SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

Syllabus of Physics for B. Tech. Programme (Common to all branches)

Course Code: BTPH101B & BTPH102B

Physics (Theory & Lab.)

L T P (3 1 3) **Credits 5.5 (4: T+L & 1.5: P)** **Total Lectures: 45**

PART - A

1. **Waves & Oscillations (06 Lectures):** Harmonic oscillator: free, damped and forced oscillators; Impedance matching and resonance; Concept of stress and strain at a point.

2. **Electromagnetic Theory (05 Lectures):** Maxwell's equations, Statements of Gauss's and Stoke's theorems; Electromagnetic wave equation in vacuum, their transverse nature and polarization; Introduction to Poynting vector.

3. **Laser & Fibre optics (10 Lectures):** Spontaneous and stimulated emissions; Einstein's theory, and A and B coefficients; Population Inversion; Components of a laser system; Ruby, He-Ne, CO2 and semiconductor lasers; applications of lasers in science, engineering and medicine. Introduction to fibre optics; Acceptance angle and numerical aperture; Step index and graded index optical fibres; Definition and significance of normalized frequency; Modes of propagation; Single mode and multimode optical fibres; Loss in optical fibres (qualitative); Fibre connectors, splices and couplers; applications of optical fibres.

PART - B

4. **Quantum Mechanics (07 Lectures):** Introduction; Wave-particle duality; Matter waves; Group and Phase velocities (qualitative); Statement of uncertainty principle; Wave function, Born probability interpretation, significance and normalization of wave function; Time independent and time dependent Schrodinger wave equations; Eigen functions and Eigen values; particle in a box (one dimension only).

5. **Physics of materials(10 Lectures):** Electronic materials: dielectrics and ferroelectrics; Magnetic materials: dia, para, ferro and ferromagnetic, Basics of domain theory, Ferites, B-H curve, Magnetic anisotropy and magnetostriction; Superconductivity; meissner effect, Type I and Type II superconductors, London equations, Qualitative idea of BCS theory, Applications of superconductivity; Nanomaterials; Introduction, Surface to volume ratio, Qualitative idea of 1D, 2D & 3D nanomaterials, Propertties of nanomaterials, Applications of nanomaterials.

6. **Semiconductors (07 Lectures):** Intrinsic and extrinsic semiconductors: Dependence of Fermi level on carrier concentration and temperature (equilibrium carrier statistics); Carrier generation and recombination; Carrier transport: diffusion and drift, p-n junction; Introduction to LED and solar cell.

Text/ Reference books:

(i). Engineering Mechanics, 2nd edition by MK Harbola.
(ii). Introduction to Mechanics by MK Verma.
(iii). Theory of Vibrations with Applications by WT Thomson.
(iv). Mechanical Vibrations by JP Den Hartog.
(v). An Introduction to the Mechanics of Solids, 2nd edition with SI Units by SH Crandall, NC Dhall and TJ Lardner.
(vi). Engineering Mechanics of Solids by EP Popov.
(vii). Quantum Mechanics by DJ Griffiths, Pearson Education, 2008.
(viii). Quantum Mechanics by Richard Robinett, OUP Oxford, 2006.
(ix). Introduction to Electrodynamics by DJ Griffiths.
(x). Optics by A Ghatak, McGraw Hill Education, 2012.
(xi). An Introduction to Fibre Optic System by John Power.
(xii). Principles of Lasers by O. Svelto, Springer Science & Business Media, 2010.
(xiii). Semiconductor Devices: Physics & Technology by SM Sze.
(xiv). Integrated Circuits by Milman and Helkias.
(xv). Solid State Electronic Devices by BG Streetman, Prentice Hall of India, 1995.
(xvi). Physics for Scientists & Engineers (Vol. I & II), Serway & Jewett, 6th Edition, Cengage Learning.
(xvii). Physics by Halliday and Resnick.
(xviii). Online courses on NPTEL.

II. Physics Laboratory: P: 3 (1.5 Credits)

Students are required to perform at least ten experiments out of the following including virtual lab.:

1. Basic knowledge of least count and error analysis of Vernier Caliper and Screw Gauge.
2. To determine the frequency of AC mains by electrically maintained tuning fork.
3. To determine the moment of inertia of a flywheel.
4. To study the variation of magnetic field along the axis of a current carrying coil.
5. To determine the polarizability of a dielectric material.
6. To determine the refractive index of the material of prism.
7. To determine the specific rotation of sugar using Laurent's half shade polarimeter.
8. To determine the angular divergence of Laser.
9. To determine the number of lines per cm on a plane grating using Laser.
10. To determine the numerical aperture of an optical fibre.
11. To study the loss of optical signal in optical fibres.
12. To determine the band gap of a semiconductor material.
13. To study the characteristics of p-n junction diode (forward bias and reverse bias).
14. To study Zener diode as a voltage regulator.
15. To study the intensity response of a solar cell.

Virtual lab.:

1. To verify that energy conservation and momentum conservation can be used with a ballistic pendulum to determine the initial velocity of a projectile, its momentum and kinetic energy.
2. To determine the wavelength of a laser using Michelson interferometer.
3. To find out the horizontal component of earth's magnetic field.
4. To determine the resistivity of semiconductors by four probe method.
5. To determine the Planck's constant from kinetic energy versus frequency graph.

Suggested Readings / Books:

1. Practical Physics, C.L. Arora, S. Chand & Co.
2. Practical Physics, R.S. Sirohi, Wiley Eastern.
3. http://vlab.amrita.edu/index.php?sub=1

Common to B.Tech. CSE, ECE, EE, ME, CHEM & CIVIL

Mathematics –I **BTAM101C** **3L:1T:0P 4credits**

Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in Calculus, multivariate analysis and linear algebra to tackle any mathematical challenge that occurs during their engineering problems.

Calculus: (6 lectures)

Evaluation of definite and improper integrals, Beta and Gamma functions and their properties. Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Calculus: (6 lectures)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders. indeterminate forms and L'Hospital's rule, Maxima and minima.

Sequences and series: (10 lectures)

Convergence of sequence and series, tests for convergence, Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Multivariable Calculus (Differentiation): (8 lectures)

Limits, continuity and partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

Matrices (10 lectures)

Inverse and rank of a matrix, System of linear equations, Symmetric, skew-symmetric and orthogonal matrices, Determinants, Eigenvalues and Eigenvectors, Diagonalization of matrices, Cayley-Hamilton Theorem and Orthogonal transformation.

Suggested Text/Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson. Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons. 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi. 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, second Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Outcomes:

On successful completion of the course, students would learn:

- To apply differential concept in practical problems of engineering.
- To apply Rolle`s Theorem for analysis and application to Engineering problems.
- To apply tool of sequence and series for learning convergence of infinite series.
- To learn the uses of multivariable functions that are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner.

BTPS101D: Programming for Problem Solving

Semester	I/II					
Course code	BTPS101C					
Category	Engineering Science Course					
Course title	Programming for Problem Solving					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	3

Course Outcomes:

On successful completion of the course, students would learn:

1) To formulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language).
2) To test and execute the programs and correct syntax and logical errors.
3) To implement conditional branching, iteration and recursion.
4) To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
5) To use arrays, pointers and structures to formulate algorithms and programs. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6) To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

DETAILED CONTENTS

Unit 1

INTRODUCTION TO PROGRAMMING (4 LECTURES)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) – (1 lecture).

Idea of Algorithm:

Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture)
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures)

Unit 2

Arithmetic expressions and precedence (2 lectures)
Conditional Branching and Loops (6 lectures)
Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops *(3 lectures)*

Unit 3

Arrays **(6 lectures)**
Arrays (1-D, 2-D), Character arrays and Strings

Unit 4

Basic Algorithms **(6 lectures)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Unit 5

Function **(5 lectures) /Procedure**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Unit 6

Recursion **(4 -5 lectures)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit 7

Structure **(4 lectures)**
Structures, Defining structures and Array of Structures

Unit 8

Pointers **(2 lectures)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Unit 9

File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

1) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

1) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

BTPS102D: Programming for Problem Solving Lab

Semester	I/II					
Course code	BTPS102C					
Category	Engineering Science Course					
Course title	Programming for Problem Solving Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	4	30	20	2

DETAILED CONTENTS

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 and 9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations

Laboratory Outcomes

1) To formulate the algorithms for simple problems.
2) To translate given algorithms to a working and correct program.
3) To be able to correct syntax errors as reported by the compilers.
4) To be able to identify and correct logical errors encountered at run time.
5) To be able to write iterative as well as recursive programs.
6) To be able to represent data in arrays, strings and structures and manipulate them through a program.
7) To be able to declare pointers of different types and use them in defining self referential structures.
8) To be able to create, read and write to and from simple text files.

BTME101D ENGINEERING DRAWING

Semester	I & II					
Course code	BTME 101D					
Category	Engineering Science Courses (B.Tech. All Branches)					
Course title	Engineering Drawing (Theory & Lab)					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	1	0	4	60	40	3

COURSE OVERVIEW:

One of the best ways to communicate one's ideas is through some form of picture or drawing. This is especially true for the engineers. Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

COURSE OBJECTIVES:

1. To understand the basic principles of engineering drawing
2. To have the knowledge of generating the pictorial views
3. To understand the development of surfaces
4. Use CAD tools for making drawings of machine components and assemblies.
5. To have the knowledge of interpretation of dimensions of different quadrant projections.

COURSE OUTCOMES:

On completion of this course students will be able to:

1. Prepare and understand drawings.
2. Use the principles of orthographic projections.
3. By studying about projections of solids, students will be able to visualize three dimensional objects and that will enable them to design new products.
4. Design and fabricate surfaces of different shapes.
5. Represent the objects in three dimensional appearances.

DETAILED CONTENTS

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Principles of engineering drawing / engineering graphics / technical drawing and their significance –Drawing Instruments: their Standard and uses – symbols and conventions in drawing practice – lettering & numbering – BIS conventions.

Types of lines and their uses, Drawing Sheets: sizes and layout, Grades of pencils used, Dimensioning: definition, types and methods of dimensioning, concept of scales in drawing, types of scales, construction of plane and diagonal scales.

UNIT – II

ORTHOGRAPHIC PROJECTIONS: Relevance of projection, Types of projections, Principles of orthographic projections in reference to quadrants – conventions – first and third angle projections, illustration through simple problems of projection; Projections of points in quadrants. Projections and trace of a line with different possible orientations in a quadrant. Methods to find true length and inclination of a line with principal planes.

UNIT – III

PROJECTIONS OF PLANES AND SOLIDS: Concept of plane and lamina, Projections of a lamina when; parallel to any reference plane, perpendicular to any reference plane, inclined to reference plane. Traces of planes. Definition of solid, types of solids – conventions-different possible orientations of solid in a quadrant. Projections of solid when; axis parallel to reference plane, perpendicular to reference plane, inclined to one and parallel to other reference plane, parallel to both horizontal and vertical planes.

SECTION OF SOLIDS: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

UNIT – IV

DEVELOPMENT OF SURFACE: Purpose of development, Parallel line and radial line method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT – V

ISOMETRIC PROJECTIONS: Principles of Isometric Projections-Isometric Scale- Isometric Views or drawing- Conventions. Isometric drawing / projections of solids such as cube, prisms, pyramids, cylinder, and cone.

SUGGESTED READING/BOOKS

TEXT BOOKS:

1. Engineering Drawing- Basant Agarwal, TMH
2. D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi.
3. P.S Gill, "Engineering Drawing", S K Kataria and sons, 18th edition, 2017 reprint
4. Jolhe, Dhananjay (2006), Engineering Drawing: With an Introduction to CAD, Tata Mc Graw Hill, India.

REFERENCE BOOKS:

1. N. D. Bhat (2006), Engineering Drawing, Charotar Publications, New Delhi.
2. Venugopal (2010), Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi.
3. Johle (2009), Engineering Drawing, Tata Mc Graw Hill, New Delhi, India.
3. Trymbaka Murthy (2007), Computer Aided Engineering Drawing, I.K. International Publishers, New Delhi.
4. R.B. Choudary (2005), Engineering graphics with Auto CAD, Anuradha Publishers, New Delhi

BTME 102D COMPUTER GRAPHICS LAB

Semester	I & II					
Course code	BTME 102 D					
Category	Engineering Science Courses (B.Tech. All Branches)					
Course title	Computer Graphics Lab (Practical)					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	30	20	01

COURSE CONTENT

1. Introduction of the CAD software and its utilities in the engineering software.
2. Study of the various toolbar options and exercises to familiarize all the drawing tools.
3. Study the basic initial setting and viewing of the drafting software interfaces.
4. Use of basic entities in 2D.
5. Study and Learn Draw and Modify commands of the drafting software.
6. Dimensioning in 2D and 3D entries.
7. Study and implementing of coordinate systems & UCS.
8. Draw the different type of 3D modeling entities using viewing commands to view them (Isometric projection).
9. Sanctioning of solid primitives and rendering in 3D.
10. Intersection of solid primitives.

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Human Values & Professional Ethics
(Batch 2022 onwards)
Semester-I/II

L	T	P
2	0	0

OBJECTIVES AND EXPECTED OUTCOMES

To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life - this ability is to be developed not for a narrow area orfield of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act onsuch discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) - it concentrates on providing to its students the skills to do things.

In other words, it concentrates on providing "How to do" things. The aspects of understanding "What to do" or "Why something should be done" is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IIITH, IITK and UPTU on a large scale with significant results.

COURSE OUTCOMES

CO No.	After undergoing this course, students must be able to:
1	Understand the fundamental issues relating to the happiness and real success in both personal and professional life.
2	Analyze their own belief to remove confusion and complexes in order to bring self-confidence, clarity and conviction.
3	Develop right understanding about oneself and rest of the existence for sustained human happiness and prosperity.
4	Refer to natural acceptance in order to understand harmony at all the levels of existence i.e. self, family, society and nature.

5	Visualize an appropriate implementation of the knowledge in their respective streams to ensure mutually enriching and sustainable systems

Course Content

PART A

1. **Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation**

- Understanding the need, basic guidelines, content and process for Value Education.
- Self Exploration-what is it?- its content and process; "Natural Acceptance" and ExperientialValidation- as the mechanism for self exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facilities- the basic requirements forfulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

2. **Understanding Harmony in the Human Being - Harmony in Myself!**

- Understanding human being as a co-existence of the sentient "I" and the material "Body".
- Understanding the needs of Self ("I") and "Body" – *Sukh* and *Suvidha*.
- Understanding the body as an instrument of "I" (I being the doer, seer enjoyer).
- Understanding the characteristics and activities of "I" and harmony in "I".
- Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correctappraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure *Sanyam* and *Swasthya*.

3. **Understanding Harmony in the Family and Society- Harmony in Human-HumanRelationship**

- Understanding harmony in the Family- the basic unit of human interaction.
- Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust(Vishwas) and Respect (Samman) as the foundation values of relationship.
- Understanding the meaning of Vishwas; difference between intention and competence
- Understanding the meaning of Samman, difference between respect and differentiation;the other salient values in relationship.
- Understanding the harmony in the society (society being as extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human goals.
- Visualizing a universal harmonious order in society- Undivided society (Akhand Samaj),Universal order(Sarvabhaum Vyawastha- from family to world family!

PART B

4. Understanding Harmony in the Nature and Existence -Whole existence as Co-existence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature

5. Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Competence in professional ethics:
  - Ability to utilize the professional competence for augmenting universal humanorder
  - Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems
  - Ability to identify and develop appropriate technologies and management patternsfor above production systems.
- Case studies of typical holistic technologies, management models and production systems.

Suggested Readings / Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education.*
2. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and Harper Collins, USA.
3. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond& Briggs, Britain.
4. A Nagraj, 1998, *Jeevan Vidya ek Parichay,* Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991.
6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
8. Subhas Palekar, 2000, *How to practice Natural Farming,* Pracheen(Vaidik) Krishi TantraShodh, Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth - Club of Rome's report*, Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers* , Oxford University Press.
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including HumanValues)*, Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, *Foundations of Ethics and Management,* Excel Books.
13. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow.Reprinted 2008

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Ability Enhancement Compulsory Course
EVS101 C: Environmental Studies

L	T	P	Credits
2	0	0	0

40 Hours are kept for various activities under the head of activities. There will be a final theory examination for the students of 50 marks but these marks will not be added to their final result as assessment will be satisfactory or non-satisfactory.

Course Outcomes:

1. Students will enable to recognize environmental problems at local and national level through literature and general awareness.

2. The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.

3. The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.

4. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT-1:

Introduction to Environmental Studies: Multidisciplinary nature of Environmental Studies: Scope & Importance Need for Public Awareness.

UNIT-2:

Ecosystems Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers & Decomposers) Energy Flow in an ecosystem: Food Chain, Food web and Ecological Pyramids Characteristic features, structure & functions of following Ecosystems:

Forest Ecosystem

Aquatic Ecosystem (Ponds, Lakes, River & Ocean)

UNIT-3:

Natural Resources Renewable & Non-renewable resources: Forest Resources: Their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Overexploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act.

Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values, Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting.

Land Resources: Land as a resource; Land degradation, soil erosion and desertification.

Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy.

UNIT-4:

Biodiversity & its conservation: Types of Biodiversity: Species, Genetic & Ecosystem India as a mega biodiversity nation, Biodiversity hot spots and bio-geographic regions of India, Examples of Endangered & Endemic species of India, Red data book.

UNIT-5:

Environmental Pollution & Social Issues: Types, Causes, Effects & Control of Air, Water, Soil & Noise Pollution, Nuclear hazards and accidents & Health risks

Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting of Glaciers & Ice caps, Rising sea levels

Environmental disasters: Earthquakes, Floods, Cyclones, Landslides.

Unit-6 : Social Issues and the Environment : From Unsustainable to Sustainable development, Resettlement and rehabilitation of people; its problems and concerns., Environmental ethics : Issues and possible solutions, Case Studies, Public awareness.

Suggested Books:

1. Bharucha, E. Text Book for Environmental Studies. University Grants Commission, New Delhi.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw HillInc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p