Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Subject: **Advanced Communication** | Course Code: **D028811(028)**
Total Theory Periods: 40 | Class Tests: Two (Minimum)
Total Tutorial Periods: 10 | Assignments: Two (Minimum)
ESE duration: Three Hours | Minimum Marks: 100, Minimum Marks: 35

Course Objectives:

1. To become familiar with fundamentals of satellite communication
2. To learn about the satellite link design
3. To gain knowledge about the different access techniques used in satellite communication.
4. To understand the concepts of Optical communication.
5. To learn about optical transmitters and receivers.

UNIT-I : **Introduction to Satellite:** Satellite Communication systems, introduction, Kepler's laws, orbits, orbital effects, orbital perturbations, Earth, Look Angles, Earth Coverage and Slant Range, Satellite sub systems, Antennas, Transponders, earth station technology, Satellite systems- GEO systems, non-GEO communication systems, Satellite Applications- Global Positioning System, Very Small Aperture Terminal system, Direct to Home Satellite Systems.

UNIT-II: Communication Satellite Link Design: Link Design Equation, System Noise Temperature, C/N, G/T Ratio, Atmosphere and Ionosphere Effects on Link Design, Uplink Deign, Complete Link Design, Interference effects on complete Link Design, Earth Station Parameters, Satellite Communication Links: Analog Baseband Signal, FDM Techniques, SNR and CNR in FM in Satellite link.

UNIT-III: Multiple Access Techniques: TDMA-Frame and Burst Structure, Frame Efficiency, Super frame, TDMA Frame Acquisition and Synchronization, TDMA burst TME Plan, Multiple Beam TDMA. Introduction: Principle of OFDM, implementation of transceivers, frequency selective Channels, Peak to average power ratio, inter-carrier interference, adaptive modulation and capacity, multiple access, multi-carrier code division multiple access.(Must be covered in abstract form only)

UNIT-IV: Optical Fiber Fundamentals: Numerical Aperture, Optical Fiber Modes and Propagation, Single Mode and Multi-Mode Fibers, Step Index and Graded Index Fibers Structures, Different types of Attenuations in Optical Fiber Communication.

UNIT-V: Light Sources, Detectors & Optical Networks: Light Emitting Diodes, LASER Principles, Laser Diode, Operating Characteristics and Modulation Circuits of LED and LASER Diodes Principle of Photo-Detection, Semiconductor Photodiode, PIN Photodiode, Avalanche Photodiode, Optical Networks: SONET/SDH Networks.

Name of Textbooks:

1. Fundamentals of Satellite Communication by Raja Rao, Pearson.
2. Satellite Communication by Monojit,Mitra, PHI.
3. Optical Fiber Communication by Keiser, TMH.
4. Fiber Optic Communications by Palais, 4th Edition, Pearson Education.
5. Theory and Applications of OFDM and CDMA: Wideband Wireless Communications by- Henrik_Schulze & Christian _Lueders

Name of Reference Books:

1. Satellite Communications by Dr. D.C. Agarwal, Khanna Publisher.
2. Satellite Communication System Engineering by Pritchard, Pearson Education.
3. Satellite Communication, Timothy Pratt, John Wiley & sons
4. Opto Electronics and Fiber Optic Communication by Sarkar & Sarkar, New Age International Publishers
5. Fundamentals of Optical Fiber Communication by Satish Kumar, PHI
6. Optical Fiber Communication-Principles and Practice by John Senior, PHI
7. Multi-Carrier Digital Communications: Theory and Applications of OFDM By- Burton_R. Saltzberg & Mustafa_Ergen_

Course Outcomes:

1. Understand the basic concepts of Satellite.
2. Able to calculate the complete C/N ratio of satellite link design.
3. Able to understand multiple access techniques related to satellite.
4. Able to understand the concepts of optical fiber communication.
5. Student gains knowledge how optical signal is transmitted and received
6. Student gets an insight into SONET/SDH networks.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology — Branch: Electronics & Telecommunication
Subject: **VLSI and Microelectronics** — Course Code: **D028831(028)**
Total Theory Periods: 40 — Class Tests: Two (Minimum)
Total Tutorial Periods: 10 — Assignments: Two (Minimum)
ESE duration: Three Hours — Maximum Marks: 100, Minimum Marks: 35

Course Objective:

1. Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect.
2. Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
3. Be able to complete a significant VLSI design project having a set of objective criteria and design constraints.
4. Design for higher performance or lower area using alternative circuit families
5. Describe and avoid common CMOS circuit pitfalls and reliability problems
6. Design functional units including adders, multipliers, ROMs, SRAMs, and PLAs

UNIT-I: Introduction, Trends & Projections in VLSI Circuits, Flow diagram of VLSI Circuit, Design and VLSI Design issues. Stick Diagrams; Physical Design Rules; Layout Designing; Euler's Rule for VLSI Physical Design.

UNIT-II: MOSFET fundamentals, Enhancement Mode MOSFETs, Depletion Mode MOSFETs, Weak & strong Inversion Conditions, Threshold Voltage Concept in MOSFETs, IV Characteristics of a MOSFET, Limitations in IV Model and MOSFET capacitance.

UNIT-III: Basic VLSI Design Styles-NMOS, CMOS Process flow; Noise Margin; Inverter Threshold Voltage; NMOS Inverter design and characteristics; CMOS Inverter Design and Properties; CMOS transmission gates, Delay, Power Dissipation and scaling in CMOS circuits.

UNIT-IV: Parallel & Series Equivalent circuits; Static CMOS Circuit Design: case study; VLSI Interconnects. High Speed Dynamic CMOS logic families; Precharge-Evaluate logic; Dynamic CMOS logic circuits, cascading , charge sharing and clock distribution.

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UNIT-V: Memory / Regular Structure Design; ROM Design, SRAM and DRAM Design.

Name of Text Books:

1. CMOS Digital Integrated Circuits-Analysis & Design, S.M. Kang & Y. Leblibici, TMH, Ed. 2003.
2. Principles of CMOS VLSI Design: A System Perspective, N.H.E. Weste & K. Eshraghian, Pearson Education India, 2004.

Name of Reference Books:

1. Digital Integrated Circuits-A Design Perspective, J.M. Rabaey, PHI.
2. Introduction to VLSI, K. Eshraghian & Pucknell, PHI.

Course Outcomes:

Students will

1. Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect.
2. Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
3. Have an understanding of the characteristics of CMOS circuit construction and the comparison between different state-of-the-art CMOS technologies and processes.
4. Be able to complete a significant VLSI design project having a set of objective criteria and design constraints.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Subject: **Radar and Navigational Aids** | Code: **D028832(028)**
Total Theory Periods: 40 | Class Tests: Two (Minimum)
Total Tutorial Periods: 10 | Assignments: Two (Minimum)
ESE duration: Three Hours | Maximum Marks: 100, Minimum Marks: 35

Course Objectives:

1. Main objective of this course is to make the students understand the basic concept in the field of Radar and Navigational aids.
2. Students are taught about different types of Radar Systems.

UNIT-I: Principles and Applications: Basic Radar, Radar Block Diagram, Radar Frequencies, Applications of Radar, Radar Range Equation, Probabilities of Detection of False Alarm Integration of Radar Pulses, Radar Cross Section of Targets.

UNIT-II: MTI And Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line Cancellers, Staggered PRF, Range Gated Doppler Filter, Limitations to MTI Performance, Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations to Tracking Accuracy, Low Angle Tracking, Tracking in range, Comparison of Trackers

UNIT-III: Propagation of Radar Waves: Forward Scattering from a Flat Earth, Scattering from Round Earths Surface, Atmospheric Refraction–Standard Propagation, Non-Standard Propagation, Diffraction, Attenuation by Atmospheric Gases, External or Environmental Noise, Other Propagation Effects.

UNIT-IV: Antennas for Detection of Radar Signals: Parabolic Antennas, Introduction to Phased Array, Cosecant Squared Antenna ,Radome

UNIT-V: Radar Transmitter and Receiver: Radar Receiver, Receiver Noise Figure, Super heterodyne Receiver, Duplexers and Receiver Protectors, Radar Displays, introduction to ECM and ECCM, Linear Beam Power Tubes, Solid State Power Sources, Magnetron.

Name of Text Books:

1. Introduction to Radar Systems by M. I Skolnik, TMH Pub. Co.
2. Microwave Radar and Navigational Aids by A.K. Sen and A. B. Bhattacharya, Khanna Publisher

Name of Reference Books:

1. Radar: Principles, Technology, Applications by Edde, Pearson Education Pub.
2. Elements of Electronic Navigation by Nagaraj, TMH Pub.

Course Outcomes :

1. To become familiar with fundamentals of Radar.
2. To gain in depth knowledge about the different types of Radar and their operation.
3. Need for signal detection in Radar and various Radar signal detection techniques.
4. To become familiar with Radio Navigation techniques

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Subject: **Consumer Electronics** | Course Code: **D028833(028)**
Total Theory Periods: 40 | Class Tests: Two (Minimum)
Total Tutorial Periods: 10 | Assignments: Two (Minimum)
ESE duration: Three Hours | Maximum Marks: 100, Minimum Marks: 35

Course Objectives:

1. To understand fundamentals of television.
2. To gain knowledge of color TV fundamentals.
3. To understand working of microphones and know concepts of optical recording.
4. To gain knowledge of public address system.
5. To gain knowledge of use of electronics in home and automobiles.

UNIT–I: Fundamentals of Television: Elements of Television system, Scanning Process, Scanning Methods and Aspect Ratio, Persistence of Vision and Flicker, Vertical Resolution, Picture Elements, Kell Factor, Horizontal Resolution and Video Bandwidth, Interlacing of Scanning Lines, Video Signals, Control Pulses, Composite Video Signal, TV Standards: 625 Line System.

UNIT–II: Color TV: Introduction, Color Spectrum, Compatibility Consideration, Color TV Signal, Luminance Signal, Chrominance Signal, Luminance and Chrominance, Recombination to Natural Color Voltages, Interleaving Process, Color Subcarrier Frequency, Phase Errors, Composite Color Signal, High Definition TV, Digital TV.

UNIT–III: Microphone and Optical Recording: Microphone: Characteristics of Microphones, Construction and working Principles of Microphones, Carbon Microphone, Dynamic Microphone, Capacitor Microphone, Tie Clip Microphone, Wireless Microphone. Optical Recording of Audio Signal: Disc, Processing of Audio signal, Readout from the Disc, Reconstitution of the Audio Signal.

UNIT–IV: Public Address System: Loudspeaker: Ideal Loudspeaker, Basic Loudspeaker, Capacitor Loudspeaker, Permanent Magnet Loudspeaker, Voice coil, Loudspeaker Impedance, Acoustic Impedance and Resonance, Woofers, Horn Type Tweeters. Loudspeaker System: Horns, Indoor Acoustics. Public Address system: Introduction to PA system, Planning a PA System, Speaker Matching System, PA System Characteristics, PA Amplifiers.

UNIT–V: Electronics in Home Appliances and Automobiles: Microwave Oven: Block diagram, LCD Timer with Alarm, Single Chip Controller, **Washing Machine:** Electronic Controller for Washing Machine, Washing Machine Hardware, Washing Cycles-Hardware and Software Development, Fuzzy Logic Washing Machine, **Electronics in Automobiles:** In Car Computers: Applications, Electronic Ignition, Electronic Ignition Lock System, Anti Lock Braking System, Electronically Control Suspension, Instruments Panel Displays, Ultrasonic Car Safety Belt System Air Bag System, Vehicle Proximity Detection System, Car Navigation System.

Text Book:

1. Consumer Electronics by S. P Bali, Pearson Publication
2. Color Television by S.P Bali, McGraw Hill.

Reference Book:

1. Monochrome and color TV by R.R. Gulati, 3 rd Edition, New Age International.
2. Basic TV and video systems by Benard Globb.
3. Audio and Video System by R.G. Gupta, 2nd Edition, McGraw Hill.

Course Outcomes:

1. Students will be able to understand the concepts of television.
2. Students gain a deep insight into concepts of color television.
3. Students will be able to know about various microphones and also optical recording technique.
4. Students learn the design aspect of PA system.
5. Students will be able to get complete knowledge of working of microwave oven, washing machine and in car computers.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Subject: **Smart Antennas** | Course Code: **D028834(028)**
Total Theory Periods: 40 | Class Tests: Two (Minimum)
Total Tutorial Periods: 10 | Assignments: Two (Minimum)
ESE duration: Three Hours | Maximum Marks: 100, Minimum Marks: 35

Course Objectives:

1. Students will be familiar with the Types of Smart Antenna Systems.
2. What are the benefits of smart antenna technology.
3. Gain an understanding and experience with smart antenna environments and implementation.

UNIT-I: Introduction To Smart Antennas: Need for Smart Antennas, Smart Antenna Configurations, Switched-Beam Antennas, Adaptive Antenna Approach, Space Division Multiple Accesses (SDMA), Architecture of a Smart Antenna System, Receiver, Transmitter, Benefits and Drawbacks, Mutual Coupling Effects

UNIT-II: **DOA Estimation Fundamentals** Introduction The Array Response Vector, Received Signal Model, The Subspace-Based Data Model, Signal Auto covariance Matrices ,Conventional DOA Estimation Methods, Conventional Beamforming Method, Capon's Minimum Variance Method, Subspace Approach to DOA Estimation ,The MUSIC Algorithm, The ESPRIT Algorithm, Uniqueness of DOA Estimates.

UNIT-III: **Beam forming Fundamentals** The Classical Beam former-Statistically Optimum Beam forming Weight Vectors, The Maximum SNR Beam former, The Multiple Side lobe Canceller and the Maximum, SINR Beam former- Minimum Mean Square Error (MMSE),Direct Matrix Inversion (DMI), Linearly Constrained Minimum Variance (LCMV) , Adaptive Algorithms for Beam forming ,The Least Mean-Square (LMS) Algorithm, The Recursive Least-Squares (RLS) Algorithm.

UNIT-IV: Space–Time Processing: Introduction, Discrete Space–Time Channel and Signal Models, Space–Time Beamforming, Inter symbol and Co-Channel Suppression, ISI Suppression, CCI Suppression, Joint ISI and CCI Suppression, Space–Time Processing for DS-CDMA, Capacity and Data Rates in MIMO Systems, Single-User Data Rate Limits, Multiple-Users Data Rate Limits, Data Rate Limits Within a Cellular System, MIMO in Wireless Local Area Networks

UNIT-V: Mobile Stations' Smart Antennas Introduction -Multiple-Antenna MS Design, Combining Techniques, Selection (Switched) Diversity, Maximal Ratio Combining, Adaptive Beamforming or Optimum Combining ,RAKE Receiver Size, Mutual Coupling Effects, Dual-Antenna Performance Improvements ,Downlink Capacity Gains

Text Books:

1. Smart Antennas, Tapan k. Sarkar, IEEE Press Wiley Interscience
2. Constantine A. Balanis, Panayiotis I. Ioannides, Introduction to Smart Antennas Morgan & Claypool Publishers
3. hmed El Zooghby, Smart Antenna Engineering, Artech House

Reference Books:

1. M.J. Bronzel, Smart Antennas, John Wiley, 2004
2. T.S. Rappaport & J.C. Liberti, Smart Antennas for Wireless Communication, Prentice Hall (PTR), 1999.
3. R. Janaswamy, Radio Wave Propagation and Smart Antennas for Wireless Communication, Kluwer, 2001

Course Outcomes:

Students will

1. Compare the performances of digital radio receivers and software radios.
2. Study the CDMA spatial processors to analyze the multi-cell systems.
3. Analyze the channel models for smart antenna systems.
4. Study the environmental parameters for signal processing of smart antenna systems.
5. Evaluate the requirements for the design and implementation of smart antenna systems.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Subject: **Bio-medical Signal Processing** | Course Code: **D028835(028)**
Total Theory Periods: 40 | Class Tests: Two (Minimum)
Total Tutorial Periods: 10 | Assignments: Two (Minimum)
ESE duration: Three Hours | Maximum Marks: 100, Minimum Marks: 35

Course Objectives:

1. To make them understand the fundamentals of signal processing for various bio-signal analysis.
2. To impart knowledge about filter characteristics and to design various filters,
3. To provide an in-depth knowledge about the basic concepts of wavelet and speech analysis.
4. To apply various signal processing techniques in analyzing the various biosignal.
5. To study about the characteristics of non stationary signals.

UNIT – I: FUNDAMENTALS OF SIGNAL PROCESSING : Sampling and aliasing, Signal reconstruction, Signal conversion systems, Circular convolution Correlation, Autocorrelation, Cross correlation, FFT, decimation in time algorithm, Decimation in Frequency algorithm.

UNIT – II: DIGITAL FILTER DESIGN : Basics of filter, Design of IIR filter-impulse invariant method, Bilinear Transformation Method Warping and pre-warping effect, Frequency transformation, Characteristics of FIR filter, FIR filter design using windowing techniques, Rectangular window, Hamming window, Hamming window

UNIT – III : WAVELET AND SPEECH PROCESSING : Introduction to wavelets, Time frequency representation, Discrete wavelet transform, pyramid algorithm, Comparison of Fourier transform and wavelet transform, Speech analysis, Cepstrum, Homomorphic filtering of speech signals, EEG signal characteristics, EEG analysis.

UNIT – IV: ANALYSIS OF BIOSIGNALS : Automatic analysis and classification of ECG, P-wave detection, QRS complex detection, Correlation analysis of ECG signals, Signal averaged ECG, Analysis of Heart Rate variability, Synchronized averaging of PCG envelopes, envelogram, Analysis of PCG signal, Analysis of EMG signal.

UNIT – V: ADVANCEMENT IN BIOMEDICAL SIGNAL PROCESSING : Analysis of non-stationary signals, time variant system, Fixed segmentation, Short time Fourier transform, autocorrelation function method, Spectral error measure method, generalized likelihood ratio, Introduction to Adaptive filters, Adaptive segmentation.

Text Books:

1. John G, Proakis and Dimitris Manolakis G. "Digital Signal Processing, Algorithms and Applications", PHI of India Ltd., New Delhi, fourth Edition, 2007.
2. Rangaraj M Rangayyan, "Biomedical signal processing", IEEE press, first edition, 2002.

Reference Book:

1. Reddy D.C, "Biomedical Signal Processing: Principles and Techniques", Tata McGraw-Hill, New Delhi, 2nd edition, 2005.
2. Sanjit. K, Mitra "Digital Signal Processing", A Computer Based Approach", Tata McGraw-Hill, New Delhi, fourth edition 2011.

Course Outcomes:

1. To learn the fundamental concepts of signal processing
2. To apply common signal processing techniques for various biomedical signals.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Semester: VIII | Course Code: **D028821(028)**
Subject: **Advanced Communication (Lab)** | Batch Size: 30
Total Lab Periods: 36 | Minimum Marks: 20, Maximum Marks: 40

List of Experiments: (At least ten experiments are to be performed by each student)

1. To measure bending loss of a fiber.
2. To measure propagation or attenuation loss in a fiber.
3. To obtain amplitude modulation and to transmit the same over fiber optic cable and to demodulate the same at the
4. receiver end.
5. To determine the numerical aperture of a fiber.
6. To measure various types of losses occur in an optical fiber.
7. To study the AC characteristics of intensity modulation of laser and fiber optic system.
8. To measure optical power of a laser diode vs forward current.
9. To monitor photo diode current vs laser optical output.
10. Demonstration of voice transmission through optical fiber using FM.
11. Communication between two computers using RS232 interface via optical fiber.
12. To measure plastic fiber patch cord loss for various lengths of fiber.
13. To study voice transmission through fiber optic cable using PWM.
14. To transmit and receive text files over fiber optic cable.
15. To transmit, receive and observe digital signals over fiber optic cable.
16. To measure rise time, fall time, pulse width distortion of a laser and to determine transmission delay.

List of Equipments/Machine Required:

Fiber optic trainer kit, Optical fiber, Splicing unit, Data Acquisition card for optical signal, O/E & E/O Converter, CRO.

Recommended Books:

1. Fundamentals of Optical Fiber Communication – Sathish Kumar, PHI.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology | Branch: Electronics & Telecommunication
Semester: VIII | Course Code: **D028822(028)**
Subject: **Power Electronics (Lab)** | Batch Size: 30
Total Lab Periods: 36 | Minimum Marks: 20, Maximum Marks: 40

List of Experiments: (At least ten experiments are to be performed by each student)

1. Study of VI characteristic of a silicon controlled Rectifier (SCR).
2. Study of VI characteristic of a DIAC.
3. Study of VI characteristic of a TRIAC.
4. Study of VI characteristic of a UJT.
5. Application of UJT as relaxation Oscillator.
6. Study of Half wave gate controlled rectifier-using SCR.
7. RC triggering Scheme of SCR.
8. Study of Voltage Commutation.
9. Study of Current Commutation.
10. Study of single-phase, Half –controlled, full-wave rectifier using two SCRs, and two diodes.
11. Speed controls of a dc shunt Motor using SCR.
12. Study of a three –phase rectifier using power diodes.
13. Study of a three phase full-wave half –controlled rectifier.
14. To study a TRIAC power control circuit
    (i) use to control the speed of a fan
    (ii) used as a dimmer.
15. To observe how a Photoconductive cell may be used to trigger an SCR.

Apparatus required:

1. Diodes	2. SPST switch.	3. Transformer	4. Oscilloscope
5. Photo cells	6. CRO	7. Voltmeter, Ammeter	8. DC shunt motor

Reference books:-

1. Fundamentals of Power Electronics ISTE S .K Bhattacharya.
2. Fundamentals of Power Electronics by S. Rama Reddy.
3. Industrial and Power Electronics by Harish C. Rai.

Open Elective For 8th Semester

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Technology.**		
Branch:	Common to all Branches	Semester:	**VIII**
Subject:	**Environmental Science**	Code:	**D000801(094)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Min Marks: 100	Min Marks: 35

Course Objectives:

- Be familiar with the reason of water pollution.
- Familiar with the causes of air pollution
- To learn various method of controlling pollution.

UNIT–I	**Environmental Pollution** Definition, cause, effects and control measures of, Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
UNIT–II	**Ecosystems** Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
UNIT–III	**Biodiversity and its conservation** Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India.
UNIT–IV	**Land resources** Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
UNIT–V	**Environmental ethics** Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Text books:

1. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain.
2. Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

Reference Books:

1. Expected impact of climate change on agricultural production and water resources.
2. Mitigation Strategies and Economics of climate change.

Course Outcome:

Student should be able to

- To be able to plan and handle issues related to environment.
- To be able to identify the reason of climate change.
- Explain about different types of environmental pollution.
- Explain and apply various methods of controlling environmental pollution