

**Syllabus for**  
**Applied Mathematics- IV (Mech. Engg.)**  
**Scheme (Theory: 4 hrs., Tutorial :1 hr)**

**UNIT – I: NUMERICAL METHODS (08Hrs)**

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position, Newton–Raphson method and their convergence, Newton–Raphson method for multiple roots, Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordan method, Crout's method and Gauss-Seidel method.

**UNIT – II: NUMERICAL METHODS (08Hrs)**

Numerical solution of ordinary differential equations: Taylor's series method, Runge- Kutta 4<sup>th</sup> order method, Euler's Modified Method, Milne's Predictor-Corrector method, Runge- Kutta method to solve Simultaneous first order differential equations. Largest Eigen value and Eigen vector by Iteration method.

**UNIT – III: Z-TRANSFORM (10Hrs)**

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

**UNIT - IV: SPECIAL FUNCTIONS AND SERIES SOLUTION(12Hrs)**

Series solution of differential equation by Frobenius method, Bessel's functions, Legendre's polynomials, Recurrence relations, Rodrigue's formula , Generating functions, Orthogonal properties of  $J_n(x)$  and  $P_n(x)$ .

**UNIT – V: RANDOM VARIABLES & PROBABILITY DISTRIBUTIONS (12Hrs)**

Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution, Mathematical Expectation, Functions of random variables, Variance & Standard Deviation, Moments, Moment generating function, Characteristic function.

## **UNIT – VI: SPECIAL PROBABILITY DISTRIBUTIONS AND RANDOM PROCESS (10Hrs)**

Geometric, Binomial, Poisson, Normal, Exponential, Uniform and Weibull probability distributions.

Random Processes: Ensemble average and time average, Auto correlation and cross-correlation, Stationary random processes, Power spectrum and Ergodic random processes.

### Text Books:

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills
3. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
4. Probability, Statistics and Random Processes by T. Veerarajan..

### Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI.
2. A Text Book of applied Mathematics, Volume I & II by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan.
3. Advanced Mathematics for Engineers by Chandrika Prasad.
4. Probability and Statistics for Engineers 4<sup>th</sup> Ed. By Miller, Freund and Johnson.
5. Probability, Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi.
6. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

**B.E. (MECHANICAL ENGINEERING): FOURTH SEMESTER**

**BEME402T: ENGINEERING THERMODYNAMICS (Theory)**

**CREDITS: 04**

**Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

**Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course provides the basic knowledge about Thermodynamic laws and relations, their application to various processes. At the end of this course, student will be able to understand the thermodynamic laws and their applications, the concept of entropy and availability, thermodynamic relations, and shall understand the various thermodynamic processes & cycles.

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**UNIT – I**

**[ 8 Hrs.]**

Introduction to Thermodynamics: Basic concepts of Thermodynamics, Systems and its forms, Property, State, Process, Cycles, Thermodynamics equilibrium, temperature, Zeroth law of thermodynamics, Introduction to First law of thermodynamics, Energy transfer, Heat and Work, Mechanical form of work, Non-mechanical form of work.

Ideal Gas: Gas laws-Boyle's law, Charles's law, Avagadro's law, Equation of state, Specific Heat, Universal gas constant, Constant pressure, Constant volume, Isothermal, Isentropic and Polytropic process on P-V Diagram.

Calculation of Heat transfer, Work done, Change in Internal Energy and Enthalpy.

**UNIT – II**

**[ 8 Hrs.]**

First law of Thermodynamics for Closed System undergoing a process and cycle (Control Mass System) and Open System (Control Volume System), Steady Flow process apply to Nozzle, Turbine, Compressor, Pump, Boiler, Throttling Device, Heat Exchanger. (Analytical treatment on First law applied to closed and open system is expected).

**UNIT – III**

**[ 8 Hrs.]**

Second Law of Thermodynamics:- Introduction, Thermal Energy Reservoirs, Kelvin-Planck and Clausius Statements, Heat Engine, Refrigerator, Heat Pump, Perpetual Motion Machine I and II, Carnot Cycle, Thermodynamic Temperature scale.

Entropy: Clausius Inequality, Entropy, Principle of increase of Entropy, Change in Entropy for different Thermodynamics Processes with T-S Diagram, Reversible and Irreversible Processes, Availability.(Simple analytical treatment is expected)

**UNIT – IV**

**[ 8 Hrs.]**

Properties of Steam: - Sensible Heat, Latent Heat, Critical State, Triple Point, Wet Steam, Dry Steam, Superheated Steam, Dryness Fraction, Internal Energy of Steam, External Work Done during Evaporation, T-S Diagram, Mollier Chart, Work and Heat Transfer during various

Thermodynamic Processes with steam as working fluid, Determination of Dryness Fraction using various Calorimeter. (Analytical Treatment using steam table and Mollier chart is expected)

**UNIT – V**

[ 8 Hrs.]

Vapour Power Cycle:- Introduction, Vapour Carnot Cycle, Rankine Cycle, Method to increase Thermal Efficiency, Reheat-Rankine Cycle, Regenerative Rankine Cycle with opened and closed feed water heaters.

**UNIT – VI**

[ 8 Hrs.]

Air Standard Cycles: - Otto Cycle, Diesel Cycle, Dual Cycle, Brayton Cycle, Stirling Cycle, Ericsson Cycle (Work done & efficiency analysis is expected)

**TEXT BOOKS:**

1. Engineering Thermodynamics, P. K. Nag, Tata McGraw-Hill Publications
2. Thermal Engineering, P. L. Ballani, Khanna Publications
3. Engineering Thermodynamics, S.S. Khandare, Charotar Publication House

**REFERENCE BOOKS:**

1. Thermodynamics and Engineering approach, Yunus A. Cengel, Michael A. Boles, Tata McGraw-Hill Publications
2. Engineering Thermodynamics, D. P. Mishra, Cengage Learning Publications
3. Engineering Thermodynamics, Gordon Rogers, Pearson Publications
4. Thermodynamics, S. C. Gupta, Pearson Publications

## **BEME403T: HYDRAULIC MACHINES (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course includes hydraulic turbines, centrifugal pumps, positive displacement pumps and miscellaneous water lifting devices. At the end of this course, students will understand practical applications of fluid; based on momentum and angular momentum principles involved in hydraulic machines. They will also understand design parameters and performance characteristics of various hydraulic machines & devices.

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### **UNIT – I [ 8 Hrs.]**

Compressible Flow:- Speed of Sound and the Mach Number, Isentropic Nozzle Flow, Normal Shock Wave, Shock Wave in Convergent-Divergent Nozzle, Vapour flow through Nozzle, Oblique Shock Wave, Isentropic Expansion. Introduction to impact of jet.

### **UNIT – II [ 8 Hrs.]**

Theory of turbo machines and their classification, Elements of hydro-electric power plant, Impulse Turbine:- principle, constructional features, Installation of Pelton Turbine, Velocity Diagram and Analysis, Working proportions, Design parameters, Performance characteristics, Governing.

### **UNIT – III [ 8 Hrs.]**

Reaction or pressure Turbine:- principles of operation, Degree of reaction, comparison over Pelton Turbine, Development of reaction turbine, Classification, Draft tube, Cavitation in Turbine, Francis Turbine, Propeller Turbine, Kaplan Turbine:- Types, Constructional features, Installations, Velocity Diagram and analysis, Working proportions, Design parameters, Performance characteristics, Governing, selection of turbines.

### **UNIT – IV [ 8 Hrs.]**

Hydrodynamic pumps:- Classification and Applications, Centrifugal pumps:- Principle of operation, Classification, Component of Centrifugal Pump installation, Priming methods, Fundamental equation, Various heads, Velocity heads, Velocity triangles and their analysis, slip factor, Effect of outlet blade angle, Vane shapes, Losses and Efficiencies of pumps, Multi staging of pumps, Design Consideration, Working proportions, N.P.S.H., Cavitations in pumps, Installation and operation, Performance characteristics, Pump and system matching and Introduction to self priming pumps.

### **UNIT – V [ 8 Hrs.]**

Positive Displacement Pumps:- Basic principle, Classification, Reciprocating Piston / Plunger Pumps:- Types, Main Components, Slip, Work Done, Indicator Diagram, Cavitations, Air vessels, Gear pump, Screw pump, Vane pump.

## **UNIT – VI**

**[ 8 Hrs.]**

Similitude: - Types of similarities, Dimensionless number and their significance, Unit and Specific Quantities, Model Testing: - Application to hydraulic turbine and hydrodynamic pumps, Miscellaneous Water Lifting Device: - Air lift pumps, Hydraulic Ram, Submersible pump, Regenerative pumps.

### **LIST OF TUTORIALS:**

- 1) Selection of Turbine
- 2) Design of centrifugal Pumps
- 3) Design of Francis Turbine
- 4) Design of reciprocating Pumps
- 5) Governing of Turbines
- 6) Study of Hydro-Kinetic System

### **TEXT BOOKS:**

1. Fluid Mechanics & Fluid Power Engineering – D. S. Kumar, S.K. Kataria & Sons Publications
2. Fluid Mechanics & Machines – R. K. Bansal, Laxmi Publications

### **REFERENCE BOOKS:**

1. Fluid Mechanics with Engineering Applications, E. Finnemore & Franzini, Tata Mc-Graw Hill
2. Hydraulic Machines-Theory and Design, V. P. Vasandani, Khanna Publishers
3. Fluid Mechanics, A. K. Jain, Khanna Publishers
4. Hydraulic & Compressible Flow Turbo-machines, A. T. Sayers, Mc-Graw Hill
5. Mechanics of Fluids, Merle C. Potter, CL-Engineering
6. Fluid Mechanics, John F. Douglas, Pearson

## **BEME403P: HYDRAULIC MACHINES (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

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### **LIST OF PRACTICALS:**

Minimum Eight out of following shall be performed:

1. To determine the metacentric height of given floating vessel.
2. To verify Bernoulli's theorem.
3. To find the value of co-efficient of given venture meter fitted in a pipe.
4. To find the value of co-efficient of Discharge for a given orifice meter.
5. Performance characteristics of Pelton wheel.
6. Performance characteristic of Francis Turbine.
7. Performance characteristic of Kaplan Turbine.
8. Performance characteristic of Reciprocating pump.
9. Performance characteristic of Variable speed pump.
10. Performance characteristic of Axial Flow Pump.
11. To find friction losses in pipe.
12. To determine co-efficient of discharge in pipes.

## **BEME404T: MACHINING PROCESSES (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** The study of machine tools & metal cutting is fundamental to mechanical engineering. This course includes the working of mechanisms of various machine tools and machining principles. The learning outcomes include concept of theory of metal cutting & force analysis, understanding the objectives of the various machine tools, constructional details and mechanisms involved in various machine tools. This course is aimed also to identify the machining parameters, different types of cutting tool materials, cutting fluids and their properties. Upon completion of this course, students shall understand the importance of machining processes and be able to apply the suitable machining processes for an engineering product.

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### **UNIT – I**

**[ 8 Hrs.]**

Introduction to Machining Parameters: Introduction to machining, Tool materials, nomenclature and tool geometry of single point cutting tool, tool materials properties, classification, HSS, carbide tool, coated tools, diamond coated tool.

Theory of Metal Cutting: Introduction. Orthogonal and Oblique cutting. Mechanics of Metal Cutting, shear plane, Stress, Strain and cutting forces. Merchant's circle, Chip formation, cutting force calculations, Determination of Torque and power required for turning Drilling and Milling. Influence of tool angle, cutting fluids, cutting speed, feed and depth of cut on power requirement, Estimation of tool life.

### **UNIT – II**

**[ 8 Hrs.]**

Lathe: Introduction. type, construction of simple lathe mechanism and attachments for various operations, machine specifications, basis for selection of cutting speed. feed and depth of cut, time estimation for turning operations such as facing, step turning, taper turning, threading, knurling.

Introduction to Capstan & Turret Lathe.

### **UNIT – III**

**[ 8 Hrs.]**

Shaper: Introduction, type, specification, description of machines, hydraulic drives in shapers, cutting parameters. Mechanism of shaper: Quick return mechanism, Crank & slotted link mechanism, Table feed mechanism, attachments for shaper, work holding devices, shaper operations, time estimation for shaping operations.

Slotter : Introduction, specifications, description, type of drives for slotter, types of slotting machines -production slotter, puncher slotter, tool room slotter, slotter tools. Planer: Introduction, specifications, description. type of planner, open side planner, pit planner Mechanism for planner: Driving mechanism, feeding mechanism, planner cutting tools, cutting parameters.

**UNIT – IV****[ 8 Hrs.]**

Milling: Introduction. Specification, types, column & knee type milling machine, fixed bed type milling machines, production milling machines, special purpose milling machines such as thread milling Machines, profile milling machine, Gear Milling/Hobbing machines. Mechanisms & Attachments for Milling. Cutting, parameters, Types of milling operations, Types of milling cutters, Tool geometry & their specifications. Indexing- simple, compound and differential.

**UNIT – V****[ 8 Hrs.]**

Grinding operations, grinding wheel, specifications & selection, cylindrical & centreless grinding operation, surface grinding, tool & cutter grinding, time estimation for grinding operations. Super finishing process: Honing, Lapping, super finishing, polishing, buffing, metal spraying, galvanizing and electroplating. Process parameters and attainable grades of surface finish, surface measurement.

**UNIT – VI****[ 8 Hrs.]**

Drilling: introduction, tools for drilling, classification of drills, twist drills, drill size and specifications, tipped drills, type of drilling machines-portable drilling machine. bench drilling machine, right drilling machine, radial drilling machine, universal drilling machine, multisided drilling machine. Drilling machines operations, time estimation for drilling. Reaming: Introduction, description of reamer, type of reaming operations. Boring: Introduction, types of boring machine, horizontal boring machine, vertical boring machine, jig machine, micro boring. boring operations. Broaching: Introduction, type of broaches, nomenclature of broaches. types of broaching machines.

**TEXT BOOKS:**

1. Workshop technology (Vol. II), V. S. Raghuvanshi, Dhanpat Rai & Sons
2. Manufacturing Science, Ghosh & Mallik, East West Press
3. Manufacturing technology (Metal cutting & Machine tools) Vol. II, P. N. Rao, Tata Mc-Graw Hill
4. Workshop technology, H. S. Bawa, Tata Mc-Graw Hill
5. Introduction to Manufacturing Processes, J. A. Schey, Tata Mc-Graw Hill
6. Workshop Technology (Volume II), Hajra Chaudhary, Media Promoters & Publishers

**REFERENCE BOOKS:**

1. Manufacturing Engineering & Technology, S. Kalpakjian & S.R. Schmid
2. Technology of Machine Tools, Krar & Oswald
3. Manufacturing Processes, M. Begman
4. Processes & Materials of Manufacture, R. Lindberg
5. Production Technology, HMT

## **BEME404P: MACHINING PROCESSES (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

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### **LIST OF PRACTICALS:**

Minimum Eight out of following shall be performed:

1. Study of Single Point Cutting Tool.
2. Study of Various forces on single point cutting tools.
3. Study of multiple point cutting tools (milling, drilling)
4. Study of Lathe Machine.
5. Study of Shaper mechanisms.
6. Study of Broaching machines.
7. One Job on Milling.
8. One Job on Drilling, Boring
9. One Job on Thread Cutting, Taper Turning.
10. One Job on Surface Grinding.
11. One Job on Shaper.

## **BEME405T: MECHANICS OF MATERIAL (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes:** This course is designed to understand the basic concepts of stress, strain and their variations under different types of loading. It includes the basic concepts involved in mechanics of materials, bending moment, shear force, stresses in beams, slope and deflection in beams under different loading and support conditions, understanding of torsional shear stress in shaft, crippling load in struts and columns. At the end of this course, students will be able to analyze different stresses, strains and deflections in a simple mechanical element under various loading and support conditions.

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### **UNIT – I**

**[ 8 Hrs.]**

Concept of simple stresses and strains: Introduction, stress, strain, types of stresses, stress and strain diagram for brittle & ductile material, elastic limit, Hooks law, modulus of elasticity, modulus of rigidity, factor of safety, analysis of tapered rod, analysis of composite section, thermal stress and strain.

Longitudinal strain & stress, lateral stresses and strains, Poisson's ratio, volumetric stresses and strain with uni-axial, bi-axial & tri-axial loading, bulk modulus, relation between Young's modulus and modulus of rigidity, Poisson's ratio and bulk modulus.

### **UNIT – II**

**[ 8 Hrs.]**

Shear force and bending moment: - Types of beam (cantilever beam, simply supported beam, overhung beam etc.), Types of loads (Concentrated and UDL), shear force and bending moment diagrams for different types of beams subjected to different types of loads, sign conventions for bending moment and shear force, shear force and bending moment diagrams for beams subjected to couple, Relation between load, shear force and bending moment.

Stresses in beams: - Pure bending, theory of simple bending with assumptions & expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.

Shear stresses in beams: - Concept, derivation of shear stress distribution formula , shear stress distribution diagram for common symmetrical sections, maximum and average shear stress.

### **UNIT – III**

**[ 8 Hrs.]**

Deflection of beams:- Deflection & slope of cantilever, simply supported, overhung beams subjected to concentrated load, UDL, Relation between slope, deflection & radius curvature Macaulay's method to determine deflection of beam.

Principal stresses and strains:- Definition of principal planes & principal stresses, analytical method of determining stresses on oblique section when member is subjected to direct stresses in one plane in mutually perpendicular two planes, when member is subjected to shear stress and direct stresses in two mutually perpendicular planes, Mohr's circle for representation of principal stresses.

## UNIT-IV

[ 8 Hrs.]

Torsion of circular shafts: - Derivation of torsion equation with the assumptions made in it. Torsion shear stress induced in the shaft, when it is subjected to torque. Strength and rigidity criterion for design of shaft. Torque transmitted by solid & hollow circular shaft. Equivalent twisting and bending moment in shaft when it is subjected to bending moment, torque & axial load. Column & Struts: - Failure of long & short column, slenderness ratio, assumptions made in Euler's column theory, end conditions for column. Expression for crippling load for various end conditions of column and derivation on column with both ends hinged. Effective length of column, limitations of Euler's formula, Rankine formula.

## UNIT-V

[ 8 Hrs.]

Introduction to fracture mechanics: - Modes of fracture, stress intensity factors, crack propagation, creep phenomenon.

Strain energy & impact loading: - Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads & impact loads. Strain energy stored in bending & torsion.

## UNIT-VI

[ 8 Hrs.]

Factor of safety, Statistical methods in determining factor of safety. Theories of failure, modes of failure, compound stresses, eccentric axial loading, variable stresses in machine parts, Endurance, S-N Curve, stress concentration & stress raisers, notch sensitivity, stress concentration factor, methods for reducing stress concentration. Goodmans criteria, Soderberg criteria, Gerber's criteria, fatigue design for finite and infinite life of the parts subjected to variable loads with uniform cross section.

### LIST OF TUTORIALS:

- 1) Two problems on principle stresses
- 2) Two problems on Mohr's circle
- 3) Two problems on Thermal stresses with heat flow
- 4) Three problems on S.F. & B.M. diagrams
- 5) Two problems on Stresses in beam bending
- 6) Two problems on shear stresses
- 7) Two problems on Macaulay's methods
- 8) Two problems on area moment method
- 9) Two problems on shafts
- 10) Two problems on columns & struts
- 11) Two problems on compound loading
- 12) Two problems on fatigue & variable loads

### TEXT BOOKS:

1. Elements of Strength of Materials, S. Timoshenko and O.H.Young, East West Press Private Ltd.
2. Strength of Materials, R K Bansal, Laxmi Publications
3. Strength of Materials, Ramamurtham, Dhanapat Rai Publication.
4. PSG Data Book.
5. Design Data for Machine Elements, B.D. Shiwalkar, Denett & Company
6. Strength of Material, R.K. Rajput, S.Chand Publication

**REFERENCE BOOKS:**

1. Strength of Material, Ferdinand L. Singer, Harper and Row, New York
2. Elements of Strength of Materials, V. Natarajan, Oxford & IBH Publishing Company
3. Strength of Materials, S S Rattan, Tata McGraw-Hill
4. Mechanics of Material, Beer & Johnson, Tata Mc-Graw Hill

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## **BEME405P: MECHANICS OF MATERIAL (Practical)**

**CREDITS: 01**

### **Teaching Scheme**

Practical: 2 Hours/Week

### **Examination Scheme**

University Assessment: 25 Marks

College Assessment: 25 Marks

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### **LIST OF PRACTICALS:**

Minimum Eight Practicals out of following areas shall be performed:

#### 1. Study of Universal Testing Machine

1. Tension test on metals.

2. Compression test on materials.

3. Shear test on metals.

4. Impact test on metals.

5. Hardness test on metals.

6. Torsion test on metals.

7. Deflection of beams.

8. Modulus of rupture test.

9. Buckling of columns.

10. Deflection of springs.

## **BEME406T: ENVIRONMENTAL STUDIES (Theory)**

**CREDITS:** Nil (College Assessment in Grades)

### **Teaching Scheme**

Lectures: 3 Hours/Week

### **Examination Scheme**

College Assessment: Grades  
(Grades: O, A, B, C)

**Course Objectives and Expected Outcomes:** This course provides an integrated and interdisciplinary approach to the study of environment and solutions to environmental problems. This course will spread awareness among the students about environmental issues and shall alert them to find solutions for sustainable development.

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### **UNIT – I**

**[ 6 Hrs.]**

#### **Introduction:**

Definition, scope and importance; Need for public awareness -Institutions in environment, people in environment.

#### **Natural Resources:**

Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles.

### **UNIT – II**

**[ 6 Hrs.]**

#### **Ecosystems:**

Concept of an ecosystem - understanding ecosystems, ecosystem degradation, resource utilization, Structure and functions of an ecosystem- (producers, consumers) and decomposers.

Energy flow in the ecosystem - water, carbon, oxygen, nitrogen; and energy cycles, integration of cycles in nature.

Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types - characteristic features, structure:, and functions of forest, grassland, desert and aquatic ecosystems.

### **UNIT – III**

**[ 6 Hrs.]**

#### **Bio-diversity:**

Introduction - biodiversity; at genetic, species and ecosystem levels Bio-geographic classification of India

Value of biodiversity - Consumptive use value, productive use .value, social, ethical, moral, aesthetic and optional value of biodiversity.

India as a mega-diversity nation; hotspots of biodiversity

Threats to bio-diversity - habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity

#### **UNIT – IV**

[ 6 Hrs.]

##### **Pollution :**

Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards.

Solid waste management - Causes, effects and control measures of urban and industrial waste. Role of individual and institutions in prevention of pollution.

Disaster management Floods, Earth quacks, Cyclone and land slides.

#### **UNIT – V**

[ 6 Hrs.]

##### **Social Issues and the Environment:**

Unsustainable to sustainable development; Urban problems, related to energy; Water conservation, rainwater harvesting, watershed management; Problems and concerns of resettlement and rehabilitation of affected people.

Environmental ethics - issues and possible solutions – Resource consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender-equity.

Preserving Resources for future generations. The rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India.

Climate change, global warming, acid-, rain, Ozone layer depletion, nuclear accidents and holocausts. Wasteland Reclamation; Consumerism and Waste products.

Environment legislations - The Environment (protection) Act; The water (Prevention and Control of Pollution) Act; The Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations - environment impact assessment (EIA), Citizens actions and action groups.

Public awareness — Using an environmental calendar of activities, self initiation.

#### **UNIT – VI**

[ 6 Hrs.]

##### **Human Population and the Environment:**

Global population growth, variation among nations, population explosion; Family Welfare Programmes.- methods of. sterilization; Urbanization.

Environment and human health - Climate and health, Infectious diseases, water-related diseases, risk due to chemicals in food, Cancer and environment.

Human rights — Equity, Nutrition and health rights, intellectual property rights (IPRS), Community Biodiversity registers (CBRs).

Value education - environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.

HIY/AIDS; Women and Child Welfare; Information technology in environment and human health.

**GUIDELINES FOR EVALUATION OF ENVIRONMENTAL STUDIES SUBJECT (As per Ordinance No. 2 of 2012):**

At the end of the course, the student shall be evaluated for 100 marks with distribution as below:

Field note book	-	25 Marks
Objective Questions	-	50 Marks (50 questions, each of one mark)
Essay type question	-	25 Marks
Passing marks	-	40 Marks

OR

In view of the above entire course the students in terms of batches of 20 students each may be assigned a project work encompassing People's Bio-diversity Register (PBR) of any Gram Panchayat as per the format of Bio-diversity Authority of India under the guidance of a teacher. The PBR should be evaluated for 100 marks.

The result shall be declared in grades as follows:

Grade O: above 75 Marks; Grade A: 61–75 Marks; Grade B: 51-60 Marks; Grade C: 40-50 Marks

**TEXT BOOKS:**

A Text Book of Environmental Studies for Undergraduate Courses, Erach Bharucha, University Press (India) Pvt. Ltd., Hyderabad

## **BEME407P: MINI PROJECT**

**CREDITS: 02**

### **Teaching Scheme**

Practical: 2 Hour/Week

### **Examination Scheme**

College Assessment: 50 Marks

**Course Objectives and Expected Outcomes:** The objective of this course is to convert an idea or concept into a simple working physical model. During this course, student will learn regarding fabrication/construction of a simple mechanical or electro-mechanical working model using various manufacturing processes.

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A group of students (not more than 10 students) shall prepare a working model of any mechanical or electro-mechanical system. Computer / mathematical model or simulation is not acceptable. Student shall submit a report with photograph of the model.

A teacher shall be allotted for each batch (Max 09 & Min. 05 Students) and the workload shall be 1 hour / batch per week.