ShriVaishnavVidyapeethVishvavidhyalaya, Indore

Name of Program: Bachelor of Electrical Engineering

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BTEE301		Circuit Theory	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):
To introduce the students with the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction. To solve the electrical network using mesh and nodal analysis by applying network theorems, analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.

Course Outcomes (COs): Upon completion of this course students will be able to:
1. Apply the nodal and mesh methods of circuit analysis.
2. Apply linearity and superposition concepts to analyze RL, RC, and RLC circuits in time and frequency domains.
3. Express complex circuits in their simpler Thévenin and Norton equivalent forms.
4. Analyze circuits both in time and frequency domains.
5. Construct and make time and frequency domain measurements on elementary RL, RC, and RLC circuits.

Syllabus

UNIT I
Practical Voltage & current sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh. Analysis of magnetically coupled circuits, Dot convention, coupling coefficient, tuned circuits, Series and parallel resonance, frequency-response of series and Parallel circuits, Q –factor, Bandwidth.
Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT II

Transient analysis- Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. Steady state analysis- Concept of phasor & vector, impedance & admittance,

UNIT III

Network Theorems for AC & DC circuits-Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

UNIT IV

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

UNIT V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, terminated two port networks.

Text Books:

1. A K Chakrabarti :Circuit theory: Dhanpat Rai

Reference Books:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH

List of experiments:

1. Verification of Thevenin Theorem.
2. Verification of Superposition Theorem.
3. Verification of Reciprocity Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Millman's Theorem.
6. Determination of Open Circuit parameters of a Two Port Network.
7. Determination of Short Circuit parameters of a Two Port Network.
8. Determination of A,B, C, D parameters of a Two Port Network
9. Determination of Frequency Response of RLC Series Circuit.
10. Determination of Frequency Response of RLC parallel Circuit.

Beyond Syllabus:

1. Analysis of step response of first order circuits.
2. Introduction to PSPICE / TINA PRO.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

ShriVaishnavVidyapeethVishvavidhyalaya, Indore

Name of Program: Bachelor of Electrical Engineering

Subject Code	Category	Subject Name	Teaching &Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*	L	T	P	Credits
BTEE302		Electrical Measurement And Instrumentation	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):
To enable the students to learn in detail about the various instruments available for monitoring/measuring electrical parameters encountered in domestic / industrial applications.

Course Outcomes (COs):
After the successful completion of this course students will be able to

1. To test and calibrate ammeter, voltmeter, and Wattmeter and energy meter
2. Measure low, medium & high Resistances using suitable bridges.
3. Understand the operating principles of Energy and power meters.
4. Learn the measurement of magnetic parameters.
5. To select proper instrument for measurement various Electrical elements

Syllabus

UNIT-I
Electrical Measurements
Standards of Measurement & Errors, Review of indicating and integrating instruments: Voltmeter, Ammeter, Wattmeter, and Energy meter.

UNIT-II
Measurement of Resistance, Inductance and Capacitance
Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.

UNIT-III
Instrument Transformers

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Indore

Joint Registrar
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Vishwavidyalaya, Indore

Current Transformer and Potential Transformer : construction, theory, phasor diagram, ratio and phase angle errors, testing and applications.

UNIT-IV

Electronic Measurements

Electronic voltmeter, multimeter, wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Spectrum & Wave analyzer. Digital counter, frequency meter, voltmeter, multimeter and storage oscilloscope.

UNIT-V

Instrumentation

Transducers, classification & selection of transducers, strain gauges, inductive & capacitive transducers, piezoelectric and Hall-effect transducers, thermisters, thermocouples, photo-diodes & photo-transistors, encoder type digital transducers, signal conditioning and telemetry, basic concepts of smart sensors and application. Data Acquisition Systems.

Text books

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney, Dhanpat Rai & Co

Reference Books:

1. Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1988.
2. Jones, B.E., "Instrumentation Measurement and Feedback", Tata McGraw-Hill, 1986.
3. Golding, E.W., "Electrical Measurement and Measuring Instruments", 3rd Edition, Sir Issac Pitman and Sons, 1960.

List of Experiments:

1. Calibration of Energy meter.
2. Measurement of resistance using Wheat stone's bridge.
3. Measurement of Insulation resistance using Megger.
4. Measurement of Power in three phase circuit by two & three wattmeter method.
5. Measurement of inductance by Maxwell's bridge.
6. Measurement of inductance by Hay's bridge.
7. Measurement of capacitance by Owens's bridge, and De Sauty bridge.
8. Measurement of displacement using LVDT.
9. Measurement of temperature by RTD, and thermocouple.
10. Measurement of Phase difference and Frequency on C.R.O.

Experiments beyond syllabus

1. Measurement of motor speed (RPM) of motor using opto-coupler and encoder disk
2. Measurement of motor speed (RPM) of motor using proximity sensor.

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Name of Program: Bachelor of Electrical Engineering

Subject Code	Category	Subject Name	Teaching &Evaluation Scheme								
			Theory			Practical		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BTEE303		Analog Electronics	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):
The main objective of this curriculum/course is to make the students well versed with basic electronic components and circuits. The students can

1. The capability to use abstractions to analyze and design simple electronic circuits.
2. An understanding of how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.
3. The capability to design and construct circuits, take measurements of circuit behavior and performance, compare with predicted circuit models and explain discrepancies.
4. The primary objective of this course is to develop an in-depth understanding of the design principles and applications of integrated analog circuits

Course Outcomes (COs):
Students who are successful in this class will be able to:

1. Understand the basic physics of carrier transport in bulk semiconductors and real device structures. 2. Understand the fundamentals of operation of the main semiconductor electronic devices.
2. Understand the basic parameters of electronic devices, their performance, and limiting factors.
3. Understand the basic principles of electronic device operation with emphasis on bipolar transistors, and unipolar microwave devices.
4. Apply theory and realize analog filter circuits, Understand the circuit operation of the 555 timer IC and regulator IC and identifying the faulty components within a circuit.

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Syllabus

UNIT-I

P-N Junctions: Diode theory, forward and reverse-biased junctions, reverse-bias breakdown, load line analysis, diode applications - Limiters, clippers, clampers, voltage multipliers, half wave & full wave rectification, Special purpose diodes - Zener diode, Varactor, light emitting diodes, Laser diodes.

UNIT-II

Transistors: BJT, FET, MOSFET, Types, working principle, characteristics, and region of operation, load line biasing methods.

UNIT-III

Transistors Amplifier: Small Signal BJT amplifiers: AC equivalent circuit, hybrid, re model and their use in amplifier design. Multistage amplifiers, frequency response of basic & compound configuration, Power amplifiers: Class A, B, AB, C and D stages, IC output stages.

UNIT-IV

Feedback & Oscillator Circuits: Effect of positive and negative feedbacks, basic feedback topologies & their properties, Analysis of practical feedback amplifiers, Sinusoidal Oscillators (RC, LC and Crystal), Multivibrators, The 555 timer.

UNIT-V

Operational Amplifiers: Op-Amp Basics, practical Op-Amp circuits, differential and Common mode operation, Inverting & Non Inverting Amplifier, differential and cascade amplifier, Op-Amp applications.

Text books:

1. A.S. Sedra & K.C.Smith, Microelectronics Circuits, Oxford University Press (1997)
2. Robert L. Boylestad & Louis Nashelsky, Electronic Devices & Circuit Theory.

Reference books:

1. Michael Shur, *Introduction to Electronic Devices*, John Wiley & Sons Inc., 2000.
2. R. T. Howe and C. G. Sodini, *Microelectronics: An Integrated Approach*, Prentice-Hall Inc. 1997.
3. Jacob Millman, and C.C. Halkias, "Electronic devices and circuits", TMH Publications.
4. Ben G. Streetman, *Solid State Electronic Devices*, PHI, 5th Ed, 2001.

List of experiments:

1. V-I Characteristics of different types of Diodes.
2. Design of various clipping and clamping circuits.
3. Design half & full wave rectifier
4. Design & Analysis of transistor amplifier in CE, CB & CC configuration.
5. Design & Analysis of JFET Amplifier.
6. Design & Analysis of MOSFET Amplifier.
7. Study of power amplifiers of various classes.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

8. Study of various oscillators.
9. Char. of Op-Amp (input offset voltage, slew rate CMRR, BW, Input bias current)
10. Study of Op-Amp as a comparator.

Experiments Beyond Syllabus

1. To demonstrate Proportional Amplifier Circuit using Op-Amp.
2. Introduction to Analog discovery Kit.
3. To design and test the IC 723 voltage regulator.
4. To design 4 bit R-2R ladder DAC using op-amp (Voltage Regulator using IC 723).
5. To study Series, shunt and switching regulators.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Name of Program: Bachelor of Electrical Engineering

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*	L	T	P	Credits
BTEE305		Electrical Engineering Material	60	20	20			3	1	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Course Educational Objectives (CEOs):
To introduce the concepts of different electrical engineering materials. To gain the concepts of conducting, semiconducting, dielectric and insulating materials with their properties and application. It will also provide the various phenomena such as Magnetostriction, Hall Effect, Super conductivity etc.

Course Outcomes (COs): Upon completion of this course the students will be able to:

1. Apply core concepts in materials science to solve engineering problems.
2. Select the material for design and construction
3. Understand the importance of life -long learning
4. Evaluate the insulating, conducting and magnetic materials used in electrical machines.
5. Understand the properties of liquid, gaseous and solid insulating materials.

Syllabus

UNIT I
Insulating Materials and their Applications:
Plastics- Definition and classification, thermosetting materials, Thermo-plastic materials; Natural insulating materials, properties and their applications; Gaseous materials – Ceramics-properties and applications.

UNIT II
Semi-Conducting Materials:
Introduction - Semi-conductors and their properties, Different semiconducting materials (silicon and germanium) used in manufacture of various semiconductor devices (i.e. p-type and n-type

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
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semiconductors), Materials used for electronic components like resistors, capacitors, diodes, transistors and inductors etc.

UNIT III

Materials For Electrical Applications

Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid Liquid and Gaseous insulating, materials. Effect of moisture on insulation.

UNIT IV

Magnetic Materials

Introduction and classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy,Magnetostriction,Diamagnetism,magnetically soft and hard materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis. B-H curve, magnetic saturation, hysteresis loop (including) coercive force and residual magnetism, concept of eddy current and hysteresis loss, Curie temperature,

UNIT V

Special Purpose Materials

Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI.

Text Books:

1. SK Bhattacharya: "Electrical and Electronic Engineering Materials" 1st edition Khanna Publishers, New Delhi, 2006.
2. A.J. Dekker "Electrical Engineering Materials", PHI, 2006.

Reference books:

1. TTTI Madras: "Electrical Engineering Materials" TMH.
2. R K Rajput: "A course in Electrical Engineering Materials", Laxmi Publications. 2009.
3. T K Basak: "A course in Electrical Engineering Materials"New Age Science Publications 2009.
4. C. S. Indulkar and S. Thruvengadem: "Electrical Engineering Materials" S. Chand.
5. John Allison "Electrical Engineering Material s & Devices" TMH.
6. V. Raghvan: "Material Science & Engineering" PHI.
7. S.P. Seth & P.V. Gupta: "A course Electrical Engineering Materials" Dhanpat Rai & Sons.

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Indore

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Vishwavidyalaya, Indore

Name of Program: B.Tech Electrical Engineering

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
BTCS403		Data Structure & Algorithms	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES
1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To teach the concept of protection and management of data.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Get a good understanding of applications of Data Structures.
2. Develop application using data structures.
3. Handle operations like searching, insertion, deletion, traversing mechanism etc. on Various data structures.
4. Decide the appropriate data type and data structure for a given problem.
5. Select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.

SYLLABUS

UNIT–I
Introduction, Overview of Data structures, Types of data structures, Primitive and Non Primitive data structures and Operations, Algorithms. Characteristic of Array, One Dimensional Array, Operation with Array, Two Dimensional Arrays, Three or Multi-Dimensional Arrays.Strings, Array of Structures, Drawbacks of linear arrays, Pointer and Arrays, Pointers and Two Dimensional Arrays, Array of Pointers, Pointers and Strings.

UNIT–II
The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation .
The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Circular Queue, Priority Queue, &Dequeue, Application of Queues.

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Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT–III

Linked List as an ADT, Linked List Vs. Arrays, Memory Allocation & De-allocation for a Linked List, Linked List operations, Types of Linked List, Implementation of Linked List, Application of Linked List polynomial.

UNIT–IV

Definitions and Concepts, Binary trees, operations on binary trees, Binary tree and tree traversal algorithms, operations on binary trees, List, representation of Tree. Graph Representation, Graph traversal (DFS & BFS).

UNIT–V

Sort Concept, Shell Sort, Radix sort, Insertion Sort, Quick Sort, Merge Sort,Heap Sort, List Search, Linear Index Search, Index Sequential Search Hashed List Search, Hashing Methods , Collision Resolution.

TEXT BOOKS:

1. Ashok N. Kamthane, "Introduction to Data structures", Pearson Education India.
2. Tremblay &Sorenson, "Introduction to Data- Structure with applications", Tata Mc- Graw Hill.
3. Bhagat Singh & Thomas Naps, "Introduction to Data structure", Tata Mc- Graw Hill.
4. Robert Kruse, "Data Structures and Program Design", PHI.
5. Aaron M. Tenenbaum& Moshe J. Augenstein, "Data Structure using PASCAL", PHI.

REFERENCES:

1. Data Structures Using C & C++, Rajesh K. Shukla, Wiley- India.
2. Data Structures Using C, ISRD Group, Second Edition, Tata McGraw-Hill.
3. Data Structure Using C, Balagurusamy.
4. C & Data Structures, Prof. P.S. Deshpande, Prof. O.G. Kakde, Dreamtech press.
5. Data Structures, Adapted by: GAV PAI, Schaum's Outlines.

LIST OF EXPERIMENTS:

1. To develop a program to find an average of an array using AVG function.
2. To implement a program that can insert, delete and edit an element in array.
3. To develop an algorithm that implements push and pop stack operations and implement the same using array.
4. To perform an algorithm that can insert and delete elements in queue and implement the same using array.
5. To implement an algorithm for insert and delete operations of circular queue and implement the same using array.
6. To develop an algorithm for binary tree operations and implement the same.
7. To design an algorithm for sequential search, implement and test it.
8. To develop an algorithm for binary search and perform the same.
9. To implement an algorithm for Insertion sort method.
10. To develop an algorithm that sorts number of elements using bubble sort method.
11. To design an algorithm for Merge sort method and implement the same.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

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Vishwavidyalaya, Indore

Name of Program: Bachelor of Railway Engineering

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*	L	T	P	Credits
ML301	Compulsory	Environment and Energy Studies	60	20	20	-	-	4	-	-	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

CourseObjectives: The students will be able to:

1. To understand sources of information required for addressing environmental challenges
2. To identify a suite of contemporary tools and techniques in environmental informatics
3. To apply literacy, numeracy and critical thinking skills to environmental problem-solving

Course Outcomes: The students should be able to:

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Syllabus

Unit I

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

Unit II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resouces, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies..

Unit III

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

Unit IV

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, manwildlife conflicts; Conservation of biodiversity: In-situ and Exsitu conservation. National biodiversity act.

Unit V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP)

Suggested Readings:

1. Agarwal, K.C.,(latest edition).**Environmental Biology**, Bikaner :Nidi Pub. Ltd.,
2. Brunner R.C.(latest edition) **Hazardous Waste Incineration**, McGraw Hill Inc.
3. Clank R.S. .,(latest edition. **Marine Pollution**, Clanderson Press Oxford (TB).
4. **Environmental Encyclopedia**, Jaico Pub. Mumbai,
5. De A.K(latest edition) **Environmental Chemistry**, Wiley Wastern Ltd.
6. ErachBharucha(2005).**Environmental Studies for Undergraduate Courses** by for University Grants Commission.

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7. R. Rajagopalan(2006).**Environmental Studies**. Oxford University Press.
8. M. AnjiReddy(2006).**Textbook of Environmental Sciences and Technology**. BS Publication.
9. Richard T. Wright(2008).**Enviromental Science: towards a sustainable future** PHL Learning Private Ltd. New Delhi.
10. Gilbert M. Masters and Wendell P. Ela .(2008).**Environmental Engineering and science**. PHI Learning Pvt Ltd.
11. Daniel B. Botkin& Edwards A. Keller(2008).**Environmental Science** Wiley INDIA edition.
12. AnubhaKaushik(2009).**Enviromental Studies**. New age international publishers.

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