B. Tech. in Mechanical Engineering

Year 2nd **Sem 3rd**

(Revised Syllabus)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME301	DCS	MATERIAL SCIENCE	60	20	20	0	0	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) To acquaint students with the basic concepts and properties of Material Science. (B) To impart a fundamental knowledge of Materials Processing. (C) Selection and application of different Metals & Alloys. (D) To understand the structure of Engineering Materials.

Course Outcomes (COs):

1. An ability to apply advanced science (such as Chemistry and Physics) and engineering principles to material systems.
2. An integrated understanding of the scientific and engineering principles underlying the four major elements of the field of Metallurgical and Materials Engineering, namely structure, properties, processing and performance related to materials systems appropriate to the field.
3. An ability to apply and integrate knowledge from each of the four elements of the field (structure, properties, processing and performance) to solve materials selection and design problems.
4. An ability to design a system, component or process to meet desired needs.

Syllabus

Unit-I

Introduction: Importance of materials, Historical perspective, Classification of materials, Properties of materials, Types of Steels and C.I., Effect of alloying elements on the Mechanical properties of Steel & C.I., Selection of material.

Unit-II

Crystal Structure, Crystallography and Imperfections: Concept of unit cell space lattice, Bravias lattices, common crystal structures, Atomic packing factor and density, Miller indices, X-ray crystallography techniques. Imperfections, Defects & Dislocations in solids.

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Unit-III

Phase and Equilibrium Diagram: Unitary and Binary phase diagrams, Phase rules, Types of equilibrium diagrams: Solid solution type, eutectic type and combination type, cooling curve behavior of solid solution & alloys, Iron-Carbon Diagram.

Unit-IV

Heat Treatment: Various types of heat treatment, Annealing, Normalizing, Quenching, Tempering (Austempering, Martempering), and various case hardening processes, Time Temperature Transformation (TTT) diagrams, Diffusion, Diffusion of Solids.

Unit-V

Mechanical Properties and Testing: Stress strain diagram of Ductile & brittle materials, Stress Vs strength. Toughness, Hardness, Fracture, Fatigue and Creep. Testing of materials, Overview of Destructive Testing and Non-Destructive testing (NDT).

Reference Books:

1. *"Science of Engineering Materials", Smith, Prentice-Hall*
2. *"Materials Science and Engineering", Callister W. D., John Wiley*
3. *"Engineering Metallurgy", Higgins R. A., Viva books Pvt. Ltd., 2004.*
4. *"Material Science & Engg." Raghvan V., Prentice Hall of India, New Delhi. 2003*
5. *"Introduction to Physical Metallurgy", Avner, S.H., Tata McGraw-Hill, 1997.*
6. *"Mechanical Metallurgy", Dieter, G.E., McGraw-Hill, 1988.*
7. *"Material Science & Metallurgy for Engineers", Dr. V.D. Kodgire & S. V. Kodgire, Everest Publication.*
8. *"Mechanical Behavior & Testing of Materials", A. K. Bhargava, C.P. Sharma. P H I Learning Private Ltd.*
9. *"Material Science and Metallurgy", U. C. Jindal, Pearson Edu., 2012.*

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME302	DCS	PRODUCTION PROCESS	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

The purpose of the Production Technology course is to orient students to the basic resources, technical processes, industrial applications, and technological impacts related to manufacturing, construction, and servicing technology. The course will help students to: (A) Use and understand the verbal and symbolic language used to describe production systems and phenomenon. (B) Develop and present creative solutions to present and future production problems. (C) Identify and investigate potential career opportunities in the area of production. (D) Understand the evolution of production technology and its influence on our culture.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
2. Able to describe different casting processes
3. Able to describe and apply different welding techniques.
4. Able to describe and apply different operations in lathe machine. Milling machine, shaper and planner machines.

Syllabus

Unit - I

Introduction: Introduction to manufacturing process and importance of manufacturing for humankind, machine tools and their parts, types of cutting tools and tool materials, tool signature, Mechanisms of formation of chips, types of chips formed, chip Breakers, Factors causing wear, tool life, variables affecting tool life.

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Unit - II

Metal Casting Processes: Introduction to casting and foundry; basic principles of casting processes; Casting types sequence in foundry operations; Pattern making, material and allowances of pattern, Molding practice; ingredients of molding sand and core sand, Properties of sand. Sand testing; different molding processes. Defects in casting

Unit - III

Metal Cutting Processes: Importance of material removal, elements of metal machining, General principles working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine Universal drilling machine, Cylindrical grinding machine, Capstan and Turret lathe, Economics of machining.

Unit - IV

Metal Joining Process: Introduction to metal joining process; Types of welding processes. Arc Welding & Gas Welding Processes, TIG Welding, MIG Welding, Spot Welding, resistance welding, submerged arc welding, plasma arc welding, thermite welding, electron beam welding, laser beam welding, Defects & Inspection of Welding Joints, Electrodes, weldability of Metals, Welding equipment's, Differentiate between welding, soldering and brazing**.**

Unit - V

Metal Forming Processes: Fundamental of hot and cold working processes. Types and operation of processes: -Forging, press working, extrusion, rolling. process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing; press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters, forces, pressure and power requirements

Reference Books:

1. *Serope Kalpajian, Steven R. Schmidt, "Manufacturing Processes for Engineering Materials", 4/e, Pearson Education, Inc.2007.*
2. *R.K. Jain and S.C. Gupta, " Production Technology", Khanna Publishers. 16th Edition, 2001.*
3. *H.M.T. Production Technology–Handbook", Tata McGraw-Hill, 2000.*
4. *Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000. M. Adithan and A.B. Gupta, "Manufacturing Technology", New Age, 2006 Hajra Choudhury, "Elements of Workshop Technology", Vol. I and II, Media Promoters and Publishers Pvt., Ltd., Mumbai, 2005.*
5. *Nagendra Parashar B.S. and Mittal R.K., "Elements of Manufacturing Processes", Prentice- Hall of India Private Limited, 2007.*

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List of Experiments

1. To make the lap joint with the help of electric arc welding.
2. To make the lap joint with the help of TIG welding.
3. Prepare a casting with the sand casting process.
4. Introduction to Machining operations.
5. Introduction to Lathe Machine.
6. Introduction to Shaper Machine.
7. Machining and machining time estimation for taper turning.
8. Machining and machining time estimation for thread cutting.
9. Machining and machining time estimation for knurling.
10. Machining of square in shaping machine.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME303	DCS	STRENGTH OF MATERIALS	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A)To gain knowledge of different types of stresses, strain and deformation induced in the mechanical components due to external loads. (B)To study the distribution of various stresses in the mechanical elements such as beams, shafts etc. (C) To study effect of various loading conditions of column and gain knowledge of theories of failure.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Define and memorize mechanical properties of material & select appropriate material for a given working Conditions.
2. Explain simple stresses, bending stress, shear stress, torsion stress, principle stresses, thin and thick cylinder, shaft, springs, columns and theories of failures.
3. Calculate and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
4. Design of shaft and pressure vessels.
5. Justify bending equation and torsion equation and use it to solve the numerical.

Syllabus

Unit- 1

Introduction: Stress-Strain, uni-axial, bi-axial and tri-axial stresses, tensile & compressive stresses, shear stress, Stress Strain Diagram, Poisson's Ratio, Modulus of elasticity, Modulus of rigidity, Bulk modulus, Factor of safety.

Unit- II

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Simple & Compound Stresses: Deformation due to self-weight, bars of varying sections, composite sections, principle of superposition, strain energy, Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analyses, Thermal Stress.

Unit– III

Bending and Deflection: Symmetric member, Deflection of beams, deformation and stress, bending of composite sections, Macaulay's method and Area moment method for deflection of beams.

Unit– IV

Torsion: Torsion of circular shafts-solid and hollow, Strength of Shaft and composite shaft, combined bending and torsion, strain energy due to torsion.

Unit– V

Columns and Theories of Failure: Buckling load, Types of end conditions for column, Euler's column theory and its limitations, Rankine- Gordon Formula, Theories of failures: Maximum principal stress theory, Maximum principal strain theory, maximum shear stress theory; maximum strain energy theory, maximum shear strain energy theory; Application of theories to different materials and loading conditions.

Reference Books:

1. *Strenght of Materials, Dr. R.K. Bansal, Lakshmi Publications, New Delhi.*
2. *Strength of Materials, Basavarajaiah and Mahadevappa, Khanna Publishers, New Delhi.*
3. *Mechanics of Materials, James M. Gere (5th Edition), Thomson Learning*
4. *Strength of Materials—S. Ramamrutham, Dhanpat Rai Pvt. Ltd.*
5. *Mechanics of Materials—S. S. Rattan, TMH Pvt. Ltd.*
6. *Strength of Materials, Subramanyam, Oxford University Press, Edition 2005*
7. *Elements of Strength of Materials, Timoshenko and Young Affiliated East-West Press*
8. *Strength of Materials, Singer Harper and Row Publications*
9. *Mechanics of Structures—S. B. Junnarkar, Charotar Publication.*
10. *Mechanics of Materials, B.C Punmia Ashok Jain, Arun Jain, Lakshmi Publications, New Delhi.*
11. *Strength of Materials—W. Nash, Schaum's Outline Series, McGraw Hill Publication.*
12. *Strength of Materials, S.S. Bhavikatti, Vikas Publishing House Pvt Limited.*

List of Experiments

1. Perform Brinell and Rockwell Hardness tests to find BHN and RHN for given specification.
2. Perform Izod/ Charpy impact test.
3. Perform Fatigue test.
4. Perform Torsion test.
5. To find tensile strength of given specimen by tensile test on MS and CI using UTM.
6. Perform Direct/cross Shear test on MS and CI by UTM.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME304	DCS	ENGINEERING THERMODYNAMICS	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A)To gain knowledge of Basic Concepts of thermodynamics. (B)To study of First law of Thermodynamics. (C)To gain knowledge of Second law of thermodynamics. (D)To gain knowledge of Entropy and Entropy. (E)To study of Gas Power cycles. (F)To study of Properties of gases and gas mixtures.

Course Outcomes (COs):

After learning the course, the students should be able to

1. Understand basic terms used in thermodynamics.
2. Understand laws of thermodynamics and its applications.
3. Comprehend the concept and applications of energy, entropy and exergy.
4. Understand various gas and vapor power cycles.
5. Understand the properties of gas mixtures.

Syllabus

Unit - 1

Basic Concepts: Microscopic & macroscopic point of view, thermodynamic system and control volume, thermodynamic properties, processes and cycles, work and heat, Thermodynamic equilibrium, Quasi-static process, work transfer and heat transfer processes.
First law of Thermodynamics: First law for a closed system undergoing a cycle and change of state, energy, PMM1, first law of thermodynamics for steady flow process, steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, heat exchanger and throttling process, filling and emptying process.

Unit – II

Second law of thermodynamics: Limitations of first law of thermodynamics, Kelvin-Planck and Clausius statements and their equivalence, PMM2, causes of irreversibility, Carnot theorem, corollary of Carnot theorem, thermodynamic temperature scale.

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Unit - III

Entropy: Clausius theorem, property of entropy, inequality of Clausius, entropy change in an irreversible process, principle of increase of entropy, entropy change for non-flow and flow processes, third law of thermodynamics.

Unit - IV

Energy: Energy of a heat input in a cycle, exergy destruction in heat transfer process, exergy of finite heat capacity body, exergy of closed and steady flow system, irreversibility and Gouy-Stodola theorem and its applications, second law efficiency.

Unit - V

Gas Power cycles: Recapitulation of Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Brayton cycle, effect of reheat, regeneration, intercooling and turbine and compressor efficiency on Brayton cycle.

Properties of gases and gas mixtures: Avogadro's law, equation of state, ideal gas equation, Vander Waal's equation, reduced properties, law of corresponding states, compressibility chart, Gibbs-Dalton law, internal energy; enthalpy and specific heat of gas mixtures.

Reference Books:

1. *Engineering Thermodynamics by P.K. Nag, McGraw-Hill Education.*
2. *Fundamentals of Thermodynamics by Borgnakke & Sonntag, 7th Ed. Wiley India (P) Ltd.*
3. *Thermodynamics – Engineering Approach by Yunus Cengel & Boles, McGraw-Hill Education.*
4. *Engineering Thermodynamics by Gordon Rogers and Yon Mayhew, Pearson Education Ltd.*
5. *Engineering Thermodynamics by Krieth, CRC Press.*
6. *Engineering Thermodynamics by Jones and Dugan, PHI Learning Pvt. Ltd.*

List of experiments

1. Study of positive displacement work (PdV work) and Heat transfer for various processes.
2. Study of First Law of Thermodynamic.
3. Study of second Law of thermodynamic.
4. Determination of efficiency of Otto cycle.
5. Determination of efficiency of Diesel cycle.
6. Study of Properties of gases and gas mixtures.
7. Study of entropy of system.
8. Study of steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, heat exchanger and throttling process.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME305	DCS	MACHINE DRAWING	0	0	0	30	20	0	0	4	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

This course provides comprehensive knowledge of (A) production drawing, (B) assembly drawings and (C) orthographic Sectional views and use of (D) computer applications in production drawing.

Course Outcomes (COs):

1. Students will be able to understand all drawing conventions, symbols and concepts of machine drawing Creation.
2. Student would be able to convert functional specification of mechanical engineering parts and assembly requirements into manufacturing drawing in a manner consistent with standards.
3. Students will be able to interpret manufacturing and assembly drawings and acquire skill in preparing production drawings pertaining to various designs.
4. On completion of this course the students will be able to acquire knowledge of the applications of computers in design, parts creation, assembling and production drawing creation, mechanism and manufacturing activity.

Syllabus

Unit – 1

Introduction of Machine Drawing and Drawing Conventions: Introduction, classification of machine drawings, principles of drawing, elements of drawing, types of machine drawing, Drawing standards, Drawing Instruments, sheet layout and title block, Application of types of lines, lettering and numbering, Sketching, Dimensioning, screw threads, screw fastening bolt, nut, washer, screw, locking arrangements of nuts, foundation bolts, keys, cotter-joints and pin joint, pipe joint and valves, Riveted joints and welded joints, shaft bearings, brackets and hangers, shaft coupling, clutches and brakes.

Drawing Conventions and Symbols: Conventional materials**,** Conventional breaks, Convention of rivets and bolts, welding conventions, Convention of roughness of surface, Convention of

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machine operation and parts, Convention of gear and gear transmission, convention of springs, Symbolic Representation of fasteners, Holes and bolts, profile section, pipe fittings and valve symbols, Electric symbols.

Unit – II

Production Drawing Elements and Assembly Drawings: Introduction, geometric tolerance types and representation, dimensional tolerance types and representation, Limits and fits, hole basis and shaft basis system of fits, surface roughness, indication of surface roughness, roughness value and grade symbol, Assembly concepts, introduction, types, sequence of preparing the assembly drawing, sectional views, convention in sectioning, bill of materials, plotting techniques.

Assembly drawing

Shaft joints: knuckle joint, cotter joints and types etc.

Keys & Shaft coupling: Muff, Flanged, Flexible, Universal and Oldham's coupling etc.

Pipe joint: Flanged joint, Socket and Spigot joint, Hydraulic joint, Union joint, Gland & Stuffing Box etc.

Bearing: Plummer block, Pedestal bearing etc.

Engine Parts: Steam engine, Piston, connecting rod, Stuffing box, cross head, crank shaft etc.

Unit - III

Orthographic Conversion, Sectional and Interpretation of Views: Principle and method of projection, orthographic projection, first angle, third angle, isometric, oblique and perspective projection, conversion of pictorial views into orthographic views illustrative problems,

Sectional views and Interpretation: Types of sectional views, full section, half section, partial section, removed section, revolved section, offset section, sectioning conventions. Reading of orthographic views, blue print reading, missing lines and views, identification of planes, illustrative problems.

Unit – IV

Production and Assembly Drawing Creation through CAD: Introduction to CAD, Why CAD Software, Scope, objective, benefit and limitations, CAD Interface, Coordinate system, Create Objects and Modify Object. Layers & Blocks, Text, Table & Dimensions, Introducing Printing, Plotting, and Layouts.

Drawing practice sheet: Indicate the surface roughness symbols, welding symbols, tolerances, all production drawing symbols and conventions in drawing practice sheets of AutoCAD Mechanical.

Parts Assembly, Visualization & Graphics standards: Assembly Creation methods, Parts Modeling & Representation, Assembly Constraints, Mechanism & Mechanism Analysis, Mass Properties

Data exchange standards – IGES – STEP – CALS – DXF – STL.

Reference Books:

1. *Machine drawing- N.D. Bhatt. & V.M. Panchal, published by Charotar publishing house.*

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2. *Machine Drawing & Design, Dr. K.K. Dwivedi & Dr. M. Pandey, Dhanpat Rai Publications.*
3. *Machine drawing – P.S. Gill S.K. Kataria & Sons Delhi.*
4. *Fundamentals of Machine Drawing by Sadhu Singh & Shah, PHI*
5. *Machine drawing – T. Jones.*
6. *Machine Design by-J.E. Shigly-McGraw Hill Publications.*
7. *Design of Machine Elements from V.B. Bhandari, TMH Publications.*
8. *Introduction to Engineering Design, McGraw Hill.*
9. *Mastering CAD George Omura with Brian Benton Autodesk.*
10. *Machine Design – P.C. Sharma & D.K. Agrawal-Kataria & Sons Publications.*
11. *Principles of Mechanical Design - R. Phelan – McGraw Hill Pub.*
12. *Machine Design - An Integrated Approach Robert-L-Norton Published by Addison Wesley Longman*
13. *(Singapore) Machine Design – M. F. Spott – PHI*
14. *Machine Design, Theory & Practice – J. Michels Walter, E. Wilson Charles – Add MacMilan Publishers, New York.*

List of Experiments

Assembly Drawing and design problem as per given syllabus.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTCS307	ODS	COMPUTER PROGRAMMING II	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) To explain the object oriented concepts. (B) To write programs using object-based programming techniques including classes, objects and inheritance. (C) To aware of the important topics and principles of software development. (D) To write a computer program to solves specified problems. (E) To use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes (COs):

Student will be able

1. To explain & implement the Object Oriented Programming concepts.
2. To explain packages and interfaces using Java program.
3. To implement Exception Handling in Java.
4. To design graphical user interface and Event Handling in Java.
5. To develop and deploy Applet in Java.

Syllabus

Unit - I

Java Fundamentals: Features of Java, OOPs concepts, Java virtual machine, Byte code interpretation. Data types, variable, arrays, expressions, operators, and control structures, Objects, Introduction to Class: Instance members and member functions, constructors, constructor overloading, Static Method, Static classes, Inner classes

Unit - II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Inner Classes, String Handling, Wrapper classes.

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Unit - III

Inheritance, Polymorphism and Collection: Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages, Collections.

Unit - IV

Exception Handling and Multithreading: Need for exceptions, Exception hierarchy: Checked Unchecked exceptions, Try, catch, finally, Throw, throws, creating exceptions. Thread Life cycle, Multi-threading advantages and issues, Simple thread program, Priorities and scheduling, Thread Synchronization.

Unit - V

Java I/O, Applets, Event Handling, and Database Connectivity: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling. Swing components: Applet, Button, Frame, etc. Sample swing programs. JDBC architecture, establishing connectivity and working with connection interface. Working with statements, Creating and executing SQL statements, working with Result Set.

Reference Books:

1. *Java- Head First 2nd edition Kathy Sierra, Bert Bates.*
2. *Programming with Java a Primer, E. Balaguruswamy Tata McGraw Hill Companies.*
3. *Java Programming John P. Flynt Thomson 2nd.*
4. *Java Programming Language Ken Arnold Pearson.*
5. *The complete reference JAVA2, Hervert schildt. TMH.*
6. *Big Java, Cay Horstmann 2nd edition, Wiley India Edition.*

List of Experiments (Expandable)

Programming assignments may be given to students so that they can better understand the concepts of object oriented programming such as objects, classes, class-relationships, association, aggregation, inheritance, polymorphism etc.
Installation of J2SDK

1. Write a program to show Scope of Variables
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA Write a program to show
4. How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Access Specifiers (Public, Private, Protected) in JAVA

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8. Write a program to show use and Advantages of CONTRUCTOR
9. Write a program to show Interfacing between two classes
10. Write a program to Add a Class to a Package
11. Write a program to show Life Cycle of a Thread
12. Write a program to demonstrate AWT.
13. Write a program to Hide a Class
14. Write a Program to show Data Base Connectivity Using JAVA
15. Write a Program to show "HELLO JAVA" in Explorer using Applet
16. Write a Program to show Connectivity using JDBC
17. Write a program to demonstrate multithreading using Java.

14/9/17
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Vice Chancellor
Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B. Tech. in Mechanical Engineering

Year 2nd **Sem 3rd**

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
ML301	DES	ENVIRONMENT AND ENERGY STUDIES	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 40 marks

Course Educational Objectives (CEOs):

(A) To understand sources of information required for addressing environmental challenges (B) To identify a suite of contemporary tools and techniques in environmental informatics (C) To apply literacy, numeracy and critical thinking skills to environmental problem-solving

Course Outcomes (COs):

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Syllabus

Unit - I

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

Unit - II

Natural Resources: Classification of Resources: Living and Non - Living resources, water

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resources, use and over utilization of surface and ground water, floods and droughts.

Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.

Unit - III

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

Unit - IV

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values -. Biodiversity at global, National and local levels. - . India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts; Conservation of biodiversity: In-situ and Exist conservation. National biodiversity act.

Unit – V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Reference Books:

1. *Agarwal, K.C., (latest edition). Environmental Biology, Bikaner: Nidi Pub. Ltd.,*
2. *Brunner R.C. (latest edition) Hazardous Waste Incineration, McGraw Hill Inc.*
3. *Clank R.S.., (latest edition. Marine Pollution, Clanderson Press Oxford (TB).*
4. *Environmental Encyclopedia, Jaico Pub. Mumbai,*
5. *De A.K (latest edition) Environmental Chemistry, Wiley Western Ltd.*
6. *Erach Bharucha (2005). Environmental Studies for Undergraduate Courses by for University Grants Commission.*
7. *R. Rajagopalan (2006). Environmental Studies. Oxford University Press.*
8. *M. AnjiReddy (2006). Textbook of Environmental Sciences and Technology. BS Publication.*
9. *Richard T. Wright (2008). Environmental Science: towards a sustainable future PHL Learning Private Ltd. New Delhi.*

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10. *Gilbert M. Masters and Wendell P. Ela. (2008). Environmental Engineering and science. PHI Learning Pvt Ltd.*

11. *Daniel B. Botkin & Edwards A. Keller (2008). Environmental Science Wiley INDIA edition.*

12. *Anubha Kaushik (2009). Environmental Studies. New age international publication.*

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