

**COURSE STRUCTURE****B. TECH I SEMESTER**

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EE1T01	BSC	Linear Algebra and Differential Equations	3	-	-	3	3
2	20EE1T02	BSC	Applied Physics	3	-	-	3	3
3	20EE1T03	HSMC	English	3	-	-	3	3
4	20EE1T04	ESC	Basic Mechanical Engineering	3	-	-	3	3
5	20EE1T05	ESC	Engineering Graphics	1	-	4	5	3
6	20EE1L06	HSMC	English Communication Skills Lab	-	-	3	3	1.5
7	20EE1L07	BSC	Applied Physics Lab	-	-	3	3	1.5
8	20EE1L08	ESC	Electrical Engineering Workshop	-	-	3	3	1.5
<b>Total number of credits</b>								<b>19.5</b>

**B. TECH II SEMESTER**

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EE2T01	BSC	Transform Techniques	3	-	-	3	3
2	20EE2T02	BSC	Applied Chemistry	3	-	-	3	3
3	20EE2T03	ESC	Electrical Circuit Analysis – I	3	-	-	3	3
4	20EE2T04	ESC	Power Systems-I	3	-	-	3	3
5	20EE2T05	ESC	Problem Solving Through C	3	-	-	3	3
6	20EE2L06	BSC	Applied Chemistry Lab	-	-	3	3	1.5
7	20EE2L07	ESC	Engineering & IT Workshop	-	-	3	3	1.5
8	20EE2L08	ESC	Problem Solving Through C Lab	-	-	3	3	1.5
9	20EE2M09	MC	Environmental Science	2	-	-	2	-
<b>Total number of credits</b>								<b>19.5</b>

**B.TECH I SEMESTER**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>BSC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS**

**Pre-requisite:** Basic knowledge about matrices, differentiation and integration

**Course Objective:** Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

**Course Outcomes:**

**At the end of the course, student will be able to**

- CO1:** Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
- CO2:** Illustrate the methods of computing eigen values and eigen vectors
- CO3:** Able to analyze the real life situations, formulate the differential equations and then applying the methods
- CO4:** Determine the solutions of linear differential equations
- CO5:** Optimize functions of several variables and able to find extreme values of constrained functions

**SYLLABUS****UNIT-I: Linear systems of equations:**

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

**UNIT-II: Eigen values & Eigen vectors:**

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

**UNIT-III: Ordinary Differential Equations of first order:**

Linear equations, Bernoulli's equation, Exact differential equations. Equations reducible to exact equations, Applications: Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth., R-L series circuits.

**UNIT-IV: Linear Differential Equations higher order:**

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral (nonhomogeneous term of the form  $e^{ax}$ ,  $\sin(ax+b)$ ,  $\cos(ax+b)$ , polynomials in  $x^m$ ,  $e^{ax} V(x)$ , any other function), Method of variation of parameters.

**UNIT-V: Partial Differentiation:**

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

**Text Books:**

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43<sup>rd</sup> Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1<sup>st</sup> Edition, 2007.

**Reference Books:**

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10<sup>th</sup> Edition, 2015.



2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9<sup>th</sup> Edition, 2014.

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<b>BSC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE1T02 APPLIED PHYSICS**

**Pre-requisite:** Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

**Course Objective:** Objective of the course is to impart

- **Knowledge** of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- **Develop** analytical capability and understand various Engineering concepts.

**Course Outcomes:**

**At the end of the course, student will be able to**

- CO1:** **Impart** knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
- CO2:** **Gain** knowledge of applications of lasers and optical fibers in various fields .
- CO3:** **Classify** magnetic and dielectric materials and their Engineering applications.
- CO4:** **Understand** basic quantum mechanics and free electron theories.
- CO5:** **Obtain** the concept of concept of holes and electrons in semiconductors.

**SYLLABUS****UNIT-I: Wave Optics:**

**Interference:** Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length and refractive index.

**Diffraction:** C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

**Polarizations:** Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

**UNIT-II: Lasers and Fiber Optics:**

**Lasers::** Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

**Fiber optics:** Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

**UNIT-III: Magnetic and Dielectric Materials:**

**Magnetic Materials:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro & ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

**Dielectric Materials:** Introduction - Dielectric polarization – Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

**UNIT-IV: Quantum Mechanics,Free Electron Theory:**

**Quantum Mechanics:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

**Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Density of States(3D),Fermi energy.

**UNIT-V: Band Theory of Solids and Semiconductors:**

**Band theory of Solids:** Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

**Semiconductors::**Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on

carrier concentration and temperature – Drift and Diffusion currents – Einstein’s equation-Hall effect- Hall coefficient - Applications of Hall effect.

### **Text Books**

1. “A Text book of Engineering Physics” by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2019.
2. “Engineering Physics” by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).
3. “Engineering Physics” by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

### **Reference Books**

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

**B.TECH I SEMESTER**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>HSMC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE1T03 ENGLISH****Pre-requisite:****Course Objective:**

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

**Course Outcomes:** At the end of the course, student will be able to

- CO1** understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- CO2** ask and answer general questions on familiar topics
- CO3** employ suitable strategies to master the art of letter writing and email writing
- CO4** recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- CO5** form sentences using proper grammatical structures and correct word forms

**SYLLABUS**

- UNIT-I** A Drawer full of happiness (Detailed Study)  
Deliverance (Non-detailed Study)



- UNIT-II** Nehru's letter to his daughter Indira on her birthday(Detailed Study)  
Bosom Friend (Non-detailed Study)
- UNIT-III** Stephen Hawking-Positivity 'Benchmark' (Detailed Study)  
Shakespeare's Sister(Non-detailed Study)
- UNIT-IV** Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study)  
Telephone Conversation(Non-detailed Study)
- UNIT-V** Stay Hungry-Stay foolish (Detailed Study)  
Still I Rise(Non-detailed Study)

### **Text Books**

1. "Infotech English", Maruthi Publications. (Detailed)
2. "The Individual Society", Pearson Publications.(Non-detailed)

### **Reference Books**

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

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<b>B.TECH I SEMESTER</b>	<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE1T04 BASIC MECHANICAL ENGINEERING**

**Course objectives:**

- To make the student familiar with systems of forces
- To create awareness on various pumps, turbines and their working principles
- To make the student understand the concept of hydroelectric power plant, its components and principle
- To induce knowledge about thermodynamics, laws and applications
- To make the student familiar with power cycle and refrigeration cycles

**Course outcomes: at the end of the course, the student will be able to**

**CO1:** Understand the concept of systems of forces

**CO2:** Learn about various pumps, turbines and their working principles

**CO3:** understand the concept of hydroelectric power plant, its components and principle

**CO4:** learn about thermodynamics, laws and applications

**CO5:** know with power cycle and refrigeration cycles

**SYLLABUS****UNIT-I**

**Introduction to Engg. Mechanics** – Basic Concepts. Systems of Forces: Coplanar Concurrent Forces– Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, analysis of plane trusses.

**UNIT-II**

**Pumps:** Types of pumps, Main components, working principle

**Hydro Prime Movers:** Hydraulic Turbines: Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine, Performance and characteristic curves.

### **Unit-III**

**Hydro Power:** Components of hydro-electric power plant, Estimation of water power potential, Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load-duration curve, firm power, secondary power, prediction of load.

### **UNIT-IV**

**Heat and Work:** Heat and Work, Point and Path function. Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I, Problems on heat and work for various processes.

First law of thermodynamics, application of steady flow energy equation to various components of a power plant (boiler, turbine, condenser and pump), Carnot engine.

### **UNIT-V**

**Introduction to cycles:** Power cycle: Introduction to 2 stroke and 4 stroke engine, Otto cycle, Diesel cycle, problems on Otto and Diesel cycle

**Refrigeration cycle:** Refrigerant, Vapour compression refrigeration (VCR) cycle, Problems on VCR cycle, vapour absorption refrigeration cycle, domestic refrigerator, window and split AC.

### **Text books:**

1. Engineering Thermodynamics, PK Nag 4<sup>th</sup> Edn , TMH.
2. Hydraulics & Fluid Mechanics Including Hydraulics Machines, Dr. P.N. Modi & Dr. S.M. Seth, Rajsons Publ, 21<sup>st</sup> Ed., 2017.
3. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications
4. Strength of materials by Bhavikatti, Lakshmi publications.



**References:**

1. A Textbook of Elements of Mechanical Engineering”, S Trymbaka Murthy, University Press (India) Pvt Ltd, 4th Edition, 2006.6

**I B.TECH - I SEMESTER**

ESC	L	T	P	C
	1	0	4	3

**20EE1T05 : ENGINEERING GRAPHICS****Objective:**

1. To introduce the students to use orthographic projections, projections of points & simple lines.
2. To make the students draw the projections of the lines inclined to both the planes.
3. To make the students draw the projections of the plane inclined to both the planes.
4. To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
5. To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

**Course Outcomes:**

At the end of the course, the student will be able to

1. Understand the concepts of projections and draw projections for simple entities such as points and lines.
2. Draw orthographic projections of planes and simple solids.
3. Understand the concept of sections and sectional views.
4. Develop the surfaces for various simple solids and understand the concept of intersection of two solids.
5. Analyze the 2D drawings and convert to 3D isometric views.
6. Learn computer aided drafting with AutoCAD and draw simple 2D part drawings and orthographic views using the software.

**SYLLABUS****UNIT I**

**Orthographic Projections:** Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

## UNIT II

**Projections of planes:** regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

**Projections of Solids** – Prisms, Pyramids, Cones and Cylinders-Simple positions

## UNIT III

**Projections of Solids** – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one plane.

**Sections of Solids:** Sections and sectional views of Right regular solids- Prisms, Pyramids, Cones and Cylinder.

## UNIT IV

**Interpenetration of right regular solids:** Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Prism Vs Cone.

**Development of Surfaces:** Development of Surfaces of right regular solids- Prisms, Pyramids, Cones and Cylinder

## UNIT V

Conversion of orthographic views to isometric view for Simple Solids such as prism, pyramid, cylinder and cone; Conversion of isometric view to orthographic views.

**Computer Aided Drafting:** Introduction to AutoCAD, Geometric commands, Modify commands, Annotation, Layers, display control and Properties tool bars. Creation of simple 2D part drawings and orthographic views.

### **Text books:**

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers

### **Reference books:**

1. Engineering Graphics for Degree by K.C. John, PHI Publishers



2. Engineering Graphics by PI Varghese, McGrawHill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

**B.TECH I SEMESTER**

HSMC	L	T	P	C
	0	0	3	1.5

**20EE1L06 ENGLISH COMMUNICATION SKILLS LAB****Course Objectives:**

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

**Course Outcomes:** At the end of the course, student will be able to

**CO1:** Acquire basic proficiency in English by learning functional aspects of English language

**CO2:** Learn the methods of enhancing vocabulary

**CO3:** Acquaint himself/herself with nuances of Phonetics

**LIST OF EXPERIMENTS**

- 1 Greetings and Introductions
- 2 Requesting Permission & Giving Directions
- 3 Inviting/ Complaining/ Congratulating
- 4 Root Words
- 5 Phonetics-Sounds and Symbols
- 6 Pronunciation Rules

**References:**

1. Strengthen Your Steps, Maruti Publications
2. Interact, Orient Blackswan
3. Word Power Made Easy, Pocket Books



**B.TECH I SEMESTER**

	L	T	P	C
<b>BSC</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**20EE1L07 APPLIED PHYSICS LAB**

**Pre-requisite:** Fundamental understanding of usage of an instrument with proper care.

**Course Objective:** Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

**At the end of the course, student will be able to**

**CO1: Outcomes:** The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

**CO2:** Implement the basic principles of Mechanics to measure different physical parameters.

**CO3:** Enhance the knowledge of Usage of electronic devices in various applications

**SYLLABUS**

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.
11. Estimation of Planck's Constant using Photo electric Effect

12. Study of I /V Characteristics of Semiconductor diode.
13. I/V characteristics of Zener diode.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
15. Energy Band gap of a Semiconductor using p - n junction diode

### **Reference Books**

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

**B.TECH I SEMESTER**

<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**20EE1L08 ELECTRICAL ENGINEERING WORKSHOP****Course Objectives:**

- To demonstrate the usage of measuring equipment
- To train the students in setting up simple wiring circuits
- To impart methods in electrical machine wiring

**Course Outcomes:** At the end of the course, student will be able to

- CO 1:** Explain the limitations, tolerances, safety aspects of electrical systems and wiring.
- CO 2:** Select wires/cables and other accessories used in different types of wiring.
- CO 3:** Measure current, voltage and power in a circuit.
- CO 4:** Make simple lighting and power circuits.

**LIST OF EXPERIMENTS**

- 1 Study of various supply systems, electrical symbols, tools and safety aspects.
- 2 Study of different switches, MCBs, measuring instruments (Ammeter, Voltmeter Wattmeter and Multimeter), wires and cables.
- 3 Identification and measurement of resistance, inductance & capacitance.
- 4 Practice house wiring with MCB, 3 pin socket, 2 way control of lamp.
- 5 Wiring of backup power supply for domestic installations including inverter, battery and load.
- 6 Practice soldering with simple electronic components on PCB
- 7 Estimation of Power loads
- 8 Maintenance /Charging of the Batteries.
- 9 Testing of Refrigerator and Geyser
- 10 Understanding the concept of earth pit, importance of earth resistance and it's measurement.

**B.TECH II SEMESTER**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>BSC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE2T01 TRANSFORM TECHNIQUES**

**Pre-requisite:** Linear Algebra and Differential Equations

**Course Objective:** Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

**Course Outcomes:** At the end of the course, student will be able to

**CO1:** Able to analyze a class of integrals in terms of beta and gamma functions

**CO2:** Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

**CO3:** Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

**CO4:** Illustrate the methods to solve the boundary value problems

**CO5:** Determine a solution of a discrete system using Z- transforms

**SYLLABUS****UNIT-I: Special functions:**

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

**UNIT-II: Laplace Transforms (all properties without proofs):**

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by  $t^n$ , Division by  $t$ , Evaluation of improper integrals.

Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application:**

Application to differential equations.

### **UNIT-III: Fourier Series & Fourier Transforms:**

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of interval, Even and odd functions, Half-range series.

Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem (without proof), finite & infinite Fourier sine & cosine transforms.

### **UNIT-IV: Partial Differential Equations:**

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

### **UNIT-V: Z-Transforms: (all properties without proofs)**

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting  $U_n$  to the right, multiplication by  $n$ , initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

#### **Text Books:**

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43<sup>rd</sup> Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1<sup>st</sup> Edition, 2007.

#### **Reference Books:**

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10<sup>th</sup> Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9<sup>th</sup> Edition, 2014.

**B.TECH II SEMESTER**

	L	T	P	C
<b>BSC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE2T02 APPLIED CHEMISTRY**

**Pre-requisite:** Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources

**Course Objective:** Objective of the course is to impart

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

**Course Outcomes:** At the end of the course, student will be able to

**CO1:** Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.

**CO2:** Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

**CO3:** Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.

**CO4:** Design models for energy by different natural sources.

Analyze the principles of different analytical instruments and their applications.

**CO5:** Obtain the knowledge of green chemistry and molecular machines

## SYLLABUS

### UNIT-I: Polymer Technology

**Polymerisation:** Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

**Plastics:** Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

**Elastomers:** Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

**Composite materials:** Fiber reinforced plastics – GFRP and Aramid FRP

**Conducting polymers:** Intrinsic and extrinsic conducting polymers

**Biodegradable polymers:** preparation and applications

### UNIT-II: Electrochemical Cells And Corrosion

**Part I: ELECTROCHEMICAL CELLS:** Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H<sub>2</sub>-O<sub>2</sub>, CH<sub>3</sub>OH-O<sub>2</sub>, phosphoric acid and molten carbonate).

**Part II: Corrosion:** Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

### UNIT-III: Material Chemistry

**Part I: Non-elemental semiconducting materials:** Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

**Super conductors:-**Type -I, Type II-characteristics and applications

**Part II: Nano materials:** Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and

(transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

**Liquid crystals:** Introduction-types-applications.

#### **UNIT-IV: Non-Conventional Energy Sources & Spectroscopy**

##### **Part I: NON-CONVENTIONAL ENERGY SOURCES**

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

##### **Part II: SPECTROSCOPY**

**UV spectroscopy-** Basic principle-Instrumentation-Applications

**IR spectroscopy-** Basic principle-Instrumentation-Applications

**NMR spectroscopy-** Basic principle-Instrumentation-Applications

#### **UNIT-V: Advanced Concepts/Topics In Chemistry**

**Part-I: Green chemistry:** Introduction, Principles of green chemistry, Green synthesis-Aqueous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

**PART-II: Molecular switches:** characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

##### **Text Books:**

1. P.C. Jain and M. Jain “Engineering Chemistry”, 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, “Engineering Chemistry”, Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, “A Textbook of Engineering Chemistry”, S.Chand & Co, (2010).
4. Shashi Chawla, “Engineering Chemistry”, Dhanpat Rai Publishing Co. (Latest edition).

##### **References:**

1. K. Sessa Maheshwaramma and Mridula Chugh, “Engineering Chemistry”, Pearson India
2. O.G. Palana, “Engineering Chemistry”, Tata McGraw Hill Education





Private Limited, (2009).

3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology", University press (latest edition)

<b>B.TECH II SEMESTER</b>	<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE2T03 ELECTRICAL CIRCUIT ANALYSIS – I**

**Pre-requisite:** Basic introduction to electrical engineering and electrical circuit concepts Linear algebra, vector analysis, matrix analysis and complex calculus, Mathematics-1.

**Course Objective:** To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems. To develop an understanding of the fundamental laws and elements of electric circuits.

**Course Outcomes:** At the end of the course, student will be able to

- CO1:** Various electrical networks in presence of active and passive elements
- CO2:** R, L, C network with sinusoidal excitation & R, L, network with variation of any one of the parameters i.e R, L, C and f.
- CO3:** Electrical networks with network topology concepts.
- CO4:** Any magnetic circuit with various dot conventions.
- CO5:** Electrical networks by using principles of network theorems.

**SYLLABUS****UNIT-I: DC Circuits**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Network reduction techniques (series, parallel, series – parallel) Star-to-delta and delta to- star transformation, Source transformation technique, nodal analysis and mesh analysis.

**UNIT-II: AC Circuits**

Periodic waveforms (determination of rms, average value and form factor), Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks, real power, reactive power, apparent power, power factor ,Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and Parallel Resonance.

### **UNIT-III: Network Topology**

Definitions of Graph and Tree, Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality

### **UNIT-IV: Magnetic Circuits**

Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction, Concept of self and mutual inductance. Dot convention-coefficient of coupling and composite magnetic circuit, Analysis of series and parallel magnetic circuits

### **UNIT-V: Network Theorems**

Analysis of Superposition theorem, Thevenin theorem, Norton theorem for independent and dependent current and voltage sources. Maximum power transfer theorem, Reciprocity theorem, and Compensation theorem.

#### **Text Book(s)**

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.

#### **References**

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthy, Dhanpat Rai & Co.

**B.TECH II SEMESTER**

ESC	L	T	P	C
	3	0	0	3

**20EE2T04 POWER SYSTEMS-I**

**Pre-requisite:** Basic knowledge about Electrical Circuits, Engineering Physics.

**Course Objective:** To understand the working of different types of power generation systems and Economic aspects of Power Generation & Tariff

**Course Outcomes:** At the end of the course, student will be able to

- CO1:** Determine the significance of various components of the Thermal Power Stations
- CO2:** Determine the significance of various components of the power generation plants
- CO3:** Describe the use of solar energy and the various components used in the energy production
- CO4:** Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
- CO5:** Appreciate the Economic Aspects different types of tariff.

**SYLLABUS****UNIT-I: Thermal Power Stations**

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super, heaters, Economizers, electrostatic precipitators  
Steam Turbines: Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

**UNIT-II: Hydel & Nuclear Power Stations**

**Hydro Power Stations:** Choice of site, arrangement of hydroelectric installations, Hydrology. Mass curve, flow duration curve, classification of Hydro Power Plants, pumped storage plants.

**Nuclear Power Stations:** Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor  
Components: Moderators, Control rods, Reflectors and Coolants. Types of

Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.

#### **UNIT-III: Solar power generation**

Solar radiation spectrum. Radiation measurement. Solar thermal systems, Solar Photovoltaic (SPV) systems- Applications -Numerical problems

#### **UNIT-IV: Wind Power Generation**

Introduction to wind energy, basic principles of wind energy conversion, forces on the blade power in the wind – maximum power, wind energy conversion Basic components of wind energy conversion systems. Classification of WECS-HAWT, VAWT. Schemes of electric generation, Site selection considerations. Numerical Problems

#### **UNIT-V: Economic Aspects of Power Generation & Tariff**

**Economic Aspects** - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.

**Tariff Methods**- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three-part, and power factor tariff methods.

#### **Text Book(s)**

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagarand, A Chakrabarti, DhanpatRai& Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers

#### **References**

1. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006.
2. Principles of Power Systems by V.K.Mehta and Rohit Mehta, S Chand Publications.

**B.TECH II SEMESTER**

<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**20EE2T05 PROBLEM SOLVING THROUGH C****Pre-requisite:****Course Objective:**

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

**Course Outcomes:** At the end of the course, student will be able to

**CO1:** Understand the basic concepts of programming

**CO2:** Understand and Apply loop construct for a given problem

**CO3:** Demonstrate the use pointers

**CO4:** Understand the use of functions and develop modular reusable code

**CO5:** Understand File I/O operations

**SYLLABUS****UNIT-I:**

**INTRODUCTION TO COMPUTERS:** Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

**BASICS OF C PROGRAMMING:** Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

**UNIT-II:**

**Decision making statements:** if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements:** while, do while, for, Compilation process.

### **UNIT-III:**

**Introduction to Arrays:** Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

**Strings:** Declaration, String operations: length, compare, concatenate, copy, String handling functions.

### **UNIT-IV:**

**FUNCTIONS:** Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

**POINTERS:** Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

### **UNIT-V:**

**STRUCTURES AND UNIONS:** Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

**FILE PROCESSING:** Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

#### **Text Books:**

1. Krnighan. B.W and Ritchie, D.M, "The C Programming Language", Second Edition, Pearson Education, 2006
2. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.

#### **References:**

1. Pradeptey, Manas Ghosh, "Fundamentals of Computing and programming in C", First Edition, Oxford University Press, 2009.
2. Paul Deitel and Harvey Deitel, "C How to Program", Seventh Edition, Pearson Publication.
3. E Balagursamy, "Programming in C, Sixth Edition, Tata McGraw Hill.
4. Ajay Mittal, "Programming in C A practical Approach", Pearson education

**B.TECH II SEMESTER**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>BSC</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**20EE2L06 APPLIED CHEMISTRYLAB**

**Pre-requisite:** Acquire some experimental skills.

**Course Objective:** Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

**Course Outcomes:**

**At the end of the course, student will be able to**

**CO1:** The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

**LIST OF EXPERIMENTS**

- 1 Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
- 2 Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
- 3 Determination of Mn<sup>+2</sup> using standard oxalic acid solution.
- 4 Determination of ferrous iron using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
- 5 Determination of Cu<sup>+2</sup> using standard hypo solution.
- 6 Determination of temporary and permanent hardness of water using standard EDTA solution.
- 7 Determination of Fe<sup>+3</sup> by a colorimetric method.
- 8 Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
- 9 Determination of iso-electric point of amino acids using pH-metry method/conductometric method
- 10 Determination of the concentration of strong acid vs strong base (by



- conductometric method).
- 11 Determination of strong acid vs strong base (by potentiometric method).
  - 12 Determination of  $Mg^{+2}$  present in an antacid.
  - 13 Determination of  $CaCO_3$  present in an egg shell.
  - 14 Estimation of Vitamin C.
  - 15 Determination of phosphoric content in soft drinks.
  - 16 Adsorption of acetic acid by charcoal.
  - 17 Preparation of nylon-6, 6 and Bakelite (demonstration only).

**B.TECH II SEMESTER**

ESC	L	T	P	C
	0	0	3	1.5

**20EE2L07: ENGINEERING & IT WORKSHOP**

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.

**Trade:****1. Carpentry**

- a. T-Lap Joint
- b. Cross Lap Joint
- c. Dovetail Joint
- d. Mortise and Tenon Joint

**2. Fitting**

- a. Vee Fit
- b. Square Fit
- c. Half Round Fit
- d. Dovetail Fit

**3. House Wiring**

- a. Parallel / Series Connection of three bulbs
- b. Stair Case wiring
- c. Florescent Lamp Fitting
- d. Measurement of Earth Resistance

**4. Tin Smithy**

- a. Taper Tray
- b. Square Box without lid
- c. Open Scoop
- d. Funnel

**5. Product prototyping using 3D Printing****6. IT Workshop**

**Task 1: Identification of the peripherals of a computer** - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

**Task 2: Practicing disassembling and assembling components of a PC**

**Note:** At least two exercises to be done from each trade.

**B.TECH II SEMESTER**

ESC	L	T	P	C
	0	0	3	1.5

**20EE2L08 PROBLEM SOLVING THROUGH C LAB****Course Objectives:**

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers & functions.
- To review the file operations, preprocessor commands.

**Course Outcomes:**

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

**Exercise 1:**

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

**Exercise 2:**

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

**Exercise 3:**

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

**Exercise 4:**

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum.  $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$  terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

**Exercise 5:**

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

**Exercise 6:**

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

**Exercise 7:**

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

**Exercise 8:**

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

**Exercise 9:**

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

**Exercise 10:**

1. Write a program in C to demonstrate the use of & (address of) and \*(value at address) operator.
2. Write a program in C to add two numbers using pointers.

**Exercise 11:**

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

**Exercise 12:**

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

**Exercise 13:**

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

**Exercise 14:**

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

**Exercise 15:**

1. Write a program in C to check whether a number is a prime number or not using function.
2. Write a program in C to get the largest element of an array using the function.

**Exercise 16:**

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name
3. Write a program in C to remove a file from the disk.

**B.TECH II SEMESTER**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>MC</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>-</b>

**20EE2M09****ENVIRONMENTAL SCIENCE****Course objective:**

To understand the importance of Environment and the importance of biodiversity

**Course outcomes:**

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

**SYLLABUS****UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1<sup>o</sup>production& 2<sup>o</sup>production- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

## **UNIT-II: NATURAL RESOURCES AND CONSERVATION**

Introduction and classification of natural resources-Forest resources: Use and over-exploitation- Deforestation-Timber extraction-Mining-Conservation-Water resources: Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources: renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

## **UNIT-III: BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-spots of biodiversity

## **UNIT-IV: ENVIRONMENTAL PROBLEMS**

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

## **UNIT-V: ENVIRONMENTAL LEGISLATION & MANAGEMENT**

Sustainable development- Air (Prevention and Control of Pollution) Act- Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

**TEXT BOOKS:**

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

**REFERENCES:**

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi