequences; Alignment of Multiple Sequences and Phylogenetic Analysis; Tools for similarity Search and Sequence Alignment- FASTA BLAST.

**UNIT-3**

Profiles and Hidden Markov Models (HMMs); Gene Identification and Prediction-Basics, Pattern Recognition, Methods and Tools; Gene Expression and Micro arrays.

**UNIT-4**

Protein Classification and Structure Visualization; Protein Structure Prediction; Proteomics; Computational methods-Analysis of Pathways, Metabolic Network Properties, Metabolic Control Analysis, Stimulation of Cellular Activities, Biological Mark Up Languages.

**UNIT-5**

Drug Discovery-Introduction, Technology and Strategies, Cell Cycle, G-protein, Coupled, Receptors. Computer Aided Drug Design-Introduction, Drug Design Approaches, Designing methods, ADME-Tox Property Prediction.

**TEXT BOOKS**

I. BIOINFORMATICS by S.C. Rastogy, 2nd Edition, Prentice Hall of India.

II. BIOINFORMATICS by V. R Srinivas, Prentice Hall of India

**REFERENCES**

1. BIOINFORMATIC COMPUTING by Bergeron, MIT Press.

2. Evolutionary Computation in Bioinformatics, Gary B. Fogel, David W. Corne (Editors), 2002

3. Introduction to Bioinformatics, Arthur M. Lesk, 2002, Oxford University Press

4. Current Topics in Computational Molecular Biology (Computational Molecular Biology), Tao Jiang, Ying Xu, Michael Zhang (Editors), 2002, MIT Press



# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Energy Conservation & Management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300802(37)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

#### **UNIT – I**

##### **Energy Scenario**

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, re-structuring of the energy supply sector, energy strategy for the future, air pollution, climate change, Energy Conservation Act – 2001 and its features.

#### **UNIT – II**

##### **Energy Conservation in Electric Utility and Industry**

Energy costs and two-part tariff, Energy conservation in utility by improving load factor, Load curve analysis, Energy efficient motors, Energy conservation in illumination systems, Importance of Power factor in energy conservation – Power factor improvement methods, Energy conservation in industries, case studies.

#### **UNIT – III**

##### **Energy in Manufacturing**

Introduction, Energy and Environmental Analysis of Products, Energy Consumption in Manufacturing, Energy Conservation, Transportation Systems, Water Conservation, Rules for the Efficient Conservation of Energy and Materials, Laws of Energy and Materials Flows.

#### **UNIT – IV**

##### **Heat Recovery System**

Sources of waste heat and its potential applications, heat recovery systems in Shell & Tube Heat Exchangers, Plate Heat Exchangers, Tubular Heat Exchangers. Vapour recompression and Energy conservation in Evaporator systems. Thermal Wheel, Heat Pipe, Heat Pumps. Waste Heat Boilers – Low Pressure & High Pressure Applications.

#### **UNIT – V**

##### **Energy Conservation Economics**

Basic discounting, life cycle costing and other methods, factors affecting economics, energy pricing and incentives for conservation, energy conservation of available work identification of irreversible processes, primary energy sources, Optimum use of prime movers, energy efficient house keeping, energy recovery in thermal systems, waste systems and waste heat recovery in thermal systems, waste heat recovery techniques, conservation in energy intensive industries, thermal insulation.

#### **TEXT BOOKS**

1. Energy Management – W.R. Murphy, G. McKay –
2. Energy Management – Paul O'Callaghan –
3. Engineering Economics & Engineering Management – R. Raju – Anuradha Agencies

#### **REFERENCE BOOKS**

1. Principles of Energy Conversion – Archie W. Culp – Jr. International Student Edition – McGraw Hill Publishers

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

2. Energy Management in illuminating System – Kao Chen – CRC Publishers
3. Industrial Energy Recovery - D.A. Reay – Wiley Publishers
4. Thermal Energy Recovery – T.L. Boyer – Wiley Publishers
5. Energy Conservation Through Control – E.G. Shinskey – Academic Press
6. Economics of Solar Energy & Conservation Systems, Vol-I & II – F. Kreith & R.E. West – CRC Press

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**SCHEME OF TEACHING AND EXAMINATION**  
**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Nanotechnology**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300803(47)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit I :** Introduction to nanotechnology: background, definition , basic ideas about atoms and molecules, physics of solid state, review of properties of matter and quantum mechanics

**Unit II :** Preparation of Nanostructured Materials : Lithography : nanoscale lithography, Ebeam lithography, dip pen lithography, nanosphere lithography. Sol gel technique Molecular synthesis, Self-assembly, Polymerization

**Unit III :** Characterization of Nanostructured materials : Microscopy: TEM, SEM, SPM techniques, confocal scanning microscopy,, Raman microscopy-Basic principles, applicability and practice to colloidal, macromolecular and thin film systems. Sample preparation And artifacts. Polymer fractionation techniques: SEC, FFF, Gel electrophoresis.: Basic theory, principles and practice.  
Thermal analysis: Basic principles, theory and practice. Micro DSC in the study of phase behavior and conformational change.

Mass spectrometry of polymers: MALDI TOF MS – Basic theory, principles and practice. Applicability to proteins, polyethers, controlled architecture systems

**Unit IV :** Cross-cutting Areas of Application of Nanotechnology : Energy storage, Production and Conversion. Agriculture productivity enhancement Water treatment and remediation. Disease diagnosis and screening. Drug delivery systems. Food processing and storage. Air pollution and remediation. Construction. Health monitoring..Vector and pest detection, and control. Biomedical applications. Molecular electronics. Nanophotonics. Emerging trends in applications of nanotechnology

**Unit V :** Industrial Implications of Nanotechnology : Development of carbon nanotube based composites. Nanocrystalline silver Antistatic conductive coatings. Nanometric powders. Sintered ceramics. Nanoparticle ZnO and TiO<sub>2</sub> for sun barrier products. Quantum dots for biomarkers. Sensors. Molecular electronics. Other significant implications

**References:**

1. Guozhong Cao, “Nanostructures and Nanomaterials”, Imperial College Press, London
2. Mark Ratner and Daniel Ratner, “A Gentle Introduction to Next Big Thing”, Pearson Education 2005

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Intellectual Property Rights**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300804(76)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit-I**

Basic Concepts of Intellectual Property: Introduction to intellectual property rights, laws and its Scope, Trade Related Aspects of Intellectual Property Rights.

**Unit-II**

Patents: Introduction to patent law and condition for patentability, Procedure for obtaining patents, Rights of a patentee, Patent infringements, Biotechnology patents and patents on computer programs, Patents from an international perspective.

**Unit-III**

Trademark and 'geographical Indications: Statutory authorities and registration procedure, Rights conferred by registration, Licensing, assignment and transfer of trademark rights, Trademark infringement, Geographical Indication of Goods & Appellations of Origin.

**Unit-IV**

Copyright: Registration procedure and copyright authorities, Assignment and transfer of copyright, copyright infringement and exceptions to infringement, Software copyright

**Unit-V**

Introduction to the law on Industrial Designs, Registration and piracy, International perspective, Introduction to the law on semiconductor layout design, Registration, commercial exploitation and infringement.

**Text Books:**

1. Vinod V Sople ,Managing Intellectual Property, – PHI
2. Kumar K ,Cyber law, intellectual property and e-commerce security, Dominant Publication and distribution, New Delhi.

**Reference Books:**

1. Inventors Guide to Trademarks and Patents- Craig Fellenstein, Rachel Ralson- Pearson Education.
2. Intellectual Property –David Bainbridge, Longman

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Value Engineering**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300805(37)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**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**

Value Engineering – S.S. Iyer – New Age International Publishers, New Delhi

Industrial Engineering & Management – O.P. Khanna – Dhanpat Rai & Sons

**REFERENCES**

Techniques of Value Analysis and Engineering – L.D. Miles – McGraw Hill, New York

Value Engineering, A Systematic Approach – A.E. Mudge – McGraw Hill, New York

Compendium on Value Engineering – H.G. Tufty – Indo American Society

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Disaster Management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300806(20)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit 1**

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters.

**Unit 2**

Behaviour of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental impact Assessment

**Unit 3**

Methods of mitigating damage during disasters, disaster preparedness.

**Unit 4**

Management systems during disasters, Construction Technology for mitigation of damage of structures.

**Unit 5**

Short-term and long-term relief measures.

**Name of Text Books:**

Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)

Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition) – Anil

K Chopra (Pearson Education Publication)

**Name of Reference Books:**

Fundamentals of Vibrations – Anderson, R.A. (Mc Millan)

IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993

Earth quake engineering damage assessment and structural design – S.F. Borg

Disasters and development – Cuny F (Oxford University Press Publication)

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Construction Management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300807(20)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit 1**

**The Owner's Perspective**

Introduction-The project life cycle -Major Types of Construction-Selection of Professional Services  
Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The  
changing Environment of the construction Industry-The Role Project Managers

**Unit 2**

**Organizing for Project Management**

What is project management? – Trends in Modern Management-Strategic planning and project  
programming- Effects of project risks on organization-Organization of Project Participants-Traditional  
designer-Constructor sequence-Professional construction management-Owner-Builder-Operation-  
Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project  
organization-perceptions of Owners and Contractors

**Unit 3**

**The Design and Construction Process**

Design and construction as an integrated system-Innovation and technological Feasibility- Innovation and  
technological feasibility-Design Methodology-Functional Design-Physical Structures-Geo-Technical  
Engineering Investigation-Construction Site Environment-Value engineering-Construction Planning-  
Industrialized Construction and Prefabrication-Computer - Aided Engineering

**Unit 4**

**Labour, Material and Equipment Utilization**

Historical Perspective – Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in  
construction-Problems in collective bargaining-Materials Management-Materials Procurement and  
Delivery- Inventory control-Tradeoffs of cost in Material Management- Construction Equipment-Choice  
of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

**Unit 5**

**Cost Estimation**

Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost  
estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Methods for allocation of  
joint costs- Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on  
Engineers List of Quantities-Allocation of Construction costs over time-Computer Aided cost Estimation-  
Estimation of operating costs

**Name of Text Books:**

Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill  
Publishing Co., New Delhi, 1998)

Project Mangement: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner  
(CBS Publishers & Distributors, Delhi, 1988)

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Name of Reference Books:**

Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000)

Construction Project Management – Frederick E.Gould (Wentworth Institute of Technology, Vary E.Joyce, Massachusetts Institute of Technology, 2000)

Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988)

Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988)



*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Ecology and Sustainable Development**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300808(20)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit 1**

**Nature of ecology and sustainable development**

Definition, scope of ecology and sustainable development, geomorphology, oceanography, climatology and biogeography.

**Unit 2**

**Energy and environment**

Introduction of energy environment, use of solar cells for heating and operated drills, methane gas digesters, environmentally friendly method of energy conservation, difference between conventional and non-conventional energy sources, future trends of energy systems.

**Unit 3**

**Theory of isostasy**

Concept of isostasy for sustainable development, discovery of the concept, concept of Hayford and Bowie, Joly, and Holmes, Global isostatic adjustment.

**Unit 4**

**Physical geography and man human impact on the natural environment**

Modification of land forms, direct alteration of land forms, wind deflation, coastal erosion and deposition, modification of the atmosphere, ultration process in eco and energy systems.

**Unit 5**

**Obstacles in sustainable development**

Pollution growth, species extinction, restriction of bat lands, desertification, soil erosion, soil pollution, characterisation of contaminated soil, global warming and ozone depletion etc.

**Name of Text Books:**

Energy and environment – Fowler (McGraw Hill, New Delhi)

Restoration Ecology and sustainable development – Krystyna M. Urbanska et.al. (Cambridge University Press, U.K.)

**Name of Reference Books:**

Reuniting Economy and Ecology in Sustainable Development – Russ Beaton et.al. (-----)

Theory and implementation of economic models for sustainable development – Jeroen C.J.M.

Van Den Bergh (-----)

Economy and Ecology: Towards sustainable development – F. Archibugi et.al. (-----)

Evaluating Sustainable Development: Giving People a voice in their destiny – Okechukwu Ukaga et.al. (-  
-----)

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Non Conventional Energy Sources**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300809(19)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit I**

Environmental Aspects of Power Generation, Heat Transfer for Solar Energy, Utilization Flat Plate Collectors: Physical principles of conversion of solar radiation into heat, Thermal losses and efficiency of FPC, Practical considerations for flat plate collectors, Applications of FPC – Water heating and drying .Focusing Type Collectors: Orientation and sun tracking systems, Types of concentrating collectors – Cylindrical parabolic collector, Compound parabolic collector, Thermal performance of focusing collectors, Testing of solar collectors.

**Unit II**

Solar cooking, solar desalination, solar ponds and solar space heating Solar Industrial process heating and Solar power generation. Solar Green Houses, Solar thermo mechanical power, solar refrigeration & air conditioning and Solar High Temperature Applications Gasifier- Classification, Chemistry, Application, advantages, disadvantages and application.

**Unit III**

Energy from Biomass: Type of biomass sources, biomass generation, factors affecting biodigestion, classification, advantages and disadvantages of biogas plants, community biogas plants, problems related to biogas plants, utilization of biogas. Energy plantation, methods for obtaining energy from biomass, thermal gasification of biomass.

**Unit IV**

Chemical Energy Sources: Fuel cells: Design, principle, classification, types, advantages and disadvantages Hydrogen Energy: Properties of hydrogen, methods of hydrogen production, physical and chemical principles, storage, advantages and application

**Unit V**

Wind Energy: Basic principle, wind energy conversion, wind energy conversion systems, design consideration, performance and application. Alcohol fuels: Overview, feedstock, methods for alcohol production, alcohol as an engine fuel; LPG, CNG Hydrogen and Ethanol as an alternative liquid fuel; engine performance with alcohol fuels. Tidal Energy.

**Name of Text Books:**

1. John A Duffie & William A Beckman: Solar Energy Thermal processes Wiley Inter science publication
- 2 H P Garg & J Prakash, Solar Energy – Fundamentals and Applications: - Wiley Inter science

**Name of Reference Books:**

1. G D Rai, Solar Energy Utilization – Khanna publishers.
2. S P Sukhatme, Solar Energy – Principles of thermal Collection & Storage – Tata McGraw Hill Publishing company ltd., New Delhi

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Energy Auditing & management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300810(24)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT I:**

History of Energy Management: Energy forecasting, Limitations of energy resources. Renewable energy resources. Load management. Energy management. Demand side management (DSM) Energy conservation in realistic distribution system. Short term load forecasting for de-centralized load management.

**UNIT II:**

Energy Situation and Global Energy Sources: World energy consumption. Energy in developing countries. Firewood crises. Indian energy sources. Non-conventional renewable energy sources. Potential of renewable energy sources. Solar energy types. Wind energy. Wave, tidal and OTEC. Super-conductors in power system. Wind power generation for large scale generation of electricity. Wind driven induction generators.

**UNIT III:**

Energy Auditing as Applicable to an Industry: Classification of energy audit System optimization. Power factor improvement. Preventive maintenance. Process modification. Non-conventional energy sources. Electricity tariffs. Types of off-peak tariffs.

**UNIT IV:**

Elements of Energy Auditing and Metering Methodologies(Case Studies): Capacity utilization. Technology up-gradation. Fine tuning, Energy conservation. Concept and methods of energy conservation.

**UNIT V:**

Demand Side Management: Introduction to DSM. Concept of DSM. Benefits from DSM. DSM techniques. Time of day pricing, Multi-utility exchange model. Time of day pricing models for planning, load management. Load priority technique. Peak clipping. Peak shifting. Valley filling. Strategic conservation. Energy efficient equipment, Socioeconomic awareness programs.

**Text Books:**

1. Ashok.V.Desai(ED)-Energy Demand: Analysis, Management and Conservation, Wiley Eastern Ltd., New Delhi.

2. S. Rao, Parulekar, Energy technology, Khanna Pbs.

**Reference Books:**

1. Jyothi Prakash- Demand Side Management, Tata McGraw-Hill Publishers.

2. N.K.Bansal, Kleeman Millin-Renewable Energy Sources and Conservation Technology, Tata McGraw-Hill Publishers.

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Managing Innovation & Entrepreneurship**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300811(37)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**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- Etlite 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.

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Biometrics**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300812(33)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit I:**

**Introduction of Biometrics**

Biometrics: definition, history, basic working architecture, types; Performance measures of biometrics; applications and benefits of biometrics; design of biometrics; biometric identification versus verification.

**Unit II:**

**Face and Iris Biometrics**

Background of face and iris recognition; Face recognition methods: Eigen face methods, contractive transformation method; Challenges of face biometrics; Design of iris biometrics: image segmentation, image preprocessing, determination of iris region; Advantages and disadvantages of face and iris biometrics.

**Unit III:**

**Fingerprint and Sign Language Biometrics**

Fingerprint matching: image acquisition, image enhancement and segmentation, image binarization, minutiae extraction and matching; Sign language biometrics: Indian sign language (ISL) biometrics, SIFT algorithm, advantages and disadvantages of ISL and fingerprint biometrics.

**Unit IV:**

**Biometric Cryptography and Privacy Enhancement**

Introduction to biometric cryptography; general purpose cryptosystems; Cryptographic algorithms: DES and RSA; Privacy concerns and issues related to biometrics; biometrics with privacy enhancement; soft biometrics; comparison of various biometrics; Identity and privacy.

**Unit V:**

**Scope of Biometrics and Biometric Standards**

Multimodal biometrics: basic architecture and fusion scheme, application, example of AADHAAR; scope and future market of biometrics; role of biometrics in enterprise and border security; DNA biometrics; biometric standards; biometric APIs.

**Suggested Books:**

1. Biometrics: concepts and applications by Dr G R Sinha and Sandeep B. Patil, Wiley India Publications, 2013.
2. Introduction to biometrics by Anil K Jain, Arun Ross and Karthik Nandakumar, Springer, 2011.
3. Biometrics Identity verification in a networked world by Samir nanawati, Michael Thieme and Raj Nanawati, US edition of Wiley India, 2012.

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Information Theory & Coding**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300813(33)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT-I:**

Uncertainty, Information and Entropy Information Measures: Characteristics on information measure; Shannon's concept of information; Shannon's measure of information; Model for source coding theorem; Communication system; Source coding and line/channel coding; channel mutual information capacity (Bandwidth);

**UNIT-II:**

Channel coding, Theorem for discrete memory less channel, Information capacity theorem: Error detecting and error correcting codes; Types of codes; Block codes; Tree codes; Hamming codes; Description of linear block codes by matrices; Description of linear tree code by matrices; Parity check codes; Parity check polynomials;

**UNIT-III:**

Compression: Lossless and lossy; Huffman codes; Binary Image compression schemes; Run – length Encoding; CCITT group-3 1D compression; CCITT group-3 2D compression; CCITT group-4 2D compression;

**UNIT-IV:**

Video Image Compression: Requirement of full motion video compression; CCITT H 261 video coding algorithm; MPEG compression methodology; MPEG-2 compression; Audio (Speech) compression;

**UNIT-V:**

Cryptography: Encryption; Decryption; Cryptogram (cipher text); Concept of cipher; Cryptanalysis; Keys: Single key (Secret key); Cryptography; two-key (Public key) cryptography; Single key cryptography; Ciphers; Block Cipher code; Stream ciphers; Requirements for secrecy; The data Encryption Standard; Public Key Cryptography; Diffie-Hellmann public key distribution; The Rivest-Shamir Adelman(R-S-A) system for public key cryptography; Digital Signature;

**Text Books:**

1.Digital Communication by Das, Mullick & Chatterjee, New Age Pub.

2.Digital Communication by Proakis, TMH

3.Digital Image Processing by Gonzales & Woods, Pearson ( for Unit – III & IV) 4.Local Area Network by G. Keiser, TMH (for Unit – V)

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Supply Chain Management**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300814(22)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

#### **UNIT I**

##### **FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT**

Supply chain networks, Integrated supply chain planning, Decision phases in a supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

#### **UNIT II**

##### **SCM STRATEGIES, PERFORMANCE**

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

#### **UNIT III**

##### **PLANNING AND MANAGING INVENTORIES**

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

#### **UNIT IV**

##### **DISTRIBUTION MANAGEMENT**

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,

#### **UNIT V**

##### **STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN**

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

#### **REFERENCES**

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, Second Edition, , McGraw-Hill/Irwin, New York, 2003.
2. Sunil Chopra and Peter Meindl. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
3. Sunil Chopra & Peter Meindl, Supply Chain Management , Prentice Hall Publisher, 2001
4. Robert Handfield & Ernest Nichols, Introduction to Supply Chain Management , Prentice hall Publishers, 1999.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## **SCHEME OF TEACHING AND EXAMINATION**

### **B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Internet and Web Technology**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300815(22)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

#### **UNIT-I**

**INTRODUCTION TO INTERNET**- Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems

#### **UNIT-II**

**HTML CSS AND SCRIPTING HTML** - Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements

#### **UNIT-III**

**XML What is XML** – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS

#### **UNIT-IV**

**INTERNET SECURITY & FIREWALLS** - Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI, Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication , Authorization And Accounting).

#### **UNIT-V**

**WEBSITE PLANNING & HOSTING** - Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),Ftp Clients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat

#### **Text Books**

1. Internet & Intranet Engineering,- Daniel Minoli, TMH.
2. .Alexis Leon and Mathews Leon – Internet for Every One, Tech World.

#### **Reference Books**

1. Eric Ladd, Jim O'Donnel –“Using HTML 4, XML and JAVA”-Prentice Hall of India -1999.



*Chhattisgarh Swami Vivekanand Technical University, Bilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

2. "Beginning Java Script" – Paul Wilton – SPD Publications –2001.
3. Frontiers of Electronics of Commerce, Ravi kalakota & Andrew B. Whinston Addison Wesley

***Chhattisgarh Swami Vivekanand Technical University, Bhilai***

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Electrical Estimation and Costing**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300816(24)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT I:**

Principles of Estimation and Residential Building Electrification Introduction to estimation and costing, Electrical Schedule. Determination of cost material and labor Contingencies. Overhead charges. General Rules guidelines for wiring of residential installation and positioning of equipments, Principles of circuit design in lighting and power circuits. Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram. Selection of type of wiring and rating of wires and cables Load calculations and selection of size of conductor, Selection of rating of main switch Distribution board, protective switchgear and wiring accessories, Preparation of detailed estimates and costing of residential installation.

**UNIT II:**

Electrification of Commercial Installation Design considerations of electrical installation system for commercial building, Load calculation and selection of size of service connection and nature of supply, Deciding the size of the cables, bus bar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc, Earthing of the electrical installation, Selection of type wire, wiring system and layout, Preparation of detailed estimate and costing of commercial installation.

**UNIT III:**

Service Connection, Power Circuits, Inspection and Testing of Installation Concept of service connection, Types of service connection and their features, Method of installation of service connection, Estimates of underground and overhead service connections, Inspection of internal wiring installations, Inspection of new installations, testing of installations, testing of wiring installations, Important considerations regarding motor installation wiring, Determination of rating of cables Determination of rating of fuse, Determination of size of Conduit, distribution Board main switch and starter.

**UNIT IV:**

Design of Overhead Transmission and Distribution Lines Introduction, Typical AC electrical LT system, Main components of overhead lines, Line supports. Factors governing height of pole, Conductor materials, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances, Conductors configuration spacing and clearances, Span lengths, Overhead line insulators, Insulator materials, Types of insulators, Lightning Arrestors, accessories, Erection of supports, setting of stays, Fixing of cross arms, Fixing of insulators, Conductor erection, Repairing and jointing of conductor, Dead end clamps, Positioning of conductors and attachment to insulators Jumpers, Tee-offs, Earthing of transmission lines. Guarding of overhead lines, Clearances of conductor from ground Spacing between conductors.

**UNIT V:**

Design and Estimation of Substation Introduction, Classification of substation, Indoor substations, Outdoor substations, Selection and location of site for substation, Main Electrical Connections, Graphical symbols for various types of apparatus and circuit elements on substation main connection diagram. Key diagram of typical substations. Equipment for substation and switchgear installations, Substation auxiliaries supply, Substation Earthing.

**Note : For estimation and costing calculations refer attached sheets**

*Chhattisgarh Swami Vivekanand Technical University, Bilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Textbooks:**

Electrical Installation Estimating & Costing, J.B.Gupta, VIII Edition S.K.Katria & Sons New Delhi

Electrical Design Estimating and Costing, K.B.Raina S.K.Bhattacharya, New Age

**Reference Books:**

1. Electrical Wiring Estimating and Costing, S.L.Uppal, G.C Garg, Khanna Publishers

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Non Conventional Energy Sources**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300817(25)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**Unit: 1**

**Introduction :** Various non-conventional energy sources, Need, availability, classification, Relative merits & demerits. Energy storage, distribution and conservation.

**Unit: 2**

**Solar Energy:** Solar Cells; Theory of Solar Cells, Materials, Solar Cell Power Plants, merits / demerits. Solar Thermal Energy : Solar energy collectors, Applications, storage, Solar Thermal Power Plants, merits / demerits.

**Unit: 3**

**Wind Energy:** Basic Principles of Wind Energy conversion Site Selection criterion ,wind Data & Energy Estimation, Types of Rotors, Characteristics, performance & limitations of energy conversion systems.

**Unit: 4**

**Tidal Energy:** Basic Principles, Components of Tidal Plants, Operation methods & utilization, Bio-Mass Energy – Conversion Technology, Classification of Plants, Advantages & Disadvantages Geo-Thermal Energy – Sources of Geo- Thermal energy, Thermal energy conversion- electrical / Non electrical conversion. Advantage & Disadvantages.

**Unit: 5**

**MHD Power Generation** – Principle of working open cycle / close cycle system. Advantages & Disadvantages Thermo Electric Power – Basic Principles, Thermo Electric Materials, Performance & Limitations. Thermionic Conversion – Principles of working. Hydrogen Energy – Principles of conversion ,production of H<sub>2</sub>.

**Text Books:**

1. G.D. Rai – Non Conventional Energy Sources –(4th ed.Khanna Pub.)
2. S.P. Sukhatme – Solar Energy – TMH.

**Reference:**

1. Bansal, Kleemann & Meliss – Renewable Energy Sources & Conversion Technology – TMH.

*Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Big Data and Hadoop**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code: 300818(22)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**UNIT I**

**CONCEPTS OF BIG DATA:** Concept of Big Data Platform – Evolution and Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools- Applications of big data.

**UNIT II**

**MINING DATA STREAMS :**Introduction To Streams Concepts – characteristics, Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window, Role of high speed mass storage.

**UNIT III**

**HADOOP:** History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Map Reduction Working - Anatomy of a Map Reduce Job run Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

**UNIT IV**

**HADOOP ENVIRONMENT:** Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks Hadoop in the cloud.

**UNIT V**

**FRAMEWORKS:** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper. Visualizations - Visual data analysis techniques, interaction techniques.

**Text Books:**

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.
3. Anand Rajaraman and Jeffrey David Ullman,“Mining of Massive Datasets”, Cambridge University Press, 2012.

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: B.E. VIII Sem**

**Subject: Robotics lab**

**Total Mark in End Semester Exam: 40**

**Minimum Number of class tests to be conducted:**

**Branch: Mechanical Engg. (Production)**

**Code: 381861(37)**

**Total Practical Period:28**

**EXPERIMENTS TO BE PERFORMED (MINIMUM FIVE NUMBERS)**

1. To detect the sensor scanning system to overcome limitation of fixed sensors on various robotic applications, ultrasonic sensor, laser range finders, infrared detectors and miniature.
2. To find the horizontal and vertical movement up to 180o in either direction.
3. To detect objects with infrared ray detector.
4. To determine object distance (3cm – 300cm).
5. To detect distance (10cm to 80 cm) with infrared object detector.
6. To determine 5 Axis Robotic Arm movement and its degree of rotation.
7. To lift the object and place 100m away in various directions.
8. To find the gripper movement ( 0 to 50mm).
9. To study various Robotic Arm Configurations.
10. To study Pick and Place Robot

**LIST OF EQUIPMENTS/MACHINES REQUIRED**

1. 5 Axis Robotic Arm System
2. Hex Crawler Robot. The Mechatronics Robot
3. Ultrasonic Range Finder
4. Servo Power Supply
5. Infrared Object/Distance Detector
6. A 7.2V Battery Charger
7. Blue Tooth Transducer
8. Blue Tooth Pc Adaptor
9. Various Wooden Models to study Robotic Arm Configuration
10. Working model of Pick and Place Robot

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: B.E. VIII Sem**

**Subject: Industrial Automation Lab**

**Total Mark in End Semester Exam: 40**

**Minimum Number of class tests to be conducted :**

**Branch: Mechanical Engg. (Production)**

**Code : 381862(37)**

**Total Practical Period:28**

**LIST OF EXPERIMENTS TO BE PERFORMED**

1. Study of control valves, actuators, accumulators and pumps.
2. Study of hydraulic circuits - hydraulic press, machine tools, automobile systems, etc
3. Performance analysis of positive displacement pumps.
4. Comparative studies on hydraulic circuit design for suitable industrial applications.
5. Study of pneumatic circuits.
6. Study of automation in material handling system.
7. Use of microprocessors: Applications in manufacturing engineering.
8. Study and experiments in programmable logic controllers: Ladder logic programming

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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: B.E. VIII Sem**

**Branch: Mechanical Engg. (Production)**

**Subject: Computer Aided Simulation&Analysis Lab Code: 381863(37)**

**Total Mark in End Semester Exam: 40**

**Total Practical Period:28**

**Minimum Number of class tests to be conducted :**

**Experiments to be performed**

1. Generate Pseudo Random No. using different Techniques.
2. Develop an Analytical Model for a given physical system.
3. Develop a Monte-Carlo Simulation Model for a given physical system.
4. Find a area of an irregular 2-D shape using Monte-Carlo Simulation
5. Find the effectiveness of simulation on a physical Stochastic System
6. Develop an algorithm for a selected Simulated Study and write the program in a high level language.



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**SCHEME OF TEACHING AND EXAMINATION**

**B.E. MECHANICAL ENGINEERING (PRODUCTION)**

**Semester: BE VIII<sup>th</sup>**

**Subject: Report Writing & Seminar**

**Total No. of periods: 2 per week**

**Total marks in End Semester Exam: Nil**

**Minimum Number of class test to be conducted: 2**

**Branch: Mechanical Engg. (Production)**

**Code:381865 (37)**

**Total Tutorial Periods : Nil**

**Teacher's Assessment: 40 marks**

**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. Sharon J. Gerson & Steven M. Gerson "Technical Writing - Process& Product", Pearson Education.

**Reference Books:**

1. Sunita Mishra, "Communication Skills for Engineers" Pearson Education
2. Davies J.W. "Communication for engineering students", Longman
3. Eisenberg, "Effective Technical Communication", Mc. Graw Hill.