FIRST SEMESTER
CORE THEORY SUBJECTS

Code: BTX01101	ENGINEERING PHYSICS	3.5 Credits [LTP: 3-1-0]

COURSE OUTCOME

The student would be able:

- To understand the method to produce coherent sources and phenomenon of interference and diffraction

- To acquire knowledge of quantum mechanical history with experimental facts and its applications.

- To learn and exhibit the deeper knowledge of laser and fibre optics and apply it for suitable applications.

- To learn the basic principles of relativity, twin paradox and energy-mass relations.

- To have a deep understanding of different bonding in materials, band theory and Hall Effect.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Wave Optics**	10
2.	**Quantum Mechanics**	7
3.	**Laser & Optical Fibre**	7
4.	**Special Theory of Relativity**	6
5.	**Elements of Material Science**	6

B. DETAILED SYLLABUS

Unit No.	Unit Details
1.	**Wave Optics**
	• **Introduction of Unit** • **Interference of light:** Types of interference, Coherent sources, Principle of Superposition, characteristics of coherent sources, methods to produce coherent sources with examples. • Michelson's Interferometers**:** Principle, Construction, Working & Applications • Newton's Rings:Principle, Construction, working & Applications • **Diffraction of light:** Fraunhofer Diffraction from a Single Slit • **Diffraction grating:** Construction, theory and spectrum • X-Ray diffraction and Bragg's Law • Resolving power and Rayleigh criterion for limit of resolution • Conclusion of Unit
2.	**Quantum Mechanics**
	• Introduction of Unit • Black body radiation and Planck's hypothesis • Wave-particle duality, Matter waves • Compton Effect, Compton shift • Wave function and its basic postulates • Physical interpretation of wave function and its properties • Time dependent and time independent Schrodinger's Wave Equation, • Applications of the Schrodinger's Equation: Particle in one dimensional box

	• Conclusion of Unit
3.	**Laser & Optical Fibre**
	• Introduction of Unit
	• Theory of laser action: Einstein's Coefficients, Components of laser, Threshold conditions for laser action
	• Theory, Design and Applications of He-Ne Laser
	• Optical Fibre: Construction and working principle of Optical fiber
	• Types of optical fibre (on the basis of modes and the refractive index of the medium)
	• Applications of optical fibre
	• Conclusion of Unit
4.	**Special Theory of Relativity**
	• Introduction of Unit
	• Relativity of size, position, velocity and time. Inertial and non-inertial frames of Reference.
	• Postulates of special theory relativity
	• Galilean and Lorentz Transformations, Length contraction, Mass Variation and Time Dilation.
	• Relativistic Velocity addition and Mass-Energy relation
	• Relativistic Energy and Momentum
	• Conclusion of Unit
5.	**Elements of Material Science**
	• Introduction of Unit: Bonding in solids, Covalent bonding and Metallic bonding
	• Classification of Solids as Insulator, Semi-Conductor and Conductor
	• Semiconductors: Conductivity in Semiconductors, Fermi dirac distribution function and Fermi energy
	• Determination of band gap of a semiconductor
	• Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier, to determine the concentration of charge carrier, to determine the mobility of charge carriers.
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Books	Author	Edition	Publication
1.	Fundamental of Optics	Jenkins and While	4th	Tata McGraw-Hill
2.	Optics	AjoyGhatak	3rd	Tata McGraw-Hill
3.	A Text Book of optics	Brijlal&Subramanium	Latest	S.Chand and co. Ltd
4.	Quantum Mechanics	Schiff	3rd	Tata Mc Graw-Hill
5.	Concept of Modern Physics	Beiser	Latest	Tata McGraw-Hill
6.	Introduction to special Theory of Relativity	R. Resnick	Latest	Johan Willy Singapore
7.	Elements of Properties of Matter	D.S.Mathur	Latest	S.Chand& Co.
8.	Solid State Physics	S.O.Pillai	Latest	Wiley Eastern Ltd.
Important Web Links				
1.	https://nptel.ac.in/courses/122107035/			
2.	https://nptel.ac.in/courses/122103011/			
3.	https://www.khanacademy.org/science/physics			
4.	https://ocw.mit.edu/courses/physics/			

COURSE OUTCOME

The student would be able to:

- Understand the forces act on a component and method of resolution

- Evaluate the centroid and center of gravity of an object and also analyze how to minimize the effort for lifting a load

- Understand the effect of friction and also evaluate forces with the effect of friction

- Analyze the conversion of linear motion into angular motion and vice versa

- Analyze the effect of impact on elastic and non-elastic body

A.   OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Fundamentals of Mechanics**	**7**
2.	**Machine & Moment of Inertia**	**8**
3.	**Friction & Belt Drive**	**7**
4.	**Dynamics of Particles**	**7**
5.	**Work, Power & Impact**	**7**

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of Mechanics**
	• Introduction of Unit • Fundamental laws of mechanics, Principle of transmissibility. • System of forces, Resultant force, Resolution of force. • Moment and Couples, Varignon's Theorem, • Resolution of a force into a force and a couple, free body diagram. • Equilibrium, Conditions for equilibrium, Lami's theorem. • Conclusion of Unit
2.	**Machine & Moment of Inertia**
	• Introduction of Unit • **Lifting Machines**: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines. • **Centroid & Moment of Inertia:** Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section. • Conclusion of Unit
3.	**Friction & Belt Drive**
	• Introduction of Unit • **Friction**: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge. • **Belt Drive**: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives. • Conclusion of Unit
4.	**Dynamics of Particles**
	• Introduction of Unit • **Kinematics of Particles and Rigid Bodies**: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration. • **Kinetics of Particles and Rigid Bodies**: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, Equation of motion in plane for a rigid body, D'Alembert principle.

5.	**Work, Power & Impact**
	• Introduction of Unit
	• **Work, Energy and Power**: Work of a force, weight, couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy.
	• **Impact**: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision, coefficient of restitution.
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Vector Mechanics for Engineers	Beer and Johnston	Latest	Tata McGraw Hill
2.	Engineering Mechanics	D S Kumar	Latest	S K Kataria& Sons
3.	Engineering Mechanics Statics	Meriam, J. L. &Kraige, L. G	Latest	John Wiley & Son
4.	Engineering Mechanics	S. Ramamruthan	Latest	Dhanpat Rai Pub.
5.	Engineering Mechanics	Shames	Latest	Pearson Education
Important Web Links				
1.	https://nptel.ac.in/courses/112103109/			
2.	https://nptel.ac.in/courses/112106286/			
3.	https://freevideolectures.com/course/2264/engineering-mechanics			

COURSE OUTCOME

The student would be able:

- To apply basic electrical concepts, including various circuit analysis techniques and fundamentals of theorem, in practical applications.
- To understand the fundamentals of AC circuits such as the R.M.S value, average value, active power, reactive power, power factor, form factor, peak factor and their applications.
- To analyze the energy conversion process and fundamentals of rotating and stationary electrical machines with their application in real life.
- To analyze the working of semiconductor devices such as Diode, BJT, UJT, photovoltaic cells, filters and fundamentals of digital electronics.
- To understand the concepts of Communication systems and Instrumentation engineering in practical applications.

A.   OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Basic Concepts of Electrical Engineering**	**7**
2.	**Alternating Quantities**	**8**
3.	**Energy Conversion and Electrical Machines**	**7**
4.	**Basic Electronics**	**7**
5.	**Communication Systems**	**7**

B.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Basic Concepts of Electrical Engineering**
	- Introduction of Unit - Basic Concepts: Electric Current, Electromotive Force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction. - DC Network Analysis & Theorems: Kirchhoff's Laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Star-Delta Transformation, Node Voltage Method, Mesh Current Method, Super- Position, Thevenin's, Norton's and Maximum Power Transfer Theorems. - Conclusion of Unit
2.	**Alternating Quantities**
	- Introduction of Unit - Single Phase AC system: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor, Peak Factor, Power Factor and Quality Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits. - Three Phase AC system:Introduction, Merits of Three Phase System, Generation and Waveform. - Conclusion of Unit
3.	**Energy Conversion and Electrical Machines**
	- Introduction of Unit - Introduction to Energy: Types of Energy, Introduction to Energy Conversion, Sources of Energy (Conventional &Non-Conventional), Energy Scenario in India & Rajasthan. - Rotating Machines:**DC Machines**: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. **AC Machines:** Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines. - Stationary Machines: Introduction, Construction and Principle of Working of Transformer, EMF Equation, Voltage Transformation Ratio. - Conclusion of Unit

4.	**Basic Electronics**
	• Introduction of Unit
	• **Semiconductor Devices:** Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of the PN Junction, PN Junction Diode, Zener Diode, LED, Photovoltaic Cell, Rectifiers, L, C, & L-C filters, BJT, UJT, Transistor as an Amplifier.
	• **Digital Electronics:** Boolean algebra, Binary System, Logic Gates and Their Truth Tables.
	• Conclusion of Unit
5.	**Communication Systems**
	• Introduction of Unit
	• **Basics of Communication:** Introduction, IEEE Spectrum for Communication Systems, Types of Communication, Amplitude and Frequency Modulation.
	• **Basics of Instrumentation:** Introduction to Transducers, Thermocouple, RTD, Strain Gauges, Load Cell and Bimetallic Strip, Introduction and Classification of Ics.
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Electrical and Electronic Technology	Edward Hughes et al,	Latest	Pearson Publication
2.	Basic Electrical & Electronics Engineering	V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar	Latest	Wiley India
3.	Basic Electrical & Electronics Engineering	Van Valkenburge	Latest	Cengage learning
4.	Basic Electrical and Electronics Engineering by,	Muthusubrmaniam	Latest	TMH
5.	Basic Electrical & Electronics Engineering	Ravish Singh	Latest	TMH
	Important Web Links			
1.	https://nptel.ac.in/courses/108108076/			
2.	https://nptel.ac.in/courses/117103063/			
3.	https://nptel.ac.in/courses/108/101/108101091/			

Course Outcomes: -

On completion of the course, students will be able:
- To identify parts of computer hardware
- To evaluate data representation techniques like binary, hexadecimal and octal
- To design algorithms to solve small computer problems related to daily life
- To apply arithmetic operations and sequential programming using C Language
- To discriminate among while, for and do-while iterative statements

OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Computers	5
2.	Data Representation	5
3.	Principles of Programming	5
4.	Introduction to C Programming	10
5.	Decision Making, Branching and Looping Statement	11

A.   DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Computers**
	• Introduction of Unit • Definition of Computer, Characteristics of Computer, Applications of Computers • Computer Generations • Computer Hardware & Software • Classification of Computers • Structure of Computer • Types of Memory: Primary Memory, Secondary Memory • Conclusion of Unit
2.	**Data Representation**
	• Introduction of Unit • Data Organization-Bits, Bytes, KB, MB, GB, TB • Number System: Concept of Radix and representation of numbers in radix r • Representation of Integer in Sign-magnitude, Signed 1's and 2'scomplement. • Binary, Octal and Hexadecimal Addition and Subtraction and their conversion • Binary Codes- Gray Code, BCD, ASCII • Conclusion of Unit
3.	**Principles of Programming**
	• Introduction of Programming Fundamentals • Algorithm Writing Rules and Examples • Flow Chart: Process and Symbols • Brief Introduction of Compiler • Conclusion of Unit
4.	**Introduction to C Programming**
	• Introduction to C • Structure of a C program • C Tokens • Basic Data types • Variable Declaration • Operators- Arithmetic Operators, Increment and Decrement, Logical, Relational and Bitwise Operators • Type Conversion-Implicit Type and Explicit Type Conversion

	• Conclusion of Unit	
5.	**Decision Making, Branching and Looping Statement**	
	• Conditional statements in C: If else, Nested If, If-else-If Ladder • Switch, Break, Continue and Go to Statement • Looping In C: For Loop, While Loop, Do-While Loop • Introduction to Array, Pointers, Function and Structures in C • Conclusion of Unit	

A. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Fundamentals of Computers	V.Rajaraman	Sixth	PHI
2.	Computer Fundamentals and Programming in C	ReemaThareja	Second	Oxford
3.	Fundamentals of Computers	E Balagurusamy	First	Tata McGraw Hill
4.	Programming in ANSI C	E Balagurusamy	Eight	Tata McGraw Hill
5.	Let US C	YashavantKanetkar	Fifteenth	BPB Publications
6.	The C Programming language	Ritchie Kernighan	Third	PHI
Important Web Links				
1.	https://www.learn-c.org/			
2.	https://www.sanfoundry.com/			
3.	https://nptel.ac.in/courses/106/104/106104128/			
4.	http://www.tutorials4u.com/c/			
5.	www.howstuffworks.com/c.htm			

COURSE OUTCOME

The student would be able to:

- understand the mechanism of language and linguistic creativity to communicate with each other.
- apply writing skills effectively for a variety of professional and social communication
- understand the importance of intonation, word and sentence stress for improving communicative competence and foster social and emotional Learning.
- apply writing skills effectively for a variety of professional and social communication.
- understand the structured conversation to make their point of views clear to the listeners by reading short stories written in English

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time Required for the Unit (Hours)
1.	**Grammar and Usage**	8
2.	**Composition**	7
3.	**Poems**	7
4.	**Essays& Short Play**	7
5.	**Short Stories**	7

B. DETAILED SYLLABUS

Unit	Contents
1.	**Grammar and Usage**
	• Introduction of Unit • Parts of speech • Tenses • Sentences • Word format • Conclusion of Unit
2.	**Composition**
	• Introduction of Unit • Letter writing • Application writing • Précis writing • Conclusion of Unit
3.	**Poems**
	• Introduction of Unit • The Solitary Reaper by William Wordsworth • God's Grandeur by Gerard Manley Hopkins • The Road Not Taken by Robert Frost • Conclusion of Unit
4.	**Essays & Short Play**
	• Introduction of Unit • Of Studies by Francis Bacon • On Doing Nothing by G.B. Priestley • The Monkey's Paw by W.W. Jacobs • Conclusion of Unit
5.	**Short Stories**
	• Introduction of Unit

	• The Three Dancing Goats by Anonymous
	• God and the Cobbler by R.K. Narayan
	• My lord, The baby by R.N.Tagore
	• Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Sr.No	ReferenceBook	Author	Edition	Publication
1.	Technical Communication	Meenakshi Raman and Sangeetha Sharma	2008	Oxford University Press,
2.	Effective Technical Communication	M. Ashraf Rizvi	2005	Tata McGraw-Hill
3.	Learn Correct English: Grammar, Usage and Composition	Shiv K. Kumar &HemalathaNagarajan	Latest	Pearson, New Delhi, India
4.	Grammar of the Modern English Language	Sukhdev Singh & Balbir Singh	Latest	Foundation Books, New Delhi
5.	Communicative English for Engineers and Professionals	Nitin Bhatnagar and MamtaBhatnagar	Latest	Pearson(New Delhi)
6.	Communicative grammar and composition	Rajesh.K.Lidiya	2008	Oxford Univ Press, New Delhi.

Important Web Links	
1.	http://www.communicationskills.co.in/index.html
2.	http://www.bbc.co.uk/worldservice/learningenglish
3.	https://www.englishlearner.com/
4.	http://www.englishclub.com/vocabulary/idioms-body.htm
5.	https://dictionary.cambridge.org/

PRACTICAL

Course Outcome:-

Students will be able:
- To understandthe concept of interference with the help of Newton's ring and dispersive power through prism.
- To evaluate the resolving power through diffraction grating and double slit arrangement.
- To evaluate the numerical aperture of optical fiber and Coherent length and time using He-Ne laser.
- To evaluate the height of the unknown object by Sextant.
- To analyze the mechanism of Ballistic Galvanometer and evaluate thespecific resistance of wire through Carey's foster bridge.

LIST OF EXPERIMENTS:

1.	To determine the wave length of Sodium light by Newton's Ring
2.	To determine the dispersive power of material of a prism for violet, red and yellow color of mercury light with the help of spectrometer.
3.	To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer
4.	To verify the expression for the resolving power of Telescope
5.	To measure the numerical Aperture of an optical fibre by He-Ne laser
6.	To determine the coherent length and coherent time by using He-Ne laser
7.	To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8.	To study the characteristics of semiconductor diode and determine forward and reverse bias resistance
9.	To Determine the height of a given line drawn on the wall by sextant
10.	To study the charging and discharging of a condenser and hence determine time constant (both current and voltage graphs are to be plotted)
11.	To determine the high resistance by method of leakage, using a ballistic galvanometer.
12.	To specify the specific resistance of a material of a wire by carey foster's bridge.
Virtual Labs	
1	http://vlab.amrita.edu/?sub=1&brch=282
2	http://vlabs.iitb.ac.in/vlab/labsps.html
3	https://praxilabs.com/en/virtual-labs.aspx?TAB=1#LOL

Course Outcomes:-

Students will be able

- To Create a model of T Lap and T- Bridle Joint through carpentry shop
- To Understand the making of prototype model through foundry shop
- To analyze the difference between gas welding and arc welding and their applications
- To create a model on fitting shop through filling, slotting, drilling and tapping operation
- To Understand the difference between forging, moldings and casting

LIST OF EXPERIMENTS

1.	**Carpentry Shop**
	• Timber, definition, engineering applications, seasoning and preservation
	• Plywood and ply boards
2.	**Foundry Shop**
	• Moulding Sands, constituents and characteristics
	• Pattern, definition, materials types, core prints
	• Role of gate, runner, riser, core and chaplets
	• Causes and remedies of some common casting defects like blow holes, cavities, inclusions
3.	**Welding Shop**
	• Definition of welding, brazing and soldering processes and their applications
	• Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications
	• Manual metal arc welding technique and equipment, AC and DC welding
	• Electrodes: Constituents and functions of electrode coating, welding positions
	• Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4.	**Fitting Shop**
	• Files, materials and classification.
5.	**Smithy Shop**
	• Forging, forging principle, materials
	• Operations like drawing, upsetting, bending and forge welding
	• Use of forged parts

List of Jobs to be made in the Workshop Practice

1.	**Carpentry Shop**
	1. T – Lap joint
	2. Bridle joint
2.	**Foundry Shop**
	3. Mould of any pattern
3.	**Welding Shop**
	4. Square butt joint by MMA welding
	5. Lap joint by MMA welding
4.	**Machine Shop Practice**
	6. Job on lathe with facing operation
	7. Job on lathe with one step turning and chamfering operations
	8. Job on shaper for finishing two sides of a job
5.	**Fitting Shop**
	9. Finishing of two sides of a square piece by filing
	10. Drilling operation on fitted job (two holes)
	11. Slotting operation on fitted job
	12. Tapping operation on fitted job

Course Outcomes:-

Students will be able to

- analyze the house wiring connections of various equipments such as energy meter, ceiling fan, tubelight etc.
- create the connections of single phase and three phase induction motors.
- Understand the construction and application of various electrical components such as Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, etc.
- Analyze the effect of L, C and L-C filters in single phase half wave and full wave bridge rectifier
- Analyze the effect of LC and LC filters in current and power rectifiers

LIST OF EXPERIMENTS:

1	Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2	Prepare the connection of ceiling fan along with the regulator and vary the speed.
3	Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.
4	Prepare the connection of three phase squirrel cage induction motor through 3-Phase Autotransformer and vary the speed.
5	Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.
6	Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
7	Measure the frequency, voltage, current with the help of CRO.
8	Assemble the single phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
9	Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
10	Verify the truth table of AND, OR, NOT, NOR and NAND gates
11	Prepare the connection of sodium lamp and measure voltage
12	Analyze the effect of LC and LC filters in current and power rectifiers
Virtual Lab	
1	http://vlabs.iitkgp.ernet.in/be/
2	http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical%20Engineering

Course Outcome:-

Students will be able to:
- Understand the concept of scale and their applications
- Analyze the different applications of conic section and engineering curves and also how to draw on sheet
- Analyze the use of projection and also understand the difference between first and third angle projection method
- Understand the purpose of sectioning and also draw sheet on section of solid
- Analyze the use of development and their application

(Theory Concepts)

1.	• Lines, Lettering and Dimension (Sketch Book) • Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet)
2.	• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods(in drawing sheet) Engineering Curves: Construction of Cycloid, Epicycloids, Hypo-cycloid(in drawing sheet)
3.	• Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet) • Projection of Points • Projection of Straight lines • Projection of planes: Different positions of plane lamina like: regular polygon, circle of three planes (four problems in drawing sheet) • Projection of Solids: Projection of right and regular polyhedron, cone (four problem in drawing sheet)
4.	• Sections of Solids: Projection of Frustum of a cone and pyramid(in drawing sheet)
5.	• Development of Surfaces: Parallel line and radial line method for right solids, Regular Solids (in drawing sheet) • Isometric Projections: Isometric Scale, Isometric axes, Isometric View of geometrical shapes (in drawing sheet)

(Practical Concepts)

6.	• Introduction • Line (coordinate Methods) • Dimension • Scale
7.	• Rectangle • Conic Section • Construction of ellipse, Parabola & Hyperbola, Polygon • Circle
8.	• AutoCAD commands (copy, Mirror, Move, Array, Block, Group, Join, Hatch etc.)
9.	• Type of Projection , Orthographic projection: First Angle and Third Angle projection • Projection of Points • Projection of Straight lines, different positions of straight lines • Projection of planes • Projection of Solids: projection of right and regular polyhedron and cone
10.	• Section of solids: projection of frustum of a cone and pyramid • Isometric projections
Virtual Labs	
1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

Course Outcomes: -

On completion of the course, students will be able:

- To prepare documents, worksheets and presentations using MS Word, Excel and PowerPoint.
- To perform arithmetic and conditional operations using C Language.
- To design program based on iterative statements using C Language.
- To perform array operations to solve computer problems.
- To demonstrate the use of pointers and structures.

LIST OF EXPERIMENTS:

	MS Office
1.	Implement basic features of MS Office, Prepare a document using MS-Word
2.	Prepare a Sheet using MS Excel and Slides using MS PowerPoint
	Programming In C
3.	Programs to demonstrate the use of input and output in C Language including data types and format specifiers.
4.	Program to evaluate arithmetic operations in C Language
5.	Program to apply conditional operators. (if-else, switch-case)
6.	Program to design program using iterative statements. (while, for and do-while)
7.	Program to implement input, output and manipulation operations on Array.
8.	Program to perform matrix addition and multiplication.
9.	Program to demonstrate declaration, definition, initialization and access operations on pointers.
10.	Program to solve problems of collection of different data types using structures.
Virtual Lab	
1	http://cse02-iiith.vlabs.ac.in/

COURSE OUTCOME

The student would be able:

- To present themselves in an effective manner and know about their short-term and long-term goals.
- To work in a team by managing time properly and focus on personal grooming, etiquettes and body language.
- To demonstrate their abilities by improving skills of LSRW (Listening /Speaking/Reading/Writing).
- To present different viewpoints or ways of thinking about a situation , expand their abilities to resolve situations and get experience within the given context
- To enhance their employability skills by working on the presentation of Résumé and giving impactful performance during Group Discussion.

LIST OF ACTIVITIES

1.	Self Introduction& knowing your environment
2.	GOAL Setting &Planning
3.	Time Management & Team Work
4.	Personal Grooming and Body language
5.	Etiquettes (Personal, Social, Professional & Corporate) etiquettes
6.	Reading skills: General & Technical Articles
7.	Listening Skills: Analysis of videos by famous Personalities
8.	Writing Skills: Picture perception & Story Making by jumbled words
9.	Speaking Skills: Extempore, JAM & Me against myself
10.	Role Plays
11.	Resume Writing
12.	Group Discussion

COURSE OUTCOME

Students will be able:
- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
- To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession.
- To help students understand the meaning of happiness and prosperity for a human being.
- To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
- To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Self-exploration**	**5**
2	**Understanding Harmony in the Human Being - Harmony in Myself**	**4**
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**	**5**
4	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**5**
5	**Professional & Language competency**	**5**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Self-exploration**
	• Introduction of the Unit • Course Introduction - Need, Basic Guidelines, Content and Process for Value Education • Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? • Its content and process; 'Natural Acceptance' and Experiential Validation- 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 for fulfillment of aspirations of every human being with their correct priority. • Conclusion &Real life applications
2	**Understanding Harmony in the Human Being - Harmony in Myself**
	• Introduction of the Unit • Understanding human being as a co-existence of the sentient 'I' and the material 'Body' • Understanding the needs of Self ('I') and 'Body' • Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), • Understanding the characteristics and activities of 'I' and harmony in 'I', • Understanding the harmony of I with the Body. • Conclusion &Real life applications
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

		• Introduction of the Unit • Understanding harmony in the Family- the basic unit of human interaction • Understanding values in human-human relationship • meaning of Justice & program for its fulfillment to ensure Trust and Respect as the foundational values of relationship, • Understanding the meaning of Trust • Difference between intention and competence, • Understanding the meaning of Respect Difference between respect and differentiation; the other salient values in relationship • Understanding the harmony in the society (society being an extension of family): as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society • Conclusion &Real life applications
4	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	
		• Introduction of the Unit • Natural acceptance of human values • Definitiveness of Ethical Human Conduct • Basis for Humanistic • Humanistic Constitution and Humanistic Universal Order • Competence in Professional Ethics & Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order • Conclusion &Real life applications
5	**Professional and Language Competence**	
		• Introduction of the Unit • Professional Communication , its meaning , importance & scope . • Sentences • Tenses and its usage • Active & Passive Voice • Conclusion &Real life applications

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	A Foundation Course in Human Values and Professional Ethics.	R R Gaur, R Sangal, G P Bagaria,	2009	Excel Books
2.	Human Values	A N Tripathy	2003	New Age International Publishers
3.	Indian Ethos and Modern Management	B L Bajpai	2004	New Royal Book Co., Lucknow
4.	Science and Humanism	P L Dhar, RR Gaur	1990	Commonwealth Publishers
5.	Human Values and Professional Ethics	Tanu Shukla, Anupam Yadav	Latest	Cengage India Private Limited.
Important Web Links				
1	https://nptel.ac.in/courses/109104068/			
2	https://www.tutorialspoint.com/engineering_ethics/index.htm			
3	https://www.storyofstuff.org/			

Code: BTX01110.2	ENVIRONMENTAL STUDIES	2.0 Credits [LTP: 2-0-0]

COURSE OUTCOME

Students will be able:
- To understand the scope of environmental studies and explain the concept of ecology, ecosystem and biodiversity.
- To implement innovative ideas of controlling different categories of Environmental Pollution.
- To explain different environmental issues together with various Environmental Acts, regulations and International Agreements.
- To summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.
- To determine the local environmental assets with simple ecosystems and identify local flora and fauna.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to environmental studies	5
2.	Environmental Pollution and its control	5
3.	Environmental Policies & Practices	5
4.	Human Communities and the Environment	5
5.	Field work	4

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to environmental studies**
	- Introduction of Unit - Multidisciplinary nature of environmental studies - Concept of sustainability and sustainable development. - Ecosystem: Structure and function of ecosystem - Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\ - Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem Aquatic ecosystems - Biodiversity and Conservation - Conclusion of Unit including Real Life Application
2.	**Environmental Pollution and its control**
	- Introduction of Unit - Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution - Nuclear hazards and human health risks - Solid waste management: Control measures of urban and industrial waste. - Pollution case studies - Conclusion of Unit including Real Life Application
3.	**Environmental Policies & Practices**
	- Introduction of Unit - Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture - Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. - Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act.

	• International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)
	• Conclusion of Unit including Real Life Application
4.	**Human Communities and the Environment**
	• Introduction of Unit
	• Human population growth: Impacts on environment, human health and welfare.
	• Resettlement and rehabilitation of project affected persons; case studies.
	• Disaster management: floods, earthquake, cyclones and landslides.
	• Conclusion of Unit including Real Life Application
5.	**Field work**
	• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
	• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
	• Study of common plants, insects, birds and basic principles of identification.
	• Study of simple ecosystems-pond, river, Delhi Ridge, etc.

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	Environmental Studies	ErachBarucha	Latest	UGC
2.	Environmental Studies	Benny Joseph	Latest	Tata McgrawHill
3.	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
4.	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
5.	Environmental Science and Engineering	P. Meenakshi	Latest	Prentice Hall India.
Important Web Links				
1.	http://www.energy.gov			
2.	https://nptel.ac.in/courses/122102006/			

COURSE OUTCOME

Students will be able:

- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
- To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession.
- To help students understand the meaning of happiness and prosperity for a human being.
- To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
- To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

LIST OF ACTIVITIES

Sr. No.	Details
1.	**Activity No. 1:Self-Introduction & Goal Setting** Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.
2.	**Activity No. 2: Ambitions and its relation to SELF & BODY** List down all your Desires & segregate between them whether the Desire is related to SELF or BODY or BOTH? And if Both which part is related to BODY and which part is related to SELF.
3.	**Activity No. 3: Creating in Harmony between mind & body** Chalk out some programs towards ensuring your harmony with the body - in terms of nurturing, protection and right utilization of the body. 2. Find out the plants and shrubs growing in and around your campus or home, which can be useful in curing common diseases.
4.	**Activity No. 4: Creative Speaking & Writing Skills** Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children. 2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.
5.	**Activity No. 5: Creative Speaking & Writing Skills** Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.
6.	**Activity No. 6: Analytical Skills** Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basic of natural acceptance of human values. If so, how should one proceed in this direction from the present situation.
7.	**Activity No. 7: Professional Writing** Write letters to the newspaper editors of your city regarding your suggestions on the role & responsibility of Youth towards Nation Building.
8.	**Activity No. 8: Professional Competence** Group Discussion & Personal Interview Sessions on contemporary& Ethical Issues.
9.	**Activity No. 9: Professional Ethics & Dilemmas** Case Studies analysis regarding the lapses in ethical conduct around in the professional Set Up and the ultimate consequences.
10.	**Activity No. 10: Professional & Ethical Approaches** Pick a card with Ethical and troubling situations written on and enact or write the response you could probably give over.

COURSE OUTCOME

Students will be able:

- To communicate scientific information precisely in both oral and written forms.
- To demonstrate basic laboratory skills of proper handling of laboratory glassware, equipment and chemical reagents.
- To test water quality parameters in given waste water sample by using different instruments.
- To investigate the values of DO, BOD and COD in industrial waste water samples.
- To detect levels of TS, TDS and TSS in waste water sample.

LIST OF EXPERIMENTS:

1.	To determine the pH of the given sample of sewage.
2.	To determine the conductivity of the given sample of sewage
3.	To determine the turbidity of the given sample of sewage
4.	To determine free chlorine of the given sample of water
5.	To determine available chlorine of the given sample of water
6.	To determine Total Solids of the given sewage sample.
7.	To determine the Total Dissolved Solids of the given sewage sample.
8.	To find out Total Settleable Solids of the given sewage sample.
9.	To determine Total Suspended Solids of the given sewage sample.
10	To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
11	To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
12	To find out Chemical Oxygen Demand of the waste water sample.
Virtual Labs	
1	https://virtuallabs.merlot.org/earth_science/index.html

Code: BTX01212	ANANDAM COURSE	2 Credits [LTP: 0-0-1]

OVERVIEW AND OBJECTIVES: The Anandam program aims to instill the joy of giving in young people, turning them into responsible citizens. Who will build a better society through daily action, it will build the habit of service in students across colleges and universities in Rajasthan. The students will have to undertake the course each semester starting with the 2020-21 academic year.

Course Outcomes

- Each student will be able to work as team member.

- Student will learn social activities.

- Students will be familiar with society.

DETAILED SYLLABUS

- Do at least one act of individual service each day

- Record this act of service in a dedicated Register/ Personal Diary

- Share this Register/ Personal Diary day in the 30-minute Anandam time slot dedicated by the college.

- Undertake one group service project for 64 Hours every term (outside college hours)

- Upload the report on the group project on the Anandam platform

- Participate in a sharing and presentation on the group service in the discussion session held once a month.

CODE: BTX01613	Social Outreach, Discipline & Extra Curricular Activities	1 Credits

OVERVIEW AND OBJECTIVES: The objective ofSocial Outreach, Discipline & Extra Curricular Activitiesis to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non technical categories.

Social Outreach, Discipline & Extra Curricular Activities shall be evaluated irrespective of period/time allocation (as in the case of Extra Curricular activity) in the teaching scheme as a **0.5 credit** course. The record related to discipline and related activities are maintained for each student and they shall be evaluated for the same also. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the First Semester are as follows:

Code	Activity	Hours	Credits
BTX01613.1	Talent Enrichment Programme (TEP)-I	2	1
BTX01613.2	Campus Recruitment Training (CRT)- I	2	