Bachelor of Technology (Electronics & Communication Engineering)

Scheme of Studies/Examination

Semester IV

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs)
			L	T	P	Hours/Week	Theory	Sessional	Practical	Total	
1	AS-206N	Numerical Analysis	4	0	0	4	75	25	0	100	3
2	ECE-202N	Data Structures & Algorithms	3	1	0	4	75	25	0	100	3
3	ECE-204N	Electronics Measurements & Instruments	3	1	0	4	75	25	0	100	3
4	ECE-206N	Electromagnetic Theory	3	1	0	4	75	25	0	100	3
5	ECE-208N	Analog Electronics	3	1	0	4	75	25	0	100	3
6	ECE-210N	Computer Architecture & Organization	3	1	0	4	75	25	0	100	3
7	ECE-212N	Data Structures Lab	0	0	3	3	0	40	60	100	3
8	ECE-214N	Electronics Measurements & Instruments Lab	0	0	3	3	0	40	60	100	3
9	ECE-216N	Analog Electronics lab	0	0	3	3	0	40	60	100	3
		Total	**19**	**5**	**9**	**33**	**450**	**270**	**180**	**900**	
10	MPC-202N	Energy Studies*	3	0	0	3	75	25		100	3

** MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.*

Note: All the students have to undergo six weeks industrial training after IV^{th} semester and it will be evaluated in V^{th} semester.

AS-206N	NUMERICAL ANALYSIS					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
4	**0**	**0**	**75**	**25**	**100**	**3 hrs**
Purpose	To acquaint the students with the complete procedure to numerically approximate the solution for different kinds of problems occur in science, engineering and technology whose exact solution is difficult to find.					
Course Outcomes						
CO1	In this section student will learn the methods to find the roots of nonlinear (algebraic or transcendental) equations, and eigen value problem of a matrix that can be obtained numerically where analytical methods fail to give solution.					
CO2	Students will learn to solve a large system of linear equations and matrix inversion by various numerical methods and techniques.					
CO3	Discussion on interpolation will be useful in constructing approximate polynomial to represent the huge amounts of experimental data, and to find the intermediate values. Numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.					
CO4	Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations will be useful in attempting many engineering problem.					

UNIT - I

Solution of Algebraic and Transcendental Equation and Eigen Value Problem: Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe's Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT-II

Solution of System of Equations and Matrix Inversion: Solution of linear algebraic equation: Gauss elimination and Gauss-Jordan methods- Method of Triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss - Jordan elimination, Crout's , Doolittle and Choleski Methods.

UNIT-III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Gauss Central difference formulae, Bessel and Stirling formulae.

Numerical differentiation: Newton's forward difference formula to compute derivatives, Newton's backward difference formula to compute derivatives, Derivatives using Central difference formulae, to find the maxima and minima of a tabulated function.

Numerical Integration: by Newton's Cotes formulae, Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules, Romberg method.

UNIT-IV

Solution of Ordinary Differential Equation: Single step methods: Taylor series method, Picard's method of successive approximation, Euler, Modified Euler's and Improved Euler methods, Runge Kutta method of fourth order only. Multistep methods: Milne and Adams– Bashforth methods.

Curve fitting: Introduction, Principle of Least squares, Method of Least squares, Fitting of a straight line, parabola and exponential functions.

References Books:

- M. K. Jain, SRK Iyengar and R.K. Jain, Numerical Methods For Scientific & Engg 6e, New Age International (P) Ltd (2008), ISBN-13:978-8122420012.

- Kendall E. Atkinson, An Introduction to Numerical Analysis, Wiley; 2 edition, (January 17, 1989), ISBN-10: 0471624896 , ISBN-13: 978-0471624899.
- S. C. Chapra and Raymond P Canale, Numerical Methods for Engineers, Tata McGraw Hill, Indian Edition.
- James Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co. Pvt. Ltd (1950), ISBN 10: 0009780021, ISBN-13:978-0009780021.
- C.F. Gerald and O.P. Wheatley, Applied Numerical Analysis, Addison Wesley; 7 edition (2003), ISBN-13:978-0321133045.

Additional Readings:

- S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd. (2007), ISBN-13: 978-8120327610.
- Babu Ram, Numerical Methods, Pearson, ISBN 978-8-317-3221-2.
- P.Thangaraj, Computer Oriented Numerical Methods, PHI, ISBN 978-81-203-3539-4.

Note: The Examiners will set nine questions: first question will be short answer type (covering the entire syllabus) and another eight questions will be set taking two questions from each unit. Students will have to attempt five questions in all; first question will be compulsory and other four questions, selecting one from each unit. All questions will carry equal marks.

ECE-202N	Data Structures & Algorithms					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of C basics, and basic algorithms using data structures such as searching and sorting, operations of linked lists and basics of trees and graphs.**					
Course Outcomes						
CO1	**Students will be able to recall 'C' basics and design basic algorithms using various data structures**					
CO2	**Students will be able to design implement various searching and sorting algorithms on arrays.**					
CO3	**Students will be able to use pointers to perform various operations of linked lists**					
CO4	**Students will be able to understand the basics of trees and Graphs.**					

Unit-I

Overview of 'C': History, Characters used in 'C", Data Types, 'C' Tokens, Structures of 'C' program, Operators and Expressions, Flow of Control, I/O functions, Arrays, Structures, user defined data types
Introduction: Overview, Concept of Data Structures, Design of suitable Algorithm, Algorithm analysis

Unit-II

Arrays - Searching and Sorting: Introduction, 1-D arrays - addressing an element in an array, array traversal, insertion and deletion, Multi-D arrays, representation of arrays in physical memory, application of arrays, Searching algorithms: linear search, binary search. Sorting algorithms: selection sort, insertions sort, bubble sort, shell sort, merge sort, radix sort (Algorithm and Analysis).
Stacks and Queues: Stacks operations, Applications of Stacks – Arithmetic operations using Infix to prefix and postfix notations, their conversion and evaluation, Queues operations, Circular, Priority queue and Deque.

Unit-III

Pointers: Introduction, Pointer variables, pointers and arrays, array of pointer, pointers and structures, Dynamic allocation
Linked Lists: Introduction, linked lists, operations on linked lists (Creation, Traversing, Searching, Insertion and Deletion), Circular and doubly linked list, Linked Stacks and Linked Queues, Comparison of sequential and linked storage.

Unit- IV

Trees: Binary Trees, representation of trees (Linear and linked), Traversal of binary trees. Types of binary trees: Expression tree, Binary search tree, Heap tree, threaded binary trees.
Graphs: Introduction, Graph terminology, various representations of Graphs, operations: Insertion, Deletion and traversal.

Text Books:

1. Data Structures using C by A. K. Sharma , Pearson Publication
2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH.

Reference Books:

1. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub
2. Data Structures and program design in C by Robert Kruse, PHI Expert Data Structures with C by R.B. Patel

Note: Question paper template will be provided to the paper setter.

ECE-204N	Electronics Measurements and Instruments					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of Electronics Measurements like measurement of voltage, current & resistance etc.**					
Course Outcomes						
CO1	**Students will learn the techniques of measurement of resistance using different bridges**					
CO2	**AC Bridges & Voltage Indicating & Recording Devices will be introduced to the students**					
CO3	**Students will be able to recognize the functioning of different Analog & Digital Instruments**					
CO4	**Transducers & Data Acquisition Systems will be introduced to the students**					

Unit-I

Measurement and Error: Functional elements and generalized configuration of a measuring Instrument, Characteristics of instruments, errors in measurements and their statistical analysis.

Measurement of Resistance: Wheat stone bridge, Carey-Foster Bridge, Kelvin double bridge, Measurement of Insulation resistance.

Unit-II

A-C Bridges: Maxwell Inductance bridge. Maxwell Inductance Capacitance Bridge, Anderson's Bridge, Hay's Bridge, De-Sauty's Bridge, Schering's bridge and Wein's bridge.

Voltage Indicating and Recording Devices: Analog voltmeters and Potentiometers, Self balancing potentiometer and X-Y recorders, Galvanometers - Oscillographs, Cathode - Ray Oscilloscopes, Magnetic Tape Recorders.

Unit-III

Electronic Instruments: Wave analyzer, Distortion meter: Q-meter. Measurement of Op-Amp parameters.

Digital Instruments: Digital Indicating Instruments, Comparison with analog type, digital display methods, digital methods of time and frequency measurements, digital voltmeters.

Unit-IV

Transducers: Classification of Transducers, Strain Gauge, Displacement Transducers - Capacitive Transducers, LVDT, Piezo-electric Transducers, Temperature Transducers – resistance thermometer, Thermocouples and Thermistors, Liquid level measurement Low pressure (vacuum) measurement.

Data Acquisition Systems: A to D and D to A converters, Analog and Digital Data Acquisition Systems, Multiplexing, Spatial Encoders, Telemetry.

Text Book:

1. A Course in Electrical and Electronics Measurements and Instrumentation: A.K. Sawhney; Dhanpat Rai & Sons.

Reference Books:

1. Electronics Instrumentation and Measurement Techniques: Cooper W.D & Helfrick A.D.; PHI
2. Doeblin E.O., Measurement Systems: Application & Design, Mc Graw Hill.

Note: Question paper template will be provided to the paper setter.

ECE-206N	Electromagnetic Theory					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of Electric & Magnetic Fields and make them understand the phenomenon of propagation of electromagnetic waves.**					
Course Outcomes						
CO1	**Basics of electrostatics including dielectric properties will be covered.**					
CO2	**Basics of magneto-statics and Maxwell's equations will be covered.**					
CO3	**Fundamentals of Uniform plane waves and their propagation in different mediums will be covered.**					
CO4	**Fundamentals of Transmission Lines and different modes of wave propagation in waveguides will be covered.**					

Unit-I

Electric Field and Current: Introduction to Vectors:Addition, Subtraction, Multiplication & Differentiation. Coordinate Systems: Rectangular, Cylinderical & Spherical. Coulomb's law. Electric Field Intensity, Electric Potential,Field of a Line Charge, Field of a Sheet of Charge, Electric Flux Density,Electric Dipole, Current Density, Continuity of Current, Gauss's Law and Applications, Electric Field Behaviour in Dielectrics, Boundary Conditions at Interface between Two Dielectrics, Method of Images,Capacitance of Two Wire Line, Poisson's and Laplace's Equations, Uniqueness Theorem.

Unit-II

Magnetic Field and Maxwell Equations: Biot - Savart Law. Ampere's law, Magnetic Vector potentials, Force on a moving charge, Differential Current Element, Force and Torque on a Closed Circuit, Magnetic Boundary Conditions, the Magnetic Circuit,Faraday's Law, Maxwell's Equations in Point and Integral form for Free space, Good Conductors & Lossy Dielectric for Sinusoidal Time Variations& Static Fields, Retarded potentials.

Unit-III

The Uniform Plane Wave: Plane Waves & its Properties, Wave Equation for Free Space and Conducting Medium, Propagation of Plane Waves in Lossy Dielectrics,Good Dieletrics& Good Conductors. The Poynting Vector and Power considerations, Skin Effect, Reflection of Uniform Plane Waves (Normal & Oblique Incidence).

Unit-IV

Transmission Lines and Waveguides: The Transmission Line Equations, Graphical Methods, Smith chart, Time-domain and Frequency- domain Analysis, Reflection in Transmission Lines, SWR. TE, TM, TEM waves, TE and TM modes in Rectangular and Circular Waveguides, Cut-off & Guided Wavelength, Wave Impedance and Characteristic Impedance, Dominant Modes, Power Flow in waveguides, Excitation of Waveguides, Dielectric Waveguides.

Text Books:

1. Hayt W H., Engineering Electromagnetics, Tata McGraw Hill, 6th Edition.

References Books:

1 Jordan E C & Balmain K G, Electromagnetic Waves and Radiating Systems, PHI.2 David K. Chang, Field and Waves Electromagnetics, Addison Wesley.

Note: Question paper template will be provided to the paper setter.

ECE-208N	Analog Electronics					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of various models of BJT's and FET's, multistage amplifiers, concept of feedback and its topologies, oscillators and detail of operational amplifiers with its applications.**					
Course Outcomes						
CO1	**To understand the concept of various amplifiers using BJT and FET and various transistor models**					
CO2	**Describe the frequency response of multistage amplifiers and the detailed concept of feedback topologies.**					
CO3	**To understand the concept of Barkhausen criteria of oscillation and various RC and LC oscillators and their frequency of oscillation.**					
CO4	**To understand the concept of Operational amplifier and its various applications such as current mirror, Schmitt trigger and various op-amp parameters.**					

Unit -I

Amplifier Models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

Unit -II

Transistor Frequency Response: High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues.
Feedback Topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

Unit -III

Oscillators: Review of the basic concept, Barkhausen criterion for oscillators,type of RC oscillators : RC phase shift oscillator , Wien bridge oscillator , LC oscillators : Hartley oscillator, Collpit oscillator , Clapp oscillator ,555 Timer as a monostable and astable multivibrator.

Unit -IV

Op-Amp Applications: Schmitt trigger and its applications. Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages.

Text Books:

1. Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi

Reference Books:

1. Operational Amplifiers and Linear Integrated Circuits by Ramakant A Gayakwad,PHI.
2. A.S. Sedra & K.C.Smith, Microelectronics Circuits, Oxford University Press
3. Robert L. Boylestad & Louis Nashelsky, Electronic Devices & Circuit Theory,Pearson

Note: Question paper template will be provided to the paper setter.

ECE-210N	Computer Architecture & Organization					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of basic structure of computer hardware & software, Control & processor design and memory & system organisation.**					
Course Outcomes						
CO1	**To understand the concept of basics of computer hardware & software**					
CO2	**To understand the concept of control design & processor design**					
CO3	**To familiarize with the concept of various memory systems.**					
CO4	**To familiarize with the concept of system organisation.**					

Unit-I

Basic Structure of Computer Hardware and Software: Introduction to basic computer architecture, register transfer, bus and memory transfers, arithmetic, logic and shift micro operations.

Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, RISC, Macros and Subroutines.

Unit-II

Control Design: Micro programmed control, control memory, address sequencing, micro program example, design of control unit, Hardwired Control: design methods, Multiplier Control Unit, CPU Control unit.

Processor Design: Decimal arithmetic unit – BCD adder, BCD subtraction, decimal arithmetic operations, ALU design, Forms of Parallel processing classification of Parallel structures, Array Processors, Structure of general purpose Multiprocessors.

Unit-III

Memory Organization:

Memory hierarchy, main memory, auxillary memory, associative memory,cache memory, virtual memory, memory management, hardware multiprocessor architectures and their characteristics, interconnection structures, Random access memories: semiconductor RAMS, Serial – access Memories – Memory organization, Main Memory Allocation.

Unit-IV

System Organization:

Pipeline and Vector Processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing, array processors, Input-output Organisation: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt,DMA, IOP serial communication.

Text Books:

1. Morris Mano, "Computer System Architecture", PHI.
2. J.F. Heys, "Computer Organization and Architecture", TMH.

Reference Books:

1. J. Hennessy and D. Patterson, Computer Architecture A Quantitative Approach, 3rd Ed, Morgan Kaufmann, 2002.

Note: Question paper template will be provided to the paper setter.

ECE-212N	Data Structures Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**

Course Outcomes	
CO1	**Students will be able to recall 'C' basics and design basic algorithms using various data structures**
CO2	**Students will be able to design implement various searching and sorting algorithms on arrays.**
CO3	**Students will be able to use pointers to perform various operations of linked lists**
CO4	**Students will be able to understand the basics of trees and Graphs.**

List of Experiments:

1. Write a program to print a 2D array.
2. Write a program to find the factorial of an n^{th} number using recursion.
3. Write a program to print Fibonacci sequence.
4. Using clock() function of time.h header file, compare the timings of linear search and binary search for an 1D array of 1000 elements
5. Compare the timings of the following sorting algorithm
    a. Bubble sort
    b. Selection sort
    c. Insertion sort
6. Implement stacks using arrays for the following user defined functions
    a. Size of stack
    b. Number of elements in the stack
    c. Pop with underflow check
    d. Push with overflow check
7. Implement queues using arrays for the following user defined functions
    a. Size of queue
    b. Number of elements in the queue
    c. Insert an element with overflow check
    d. Delete an element with underflow check
8. Implement linked list for the following user defined functions
    a. Create a node and Insert an element
    b. Delete an element and its node
    c. Find the location of a given value
    d. Print the list in forward or reverse order
9. Traverse a tree and print the elements in
    a. Preorder
    b. Post order
    c. In order
10. Traverse a graph and print the elements using
    a. Depth first search
    b. Breadth first search

ECE-214N	Electronics Measurements and Instruments Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes						
CO1	**To measure the unknown inductance and capacitance using various AC bridges.**					
CO2	**To measure the unknown frequency using different frequency bridges.**					
CO3	**To understand the concept of caliberation of energy meter and B-H curve of different magnetic materials.**					
CO4	**To understand the concept conversion of voltmeter into ammeter using potentiometer.**					

List of Experiments:

1. To measure the unknown Inductance in terms of capacitance and resistance by using Maxwell's Inductance bridge.
2. To measure unknown Inductance using Hay's bridge.
3. To measure unknown capacitance of small capacitors by using Schering's bridge.
4. To measure 3-phase power with 2-Wattmeter method for balanced and unbalanced bridge.
5. To measure unknown capacitance using De-Sauty's bridge.
6. To measure unknown frequency using Wein's frequency bridge.
7. To measure unknown low resistance by Kelvin's Double bridge.
8. To test the soil resistance using Meggar (Ohm meter).
9. To calibrate Energy meter using standard Energy meter.
10. To plot the B-H curve of different magnetic materials.
11. To calibrate the Voltmeter using Crompton Potentiometer.
12. To convert the Voltmeter into Ammeter using Potentiometer.
13. Insulation testing of cables using Digital Insulation Tester.

ECE-216N	Analog Electronics Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes						
CO1	**To design and calculate the gain , frequency response etc of the various configuration of transistor amplifier.**					
CO2	**Describe the frequency response of and test the performance of various LC and RC oscillators.**					
CO3	**To understand and design the various applications of 555 timer such as astable and monostable multivibrator.**					

List of Experiments:

1. To Design a simple common emitter (CE) amplifier Circuit using BJT and find its gain and frequency response.

2. To Design a differential amplifier using BJT and calculate its gain and frequency response

3. To design RC coupled Single stage BJT amplifier and determination of the gain ,frequency response, input and output impedances.

4. To design a BJT Emitter follower and determination of the gain, input and output impedances .

5. To design and test the performance of BJT-RC Phase shift Oscillator for f0 ≤ 10 KHz.

6. To design and test the performance of BJT – Hartley Oscillators for RF range f0 ≥100KHz.

7. To design and test the performance of BJT – Colpitt Oscillators for RF range f0 ≥100KHz.

8. To design an astable multivibrator using 555 timer.

9. To design a monostable multivibrator using 555 timer.

10. To design Schmitt trigger using op-amp and verify its operational characteristics.

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MPC-202N	Energy Studies (B.Tech All Branches Semester III/IV)					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**-**	**-**	**75**	**25**	**100**	**3**
Purpose	**To make the students conversant with the basics concepts and conversion of various form of Energy**					
Course Outcomes						
CO1	**An overview about Energy , Energy Management, Audit and tariffs**					
CO2	**Understand the Layout and working of Conventional Power Plants**					
CO3	**Understand the Layout and working of Non Conventional Power Plants**					
CO4	**To understand the role of Energy in Economic development and Energy Scenario in India**					

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.
Energy Management: General Principles of Energy Management, Energy Management Strategy.
Energy Audit & Tariffs: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non Conventional Energy sources: Basicprinciple, site selection and power plant layout of Solar energy, photovoltaic technologies, PV Systems and their components, power plant layout of Wind energy, layout of Bio energy plants ,Geothermal energy plants and tidal energy plants.

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

Text Books:

1. Energy Studies-Wiley and Dream tech India
2. Soni, Gupta, Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
3. NEDCAP: Non Conventional Energy Guide Lines
4. G.D. Roy :Non conventional energy sources
5. B H Khan :Non Conventional energy resources - McGraw Hill
6. Meinel A B and Meinal M P,Addison :Applie
7. d Solar Energy- Wesley Publications
8. George Sutton :Direct Energy Conversion - McGraw