FACULTY OF SCIENCE AND TECHNOLOGY
Proposed Revised Syllabus Structure w.e.f. 2017-18
Second Year B. Tech. (Electrical Engineering)

Course Code	SEMESTER-III	Contact Hrs / Week				Examination Scheme						
	Course	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
BSH201	Engineering Mathematics-III	3	1	-	4	20	80	-	-	100	4	3 Hrs
EED202	DC Machines & Transformers	3	1	-	4	20	80	-	-	100	4	3 Hrs
EED203	Electrical Measurements	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED204	Electronics Devices & Circuits	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED205	Power Plant Engineering	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED206	Data Structure	2	-	-	2	10	40	-	-	50	2	2 Hrs
EED221	Lab I : DC Machines & Transformers	-	-	2	2	-	-	25	25	50	1	
EED222	Lab II : Electrical Measurements	-	-	2	2	-	-	25	25	50	1	
EED223	Lab III: Electronics Devices & Circuits	-	-	2	2	-	-	25	25	50	1	
EED224	Lab IV : Fundamentals of MATLAB	-	-	2	2	-	-	50	-	50	1	
BSH225	Lab V: Development of Skills II	-	-	2	2	-	-	50	-	50	1	
	Total of Semester-III	**20**	**2**	**10**	**32**	**110**	**440**	**175**	**75**	**800**	**27**	

Course Code	SEMESTER-IV	Contact Hrs / Week				Examination Scheme						
	Course	L	T	P	Total	CT	TH	T W	P	Total	Credits	Duration of Theory Exam
BSH251B	Engineering Mathematics-IV	3	1	-	4	20	80	-	-	100	4	3 Hrs
EED252	AC Machines	3	1	-	4	20	80	-	-	100	4	3 Hrs
EED253	Network Analysis	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED254	Analog & Digital Circuits	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED291-293	Programme Elective-I	4	-	-	4	20	80	-	-	100	4	3 Hrs
EED255	Signals and Systems	2	-	-	2	10	40	-	-	50	2	2 Hrs
EED271	Lab VI: AC Machines	-	-	2	2	-	-	25	25	50	1	
EED272	Lab VII : Network Analysis	-	-	2	2	-	-	25	25	50	1	
EED273	Lab VIII : Analog & Digital Circuits	-	-	2	2	-	-	25	25	50	1	
EED274	Lab IX : Signals and Systems	-	-	2	2	-	-	50	-	50	1	
EED275	Lab X : DOS-III PLC Fundamentals	-	-	2	2	-	-	50	-	50	1	
	Total of Semester-IV	**20**	**2**	**10**	**32**	**110**	**440**	**175**	**75**	**800**	**27**	
	Grand Total of III&IV									**1600**	**54**	

L: Lecture hours per week T: Tutorial hours per week P: Practical hours per week CT: Class Test
TH: University Theory Examination TW: Term Work P: Practical/Oral Examination

Programme Elective-I

EED291: Electrical Engineering Materials
EED292: Energy Audit and Management
EED293: Digital Computational Techniques

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code:BSH201

Course : Engineering Mathematics III	**Credits: 4**
Teaching Scheme:	**Class Test: 20 Marks**
Theory: 3 Hrs/week	**Theory Examination: 80 Marks**
Tutorial: 1 Hr/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. The contents aims to develop and apply the knowledge of the student in the direction of solving the practical problem of differential equation in the engineering and technology. 2. To develop Logical understanding of statistics. 3. To study the basic of Laplace transform.
Unit-I	**:**	**Linear Differential Equation:** Solution of linear differential equation of order n with constant coefficients: The complementary function, Method of finding particular integral: Short method, General method, Method of variation of parameters. Equations reducible to linear equations with constant coefficients: i) The Cauchy's linear equation. ii)The Legendre's linear equation. **(10 Hrs)**
Unit-II	**:**	**Application of linear differential equations to:** i) Mechanical system. ii) Electrical System. **iii)** Beam and Shafts. **(04 Hrs)**
Unit-III	**:**	**Vector Differentiation:** Differentiation of vectors, Radial, Transverse, Normal And tangential components of velocity and acceleration, Scalar and vector point function , Gradient of scalar point function , Divergence and curl of vector point function , Second order differentiation operator , Irrotational and solenoid fields. **(10Hrs)**
Unit-IV	**:**	**Laplace Transform:** Definition, Laplace Transform of elementary function and its table, Theorem and properties of Laplace Transform: First shifting theorem, Second Shifting Theorem, Multiplication by t^n, Division by t, Change of scale property, Laplace Transform of integral, Laplace Transform of Derivative. Laplace Transform of some special functions: Periodic function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function Laplace Transform using Heaviside Unit function, Dirac delta function. Method to find inverse Laplace Transform: i. Use of Laplace Transform table ii. Use of Theorem and properties of Laplace iii. Use of partial fraction iv. Convolution theorem v. Use of development of Heaviside Unit Step Function Application of Laplace Transform to solve linear differential equation **(12 Hrs)**

Unit-V	**:**	**Fourier Transform**: Fourier integral: Complex form of Fourier integral, sine and cosine integral, Fourier transform and inverse transform. D.U.I.S. rule (only statement), Fourier transform and inverse transform for even and odd function, Fourier sine and cosine transform and inverse transform. **(07 Hrs)**
Unit-VI	**:**	**Statistic and Probability:** Measures of central tendency: Mean Median, Quartiles and Mode. Measures of dispersion: Quartile deviation, Mean deviation, Standard deviation, coefficient of variation **(05 Hrs)**
Text Books	**:**	1. A Text Book of Applied Mathematics Volume-III by P.N. Wartikar J.N.Wartikar, Pune Vidyarthi Griha Prakashan. 2. Advanced Engineering Mathematics by H.K.Dass, S.Chand and Co.Ltd. 3. Higher Engineering Mathematics by Dr.B.S.Grewal, Khanna Publishers. 4. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publishing Co. Ltd.
Reference Books	**:**	1. Solution to Higher Engineering Mathematics Volume –III by C.P.Gandhi.
Course Outcomes	**:**	1. Students will be able to understand the Linear Differential Equations and their applications. 2. Students will be able to understand the Differentiation of vectors, divergence, curl, second order differential operators. 3. Students will be able to understand the Mean Median, Quartiles and Mode, Standard deviation, Measures of dispersion. 4. Students will be able to understand the Laplace Transform of elementary function, Theorem its properties, Methods of Inverse Laplace transforms. 5. Students will be able to understand the Fourier integral, Fourier transform and inverse transform for even and odd function. 6. Students will be able to understand the Binomial Distribution, Poisson distribution, and Normal Distribution.

Tutorials: 12 Tutorial classes are to be arranged on above syllabus. Tutorial classes may be as case studies, recent trends in concerned subject, assignment works etc.

Section A: Units I, II, III and Section B: Units IV, V, VI.
Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED202

Course : DC Machines & Transformers	**Credits: 4**
Teaching Scheme:	**Class Test: 20 Marks**
Theory: 3 Hrs/week	**Theory Examination: 80 Marks**
Tutorial: 1 Hr/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Familiarization of DC Machines & Transformers. 2. Understanding the construction, operations and applications of DC Machines & Transformers. 3. Understanding the response of these machines for electrical/ mechanical loads. 4. Use and applications of DC Machines & Transformers on Socio – Industrial purpose.
Unit-I	**:**	**DC Machines:** Electromechanical Energy Conversion Principle, Different parts & construction, their functions of DC machine .Types Armature windings, coil span, pitch of winding, back pitch, front pitch, resultant pitch, commutator pitch, single and two layer winding, Uses of lap and Wave Winding. **(08 Hrs)**
Unit-II	**:**	**DC Generator:** Basic principle of working, Different Types, E.M.F. equation, Armature reaction, Demagnetization & cross magnetization ,Compensating winding, Commutation, Reactive voltage, Overcoming of armature reaction, Causes of bad commutation and remedies, Characteristics and applications of different types, Parallel operation of shunt Generators and Load sharing ,Uses of Generators. **(08 Hrs)**
Unit-III	**:**	**D.C. Motors:** Principles of working, Significance of Back EMF, Torque Equation, Types, Characteristics and Selection of DC Motors for various applications, Starting of DC Motors, Speed Control of DC Shunt and Series Motors, Braking of DC Motors- Plugging, Dynamic Braking, Regenerative Braking; Losses and Efficiency, Condition for Maximum Efficiency. **(08 Hrs)**
Unit-IV	**:**	**Single Phase Transformers:** Working of transformer on no-load and on load, Phasor diagrams, Exact and approximate equivalent circuits referred to either side, losses, Efficiency, maximum efficiency, ratings. Open circuit and short circuit tests, Polarity test, Parallel operation, and conditions to be satisfied, load sharing under various conditions. Autotransformer working and applications. **(08 Hrs)**
Unit-V	**:**	**Three Phase Transformers:** Types construction, comparison with a bank of three single phase transformers, Standard connections, Connection Types, Efficiency, Voltage regulation and Transformer Tests, Parallel operation of three phase transformers. **(08 Hrs)**
Unit-VI	**:**	**Special Motors:** Stepper Motor and different types, Variable Reluctance, PM, Hybrid. Permanent magnet DC Motor, Low inertia DC Motor, Permanent Magnet Synchronous, Synchros, Types of Synchros, Application of Synchros. **(08 Hrs)**

Text Books	**:**	1. A text book of Electrical Technology by B.L Theraja Vol-II, Chand Publication. 2. Principles of Electrical Machines by V.K.Mehta, Chand Publication. 3. Electrical Machines by Ashfaque Hussain. 4. Electrical Machines by Nagnath Kothari, TATA McGraw Hill. 5. Electrical Technologies by Edward Hughes Elbs , Pearson Education.
Reference Books	**:**	1. Theory of AC Machines by Langsdorf , Tata McGraw Hill. 2. Principles and practice of Electrical Engineering by Gray Wallance , Int. student Ed.VIII Ed. 3. Performance and design of d.c. machines by Claytonand and Hancokk. 4. Indian Standard Guide for testing DC Machine, IS: 9320-1979, By I S I, New Delhi. 5. I S Specification for safety transformer IS: 1416-1972, By I S I, New Delhi.
Course Outcomes	**:**	1. Students will be able to understand construction of DC machines. 2. Students will be able to understand working principle, characteristics and applications of DC generator. 3. Students will be able to understand working principle, characteristics and applications of DC motor and different braking systems. 4. Students will be able to understand working, equivalent circuit parameters and applications of transformer. 5. Students will be able to understand construction, phasor diagrams, efficiency & regulation, parallel operation of transformers. 6. Students will be able to understand the working principle of different special motors and their applications.

Tutorials: 12 Tutorial classes are to be arranged on above syllabus. Tutorial classes may be as case studies, recent trends in concerned subject, assignment works etc.

Section A: Units I, II, III and Section B: Units IV, V, VI.
Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED203	**Credits: 4**
Course : Electrical Measurements	**Class Test: 20 Marks**
Teaching Scheme:	**Theory Examination: 80 Marks**
Theory: 4 Hrs/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Classify the different measuring instruments. 2. Various methods of measurement of resistance. 3. Describe principle and operation of Wattmeter and measurement of power. 4. Introduction and working principal of Energy meter theory.
Unit-I	**:**	**Measurement and Instrumentation theory:** Characteristics of measuring instruments: Static and dynamic, accuracy, linearity, speed of response, dead zone, repeatability, resolution, span, reproducibility, drifts. Need for calibration, standards and their classification. Block diagram of generalized Instrumentation system. Classification of measuring instruments - Absolute and secondary instruments, types of secondary instruments: indicating, integrating, and Recording, analog / digital. **(10 Hrs)**
Unit-II	**:**	**Essentials of indicating instruments:** Deflecting, controlling and damping systems. Construction, working, torque equation, various advantages and disadvantages of MI (attraction and repulsion), and PMMC. Ammeter and Voltmeter theory Extension of range of ammeters and voltmeters using shunt, multiplier. Universal shunt, Universal multiplier. Block diagram and operation of digital ammeters and voltmeters in brief. **(08 Hrs)**
Unit-III	**:**	**Measurement of Resistance :** Measurement of low, medium and high resistance. Kelvin's Double Bridge, Ammeter Voltmeter method, Megger, Earth tester for earth resistance measurement, Measurement of insulation resistance when power is ON. **A.C. Bridges:** Introduction, sources & detectors for a.c. bridge, general equation for bridge at balance. Measurement of Inductance: Maxwell's Inductance & Maxwell's Inductance – Capacitance Bridge, Andersons Bridge. Measurement of Capacitance: Shearing Bridge. **(12 Hrs)**
Unit-IV	**:**	**Instrument Transformers:** Construction, connection of CT & PT in the circuit, advantages of CT / PT over shunt and multipliers for range extension, transformation ratio, turns ratio, nominal ratio, burden etc, and ratio and phase angle error. (No derivation of formulae is expected). **(04 Hrs)**
Unit-V	**:**	**Wattmeter theory and measurement of power:** Construction, working, torque equation, errors and their compensation, advantages/disadvantages of dynamometer type wattmeter, low power factor Wattmeter, poly-phase wattmeter. Power measurement in three phase system. Power measurement in three phase system for balanced and unbalanced load using three wattmeter method, two wattmeter method. **(08 Hrs)**

Unit-VI	**:**	**Energy meter theory:** Construction, working, torque equation, errors and adjustments of single phase conventional (induction type) energy meter, Block diagram and operation of electronic energy meter. Three-phase energy meters. **(06 Hrs)**
Text Books	**:**	1. A Course in Electrical and Electronic measurements & Instrumentation – by A. K. Sawhaney, Dhanpat Rai & Sons. 2. A Course in Electronic and Electronic measurements by J. B. Gupta, S. K. Kataria& Sons. 3. Instrumentation: Measurement and Analysis by Nakra &Chaudhari Sixth Reprint, Tata McGraw Hill, New Delhi.
Reference Books	**:**	1. Electrical measurement & measuring instrument by E. W. Golding & Widing, Fifth edition, A. H. Wheeler & Co. ltd. 2. Electronic measurement and instrumentation by Dr. Rajendra Prasad, Khanna Publisher, New Delhi. 3. Introduction to Measurements and instrumentation by Ghosh, Second Edition PHI Publication. 4. Introduction to Measurements and instrumentation by Anand PHI Publication.
Course Outcomes	**:**	1. Students will be able to introduce about the measurement and instrumentation theory and essential parameters for indicating instruments. 2. Students will be able to understand the measurement of resistance by different measuring instruments. 3. Students will be able to understand A.C. Bridges for measurement of inductance and capacitance. 4. Students will be able to understand the construction, working, torque equation of different types of wattmeter and power measurement by wattmeter method. 5. Students will be able to understand the construction, working, torque equation of energy meter, block diagram and operation of electronic energy meter and three phase energy meter. 6. Students will be able to understand the construction, connections of instrument transformers, transformer ratio, turns ratio, nominal ratio and burden.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED204 **Credits: 4**

Course : Electronic Devices & Circuits **Class Test: 20 Marks**

Teaching Scheme: **Theory Examination: 80 Marks**

Theory: 4 Hrs/week **Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Familiarization of various electronic devices and circuits. 2. Understand the various methods used to bias the amplifying circuits. 3. Understanding of low frequency and high frequency models of transistors. 4. Understanding the power amplifying circuits and oscillating circuits.
Unit-I	**:**	**Rectifiers and Filters:** Half wave rectifier, full wave rectifier, bridge rectifier, PIV, efficiency, ripple factor.TUF analysis, Ripple Factor calculation for C,L,LC , regulation with and without filter, load and line regulation. **(06 Hrs)**
Unit-II	**:**	**Theory of Junction Transistors and Field Effect Transistor:** Transistor action – Transistor parameter, Transistor current components, Transistor as an amplifier and as switch , collector efficiency, early effect in transistor, Junction FET operation, Enhancement MOSFET, depletion MOSFET, comparison. JFET and MOSFET. Power MOSFET, Equivalent circuit operation, static characteristics. **(08 Hrs)**
Unit-III	**:**	**Bias Stability and Device Stabilization:** Transistor Biasing : Location of Q point, fixed bias circuit, collector to base circuit, self bias circuit, graphical DC bias analysis, design of all biasing circuits, FET biasing: self biasing, voltage divider biasing. Stability factor and methods on bias compensation. (**08 Hrs)**
Unit-IV	**:**	**Amplifiers:** Frequency Response, RC coupled and transformer coupled amplifier, single stage and multi stage amplifier, wide band amplifier, cascade amplifiers, feedback amplifiers, positive and negative feedback, current and voltage feedback. Effect of feedback on gain, Input and output impedance, Noise and distortion (derivation treatment.) DC amplifiers: Drift in amplifiers, differential amplifiers. (**10 Hrs)**
Unit-V	**:**	**Transistor Model and High Frequency Amplifiers:** Hybrid parameters: H equivalent , Pi equivalent circuit, small signal single stage amplifier, analysis of CE,CC,CB circuits, voltage gain, current gain, input/output impedance, dependence on source and load impedance, emitter follower analysis, boot strapping in emitter follower. High frequency equivalent circuits, for BJT and FET amplifiers, hybrid Pi equivalent circuit, Determination of lower and higher cutoff, frequencies, Effect of junction capacitance and miller's theorem. **(08 Hrs)**
Unit-VI	**:**	**A. Power Amplifiers:** Types: Class A, Class B, Class AB, and Class C, capacitor coupled quasi complimentary, push pull, expression for efficiency of Class A class B amplifier, distortion in amplifiers. **B Tuned Amplifiers:** Tuned Amplifiers – Single tuned, double tuned Stager tuned. **(08 Hrs)**

Text Books	**:**	1. 'Electronic Devices' by Thomas Floyd. 2. Electronic Circuit Analysis and Design by Donald Neamem, Tata McGraw-Hill.
Reference Books	**:**	1. 1.J. Milliman and C.C. Halkies, "Electronics devices and circuits", McGraw Hill,1995. 2. J. Milliman and C.C. Halkies, "Integated Electronics", McGraw Hill. 3. Malvino A P "Electronics Principles", McGraw Hill International,1998. 4. David A. Bell, "Electronics devices and circuits",PHI,1998. 5. Boylestred R and Nashelsky, "Electronics devices and circuits theory",,PHI 1993. 6. Somnath Nair, "Electronics devices and applications" PHI 2002. 7. Russell L. Meade, "Foundations of Electronics circuits and devices " Thomson Asia.
Course Outcomes	**:**	1. Students will be able to understand the different types of rectifiers, filters and protection circuits. 2. Students will be able to understand the characteristic operation of different transistors such as FET, MOSFET, Power MOSFET, etc., 3. Students will be able to analyze the bias stability and stabilization of transistors. 4. Students will be able to understand the operation of different amplifiers and their feedback circuits. 5. Students will be able to analyze the various transistor circuit models and high frequency amplifiers. 6. Students will be able to understand the different power amplifiers, oscillators and tuned amplifiers.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED205	**Credits: 4**
Course : Power Plant Engineering	**Class Test: 20 Marks**
Teaching Scheme:	**Theory Examination: 80 Marks**
Theory: 4 Hrs/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. To classify the different sources of electric power generation. 2. To decide the various factors governing selection of site for power plant and list their merits. 3. To describe principle and operation of power generation. 4. To identify and describe the function of each component of power plant. 5. To select the power generation technique based on economy. 6. To compare between various sources of power generation.
Unit-I	**:**	**Introduction:** Power to progress, importance of power generation and electrical energy in India, Different types of conventional energy sources, types of non-conventional energy sources, Structure of power industry, advantages and disadvantages of conventional and nonconventional energy resources. **(06 Hrs)**
Unit-II	**:**	**Thermal Power Plants:** Types of boilers, Feed water and its treatment, Steam turbine and alternators. Site selection, Main parts and its working. Fuel Handling: delivery of load, unloading, preparation, transfer, outdoor (dead) storage, indoor (live) storage, In plant Handling, Coal weighing. Ash disposal and dust collation: Draught systems, electrostatic precipitator Prospectus and development of thermal plants in India. **(10 Hrs)**
Unit-III	**:**	**Hydro Power Plant:** Site selection, Hydrology, storage and poundage, general arrangements and operation of hydro power plant, Hydraulic turbines, turbine size, pelton-wheel turbine, Francis and Kaplan turbines, selection of turbines, Dams, Spillways, gates, intake and out take works, canals and layout of penstocks, water hammer and surge tank, simple numerical on hydrographs and number of turbine required Prospectus and development of hydro plants in India. **(10 Hrs)**
Unit-IV	**:**	**Nuclear power plant:** Introduction, atomic physics, nuclear reaction, materials, site selection, nuclear reactors and working of each part, classification of nuclear reactor, nuclear waste disposal, plant layout, Prospectus and development of nuclear plants in India. **(08 Hrs)**
Unit-V	**:**	**Gas power plant:** Simple gas turbine power plant, methods to improve thermal efficiency, open loop and closed loop cycle power plants, gas fuels, plant layout. **Diesel power Plants:** Introduction (advantages & disadvantages), typical layout of power plant, site selection, applications. **(04 Hrs)**

Unit-VI	**:**	**Economic Aspects of Power Generation:** Introduction, terms commonly used in system operations, variable load on power station, peak load, base load, diversity factor, plant utility factor, maximum demand, load curves, load duration curves, types of loads, selection of generation units, interconnected grid systems, cost of electrical energy, Tariff & different types of tariff. **(10 Hrs)**
Text Books	**:**	1. P. K. Nag : Power Plant Engineering ,Tata McGraw Hil 2. Dr. P. C. Sharma: Power Plant Engineering , S K Kataria & Sons. 3. Chakrabarti, Soni, Gupta, Bhatnagar "A text book on power system Engineering", DhanpatRai publication 4. R.K.Rajput, "Power Plant Engineering", Laxmi publications. 5. J B Gupta, , "Power Plant Engineering", S K Kataria & Sons.
Reference Books	**:**	1. Arora and Domkundwar: A course in Power Plant Engineering,DhapatRai publication. 2. S. P. Sukhatme: Solar Energy, Tata McGraw-Hill Education.
Course Outcomes	**:**	1. Students will be able to introduce about the power generation, conventional and non-conventional energy sources. 2. Students will be able to understand the working of boilers, water treatment, Steam turbine and alternators of thermal power plant. 3. Students will be able to understand the operation and working of different types of hydro power plant. 4. Students will be able to introduce about of atomic physics, nuclear reaction and classification of nuclear reactors in nuclear power plant. 5. Students will be able to introduce about the different methods of gas and diesel power plant. 6. Students will be able to analyze the economic aspects of power generation based on different parameters.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED206	**Credits: 2**
Course : Data Structure	**Class Test: 10 Marks**
Teaching Scheme:	**Theory Examination: 40 Marks**
Theory: 2 Hrs/week	**Theory Examination(Duration): 2 Hrs**

Course Objectives	**:**	1. The students shall learn the C language and pointers in depth. 2. They will be able to use pointers for data manipulation. 3. They will learn data structures Concepts.
Unit-I	**:**	**Introduction to Data structures:** Introduction to Data Structures: Concept of data, Data object, Data structure, Abstract Data Types (ADT), Concept of Primitive and non primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures. **(04 Hrs)**
Unit-II	**:**	**Searching and sorting techniques:** Need of searching and sorting, why various methods of searching and sorting, Searching methods: Linear and binary search. Sorting methods: Bubble, insertion, selection, merge, quick, bucket, Time complexity of each searching and sorting algorithm. **(04 Hrs)**
Unit-III	**:**	**Linear data structures using sequential organization:** Concept of sequential organization, Concept of Linear data structures, Concept of ordered list, Storage representations of ordered list such as row major, column major and their address calculation. **(04 Hrs)**
Unit-IV	**:**	**Linear data structures using linked organization:** Concept of linked organization, Comparison with sequential organization, Types of Linked List- singly linked list, doubly linked list, circular linked list. **(04 Hrs)**
Unit-V	**:**	**Stack and queues:** Concept of Stack and Queue, circular queue, Implementation of stacks and queue. **(04 Hrs)**
Unit-VI	**:**	**Tree and Graphs:** Difference in linear and non-linear data structure, Trees and binary trees-concept and terminology, B-tree and B+tree, AVL -tree, Graph-concept and terminology. **(04 Hrs)**
Text Books	**:**	1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cenage Learning, ISBN 9788131503140. 2. Samirkumar bandhopadhay ,Kashnath Dey, "Data structures using C",Pearson publication.
Reference Books	**:**	1. A.K.Sharma ,"Data structures using C" Pearson publication, ISBN 978-81 317-5566-2 **2.** Yashwant Kanitkar,"Let us C & Pointer in C",BPB Publication**.** 3. Aaron M. Tenenbaum, "Data structure using C",Pearson Publication.

Course Outcomes	**:**	1. Students will be able to introduce about the concept of data structure, data types, Primitive and non primitive, linear and Non-linear, static and dynamic, persistent and ephemeral of data structures. 2. Students will be able to understand the need of searching and sorting. Sorting methods, Time complexity of each searching and sorting algorithm. 3. Students will be able to understand the concept of sequential organization, linear data structures, ordered list and storage representation. 4. Students will be able to understand the concept of linked organization, singly linked list, doubly linked list, circular linked list, and concept of stacks, Implementation of stacks using linked and sequential organization. 5. Students will be able to understand the concepts of stacks and queues and its implementation. 6. Students will be able to understand the concepts and terminology of tree and binary tree and graphs as an ADT.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions.
2. Four questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED221 **Credits: 1**

Course : Lab I- DC Machines & Transformers

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Understanding the construction, operations and applications of DC Machines & Transformers through practical approach.
List of Practical (Not Less than 10)	**:**	**List of Practical :** Any 10 experiments from following list: 1. Internal, External & Magnetizing Characteristics (OCC) of DC shunt generator. 2. Load Characteristics of DC Series/compound Generator 3. Study of Three Point starter for DC Motors.. 4. To perform Starting and Reversing of DC Shunt motor. 5. To perform Speed control of DC shunts motor. 6. To perform Load test on DC shunt/series motor 7. Efficiency and losses calculation of DC motor by Swinburne's test, and limitations of this test. 8. Parallel operation of single phase transformer. 9. Polarity & Turns Ratio test on 1 Phase Transformer. 10. Efficiency and regulation of three phase transformer by indirect loading. 11. Swmpner's test on 1-phase transformers.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED222 **Credits: 1**

Course : Lab II- Electrical Measurements

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Familiarization of various measuring instruments through practical demonstrations.
List of Practical	**:**	**List of Practical :** 1. Measurement of power in three-phase circuit using two wattmeter method (Balanced & Unbalanced Loads). 2. Measurement of Reactive power in three phase balanced circuit using one wattmeter method and by one wattmeter method with two way switch. 3. Calibration of Single phase or Three phase static energy meter at different power factors using Digital meters. 4. Measurement of Low resistance using Kelvin's Double Bridge. 5. Measurement of inductance using Anderson's Bridge. 6. Earth resistance measurement by Earth Tester. 7. Extension of instrument range: ammeter, voltmeter, watt meter using CT / PT. 8. Measurement of power in three-phase four wire using three CTs and Two wattmeters. 9. Study and use of CRO for measurement of Current, Voltage, Time period, Frequency, Phase angle. 10. Study of electrical transducers.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED223 **Credits: 1**

Course : Lab III- Electronics Devices & Circuits

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Familiarization of various analog and digital circuits through practical approach.
List of Practical	**:**	**List of Practical :** 1. Determination of ripple factor, PIV, TUF of Half wave and full wave rectifier (with and without capacitors). 2. Fixed and self biased circuits analysis using stability factor. 3. Study of transformer coupled power amplifiers. 4. Plot transistor characteristics in CE configuration and Determination of h-parameters graphically. 5. Plot transistor characteristics in CE configuration and Determination of h-parameters graphically. 6. Plot and compare frequency response of RC coupled amplifiers with feedback and without feedback (comparison of Gain and Bandwidth). 7. Determination of Voltage gain, current gain, input and output impedance of FET amplifiers. 8. Designing and frequency calculation of RC phase shift oscillator, Hartley oscillator, Colpitts oscillator. 9. Study of class A, class B, class AB amplifiers. 10. Design and test fixed IC regulated circuit.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: EED224 **Credits: 1**

Course : Lab IV- Fundamentals of MATLAB

Teaching Scheme: **Term Work: 50 Marks**

Practical: 2 Hrs/week

Course Objectives	**:**	To learn basic knowledge of MATLAB.
List of Practical	**:**	**List of Practical:** 1. Introduction to MATLAB. 2. Working with Matrices. 3. Working with different mathematical Expressions. 4. Working with Relational & Logical Operations. 5. Working with Plotting Functions. 6. Working with Complex & Statistical Functions. 7. Working with different Input / Output of Variables (Numbers & strings) 8. Working with Flow control Functions 9. Introduction to MATLAB Simulink Basics. 10. Any electrical Circuit Simulation using MATLAB.

The assessment shall be done on the basis of the following:

- Continuous assessment.
- Performing the experiments in the laboratory.
- Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-III

Course Code: BSH225 **Credits: 1**

Course : Lab V- Development of Skill II

Teaching Scheme: **Term Work: 50 Marks**

Practical: 2 Hrs/week

Course Objectives	**:**	1. Students will be able to apply communicative English Grammar in communication. 2. Students will be able to enhance the level of English vocabulary. 3. Students will be able to pronounce and articulate words as well as sentences accurately. 4. Students will be able to understand and apply correct body language eventually. 5. Students will be able to develop life skills. 6. Students will be able to develop placeability skills and business correspondence.
List of Practical	**:**	**List of Practical:** **1. English Communicative Grammar:** Structure of sentences, types of sentences, grammatical common errors in English. **(4 Hrs)** 2. **Vocabulary Building:** Usage of words in sentences, common errors in spelling of words, synonyms, antonyms, phrases and idioms. **(2 Hrs)** **3. Phonetics:** Syllables, Stress, intonation, pronunciation of words, phonetic transcription - conversion of words to phonetic symbols and from phonetic symbols to words, British and American English (basic difference in vocabulary, spelling, pronunciation and structure), non-verbal language. **(4 Hrs)** **4. Non-verbal Communication (Body language):** Posture, gesture, eye contact, facial expression, proxemics ,chronemics, appearance and symbols. **(2 Hrs)** **5. Soft Skills:** Personality development, self analysis through SWOT, Johari window, interpersonal skills, perception and attitude, values and ethics, career planning. **(2 Hrs)** **6. Placeability Skills:** Job application, resume writing, analytical and reasoning test, debate, group discussion, demo presentation and interview skills. **(4 Hrs)** **7. Business Correspondence:** Letter writing at work place (hard copy and soft copy), telephone and Email etiquette, report writing. **(2 Hrs)**

List of Reference Books	**:**	1. The Essence of Effective Communication by Adrian Budday, Ron Ludlow and Fergus' Panton, Prentice Hall of India-Private Ltd. 2. Communicating in Style by Yateendra Josh,i The energy Resource Institute. 3. Effective Technical Communication by Anne Eisenberge, Mc Graw Hill International Editors. 4. Professional Communication Skills by A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh, S. Chand & Company Ltd. 5. Business Communication by Urmila Rai, S. M. Rai, Himalya Publishing House. 6. Developing Communication Skills by Krishna Mohan and Meera Banerjee, Macmillan India Limited. 7. Better English Pronunciation by J.D.O'Connor., Cambridge Publication. 8. Professional Communication Skill by Pravil S.R. Bhatia, S.Bhatia, S. Chand & Co. 9. Living English Structure by Allan Walter, Pearson Education India. 10. Communication Techniques & Skill by R.K. Chadha. 11. Technical Communication- Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press. 12. A course in Phonetics & Spoken English by J.Sethi,P.V.Dharmatma, PHI publication. 13. Communication Skills for Engineers by Sunita Mishra, C. Murli Krishna, Pearson Education. 14. Communication Skills by Leena Sen, PHI. 15. Technical Communication- A Reader Centered Approach by Paul V. Anderson, Thomson Publication. 16. Grammar of Spoken and Written English by Dauglas Biber, Geoffrey Leech, Longman. 17. A Practical English Grammar by A.J. Thomson & A.V. Martinet, Oxford University Press. 18. Oxford English Grammar by Sydney Greenbaum, Oxford University Press. 19. Developing Graduate Employability Skills: Your Pathway to Employment by Mercy V. Chaita, Universal Publishers.

The assessment shall be done on the basis of the following:

- Continuous assessment.
- Performing the experiments in the laboratory.
- Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: BSH251B

Course : Engineering Mathematics IV	**Credits: 4**
Teaching Scheme:	**Class Test: 20 Marks**
Theory: 3 Hrs/week	**Theory Examination: 80 Marks**
Tutorial: 1 Hr/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. To develop the mathematical skills of the student related to function of complex variable and vectors. 2. To study and apply various types of transforms. 3. To provide Numerical techniques for solving the practical problem in engineering and technology.
Unit-I	**:**	**Function of complex variable** : Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem , Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region, Singularities, Residues, Cauchy's residue theorem. (**12 Hrs)**
Unit-II	**:**	**Application of Complex Variable:** Evaluation of real integrals: Integration along unit circle and along the upper half semi circle, Conformal Transformation, Bilinear transformation.
Unit-III	**:**	**Vector Integration:** Line integral, Surface integral, Gauss divergent theorem, Stoke's theorem, Green's theorem. **(07 Hrs**)
Unit-IV	**:**	**Numerical Method:** Solution of algebraic and transcendental equation, Newton Raphson method, Lagrange's interpolation, Solution of linear simultaneous equation by Guass Elimination method, Gauss-Seidel method,Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method. **(10 Hrs**)
Unit-V	**:**	**Probability:** Introduction, Probability Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution. **(06 Hrs)**
Unit-VI	**:**	**Z- transform :** Definition, Z-transform of elementary function, properties of Z-transform, Inverse Z-transform: Partial fraction method, inversion integral method (Residue method), Solution of Difference equation by using Z-transform. **(08 Hrs)**

Text Books	**:**	1. A Text Book of Applied Mathematics Volume-III by P.N. Wartikar J.N.Wartikar, Pune Vidyarthi Griha Prakashan. 2. Advanced Engineering Mathematics by H.K. Dass, S.Chand and Co. Ltd. 3. Higher Engineering Mathematics by Dr. B.S.Grewal, Khanna Publishers. 4. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publishing Co. Ltd.
Reference Books	**:**	1. Solution to Higher Engineering Mathematics Volume –III by C.P.Gandhi
Course Outcomes	**:**	1. Students will be able to introduce the complex variable function on Cauchy-Riemann equation, Cauchy's theorem, Taylor's and Laurent's series and Cauchy's residue theorem. 2. Students will be able to understand the applications of complex variables. 3. Students will be able to understand the vector integrations such as line integral, surface integral, Gauss divergent theorem, Stoke's theorem, Cylindrical and Spherical polar coordinates. 4. Students will be able to understand the Solution of algebraic and transcendental equation, Newton Raphson method, Guass-seidal method, Taylor series method and fourth order Runge-Kutta method. 5. Students will be able to compute Probability of events. 6. Students will be able to define z-transform of elementary functions, properties of Z-transform and Inverse Z-transform.

Tutorials: 12 Tutorial classes are to be arranged on above syllabus. Tutorial classes may be as case studies, recent trends in concerned subject, assignment works etc.

Section A: Units I, II, III and Section B: Units IV, V, VI.
Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED252

Course : AC Machines	**Credits: 4**
Teaching Scheme:	**Class Test: 20 Marks**
Theory: 3 Hrs/week	**Theory Examination: 80 Marks**
Tutorial: 1 Hr/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. To introduce fundamentals, physical concepts, and operating principles of AC machines. 2. To determine performance of AC motors. 3. To perform various specialized tests on performance of AC machines.
Unit-I	**:**	**Three Phase Induction Motors (Part-I):** Constructional features of three phase induction machines, Production of rotating magnetic fields, principle of operation, generated emf, emf polygon, flux and mmf phasors, slip, rotor frequency, rotor emf/current/power, p.f. and torque. Phasor diagrams, Equivalent circuit, Torque-Slip/speed characteristics, current-speed, speed control, Losses and efficiency, power slip characteristics. **(10 Hrs)**
Unit-II	**:**	**Three Phase Induction Motors (Part-II):** Circle diagram, power factor control of three phase induction motor, starting of three phase IM., Polarity test, cogging and crawling, Applications of poly-phase IM. **(06 Hrs)**
Unit-III	**:**	**Single Phase Induction Motors:** Introduction, single phase induction motors, double field revolving theory, Split Phase, Capacitor Start, Capacitor start & run, Shaded Pole, determination of circuit parameters, Torque-slip characteristics, advantages, drawbacks, applications. Comparison of 1-phase induction motor with 3-phase induction motor. Comparison with different single phase motors in view of performance. **(04 Hrs)**
Unit-IV	**:**	**Synchronous Alternators:** Constructional features synchronous machine, Excitation systems, flux and mmf phasors, phasor diagram of cylindrical rotor alternator, EMF equation, armature reaction, Short circuit ratio, synchronous reactance, synchronous impedance, determination of voltage regulation, operating characteristics of alternator and their ratings. **(12 Hrs)**
Unit-V	**:**	**Parallel Operation of Alternators:** Conditions for parallel operation, Load sharing between two alternators in parallel, Parallel-Generator theorem process of synchronizing an alternator with infinite bus-bar by lamp methods & by use of synchroscope. Synchronizing torque, power and current. **(06 Hrs)**
Unit-VI	**:**	**Synchronous Motors:** Construction & principle of operation, various methods of starting, phenomenon of hunting and damper winding. Operation of 3-phase Synchronous motor with constant excitation & variable load, constant mechanical load on its shaft & variable excitation. Power flow chart, losses. Power factor control of synchronous motor, Merits and demerits of synchronous motors & its application. **(10 Hrs)**

Text Books	**:**	1. A test book of Electrical Technology by B.L.Theraja Vol-II Chand Publication. 2. Principles of Electrical Machines By V.K. Mehta – Chand Publication. 3. Electrical Machines by Ashfaque Hussain, TATA McGraw Hill. 4. Electrical Machines by Nagnath Kothari TATA McGraw Hill. 5. Electrical Machines by J.B. Gupta, SK Kataria & Sons Publication (2010).
Reference Books	**:**	1. Theory of AC Machines by Langsdorf (Tata McGrawHill) 2. Principles and practice of Electrical Engineering by Gray Wallance(Int. student Ed.VIIIEd.) 3. Electric Machines by Nagrath, Kothari Tata McGraw Hill Publication. IInd Edition. 4. Electrical Machinery by A.E.Fitzgerald, C.Kingsley, S.D.Umans Tata McGraw Hill. 5. Performance & Design of Alternating Current Machine. Say.M.G - CBS Publisher (2002).
Course Outcomes	**:**	1. Students will be able to understand about the construction, principle and operation of, phasor diagram, torque equations, torque-speed characteristics, advantages and disadvantages and its applications three phase induction motor. 2. Students will be able to understand starting methods, control, polarity test, cogging and crawling, applications of three phase induction motor. 3. Students will be able to understand about the single phase induction motors, circuit model, characteristics, applications and comparison with different single phase motor along with performance. 4. Students will be able to understand the features of synchronous generators, armature winding, EMF equations, Short circuit ratio, phasor diagram, losses and efficiencies. 5. Students will be able to understand the conditions for parallel operation, load sharing, parallel-Generator theorem, bus-bars method and Synchronizing torque, power and current. 6. Students will be able to understand the construction, principle, operation synchronous motor, phasor diagram, power flow chart, 'V' Curves and 'Inverted V' (pf) curves, merits, demerits and its applications.

Tutorials: 12 Tutorial classes are to be arranged on above syllabus. Tutorial classes may be as case studies, recent trends in concerned subject, assignment works etc.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED253 **Credits: 4**

Course : Network Analysis **Class Test: 20 Marks**

Teaching Scheme: **Theory Examination: 80 Marks**

Theory: 3 Hrs/week **Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Familiarization of various network analysis and topologies. 2. Understanding the various methods for analysis of electrical networks. 3. Understanding of transient response analysis of electrical network. 4. Design and set up of LC and RL circuits.
Unit-I	**:**	**AC Circuit Analysis:** Voltage and Current laws (KVL/KCL), Network Analysis: Mesh, Super mesh, Node and Super Node analysis. Source transformation and dot convention for coupled circuits. Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorem, Tellegen's Theorem, Substitution theorem, Milman's Theorem, Dual Network and Duality theorem. Resonance and its types, Quality factor, filter and its types. **(10 Hrs)**
Unit-II	**:**	**Graph Theory :** Graph of a network, Definitions, Tree, Co tree, Link, basic loop and basic cut set, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analyses. **(06 Hrs)**
Unit-III	**:**	**Transient Circuit Analysis:** Initial Condition and its evaluation, Natural response and forced response, Transient response and steady state response, Evaluation of time response both through classical and Laplace methods, Inverse Laplace transforms, transformed networks with initial conditions. Analysis of electrical circuits with applications of step, pulse, impulse & ramp functions, Laplace transforms various periodic and non periodic waveforms application of Laplace transforms. **(10 Hrs)**
Unit-IV	**:**	**Two Port Network:** Characteristics of linear Time invariant network, Z, Y, H and transmission parameters, Interrelations between parameters Z, Y, H. Ladder and Lattice networks. T & π Representation, Open and short Circuit Impedance, Image Impedance. **(10 Hrs)**
Unit-V	**:**	**Positive Real Function:** Driving-Point Functions, Brune's Positive Real Functions, Properties of Positive Real Functions. TESTING DRIVING-POINT FUNCTIONS: An application of the Maximum Modulus Theorem, Properties of Hurwitz Polynomials, The Computation of Residues, Even and Odd functions. **(06 Hrs)**

Unit-VI	**:**	**Driving-Point Synthesis With LC Elements:** Elementary Synthesis Operations, LC Network Synthesis, RC and RL networks. Properties of RC Network Function, Foster Form of RC Networks, Foster From of RL Networks, The Cauer Form of RC and RL Networks.RLC one terminal - pairs: Minimum Positive Real Functions. **(06 Hrs)**
Text Books	**:**	1. Network Analysis by Cramer McGraw Hill Publication. 2. "Engineering Circuit Analysis" by William H. Hayt, Jr. Jack E. Kemmerly, McGraw Hill. 3. "Introduction to Circuit Analysis" by Bolylestad Robert L. 4. Electric Circuits and Networks by K.S. Suresh Kumar, Pearson Education. 5. Network and systems, by Roy Choudhary D, New Age Pub
Reference Books	**:**	1. "Network Analysis" by M. E. Van Valkenburg. Third Edition, Prentice Hall of India Private Limited. 2. Network Theory by N. C. Jagan, C. Lakshminarayana, Second Edition, BSP Publication. 3. Network Analysis & Synthesis by G. K. Mittal, Khanna Publication. 4. Introduction to Electric Circuits by Richard C. Dirof, James A. Svoboda, Sixth Edition,Wiley. 5. Introduction to Electric Circuits by Alexander & Sadiku. 6. Introduction to Electric Circuits by S Charkarboorty. 7. Fundamentals of Electrical Networks by B.R.Gupta & Vandana Singhal, S.Chand Publications. 8. Electrical Circuit Analysis by P. Rameshbabu, Scitech Publication India Pvt Ltd,
Course Outcomes	**:**	1. Students will be able to introduce about the A.C. circuit analysis by Mesh, Super mesh, node, super node and theorems such as super position, Thevenin's, Norton's and Maximum Power Transfer Theorem and Resonance and its types. 2. Students will be able to introduce about the Graph theory of a network such as Tree, Co-tree, Link, basic loop and basic cut set, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analyses. 3. Students will be able to understand the initial conditions, response, evaluation, transformation, analysis of transient circuit and its applications. 4. Students will be able to understand the characteristics of two port networks, Interrelations between parameters, Ladder and Lattice networks, T & π representation, Open and short circuit Impedance. 5. Students will be able to introduce about the fundamentals of network synthesis. 6. Students will be able to understand the poles and zeros of network functions, time domain -behavior and stability analysis.

Section A: Units I, II, III and Section B: Units IV, V, VI

Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED254	**Credits: 4**
Course : Analog & Digital Circuits	**Class Test: 20 Marks**
Teaching Scheme:	**Theory Examination: 80 Marks**
Theory: 3 Hrs/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	To introduce the basic building blocks, theory and applications of analog and digital circuits.
Unit-I	**:**	**Special Diodes**: LED, Varactor diode, Photo diode, Schottky diode, Tunnel diode; their characteristics and applications, Transistors as a switch. (**06 Hrs)**
Unit-II	**:**	**Linear Voltage Regulators**: IC -78xx, 79xx, LM 317. Design of adjustable voltage source using IC-LM317, IC – 555 – functional block diagram, Application of IC555 – Design of Multivibrator (Monostable and Astable), VCO. (**08 Hrs)**
Unit-III	**:**	**Oscillator:** Basic principle of Oscillator, Barkhausens Criteria for Sustained Oscillations, Classification of Oscillator, R-C Phase Shift and Wein-Bridge oscillators, tuned oscillators- Collpitts and Hartley; Crystal oscillator. (**08 Hrs)**
Unit-IV	**:**	**Logic families:** Review of Number formats: Binary, hexadecimal, BCD and their basic math operations like addition and subtraction, Introduction to Logic gates and Boolean Algebra, Specifications of Digital IC, Logic Families: TTL, ECL,TTL variant families, like standard, LS, HS, Tristate gate, CMOS logic, Comparison of logic families, Interfacing of TTL and CMOS different families. (**10 Hrs)**
Unit-V	**:**	**Combinational Logic Circuit:** K-Maps and their use in specifying Boolean expressions upto 4 variables, Minterm, Maxterm, SOP and POS implementation Implementing logic function using universal gates, Binary Arithmetic circuits: Adders, Subtractors (Half and Full), BCD adder , Substractor, Carry look ahead adder, Serial adder, Magnitude comparators, Designing code ,converter circuit e.g binary to gray, gray to binary, Multiplexer and Demultiplexer , Shannon's theorem. (**08 Hrs)**
Unit-VI	**:**	**Sequential Logic Circuits :** Comparison of combinational & sequential circuit, Flip-flops: SR, T, D, JK, Master Slave JK, Counters: Modulus of counter, Synchronous and Asynchronous counters, Ripple counters, Up/Down Counter, Ring counter, Johnson counter, Sequence generator, Shift Register. (**08 Hrs)**
Text Books	**:**	1. Boatkar K. R., "Integrated Circuits", Khanna Publication. 2. Millman and Halkias, 'Integrated Electronics', Tata McGraw Hill 3. R.P Jain , "Modern Digitals Electronics", Tata McGraw Hill, 1984. 4. Roger L. Tokheim, "Digital Electronics", Tata McGraw Hill.

Reference Books	**:**	1. Boylestad Robert and Nashelsky Louis - 'Electronic Devices and Circuits', Prentice-Hall of India, 2. Malvino & Leach, "Digital principal and Application", Tata McGraw Hill, 1991.
Course Outcomes	**:**	1. Students will be able to introduce about the special diodes such as LED, varactor diode, Photo diode, schottky diode, Tunnel diode characteristics and its applications. 2. Students will be able to understand the different IC's of linear voltage regulator, functional block diagram, application of IC555 and design of multivibrator. 3. Students will be able to understand the basic principle of oscillator and its types in detail. 4. Students will be able to understand the logic families by numbering system, logic gates, logic families, TTL and CMOS logics and interfacing. 5. Students will be able to understand the K – Mapping, Boolean expression, SOP, POS, Adder, Substractor, BCD adder, code converters and Hazards in combinational logic circuits. 6. Students will be able to understand the Flip-Flops and its types, Counters and Shift registers in sequential logic circuits.

Section A: Units I, II, III and Section B: Units IV, V, VI.
Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED255	**Credits: 2**
Course : Signals and Systems	**Class Test: 10 Marks**
Teaching Scheme:	**Theory Examination: 40 Marks**
Theory: 2 Hrs/week	**Theory Examination(Duration): 2 Hrs**

Course Objectives	**:**	1. To introduce the fundamental concepts and techniques in signals and systems. 2. To be familiarized with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems.
Unit-I	**:**	**Signals in Natural Domain:** Classification of signals, Basic operation on signals, Elementary signals, Representation and Classification of continuous and discrete time systems, Properties of systems, System Model: Input-Output Description. **(05 Hrs)**
Unit-II	**:**	**System analysis using Laplace transform:** Unilateral and Bilateral Laplace Transform, Properties of Laplace Transform, Inversion of Laplace Transform, Solving Differential Equations with Initial Conditions, Transform analysis of LTI systems. **(05 Hrs)**
Unit-III	**:**	**Signals in Frequency Domain:** Fourier Series Representation – Trigonometric Fourier Series, Exponential Fourier Series, Fourier Transform and its properties, Transform of some useful functions. **(03 Hrs)**
Unit-IV	**:**	**Discrete signals in Frequency Domain:** Discrete Fourier series, Discrete Time Fourier Transform and Properties, DTFT spectrum. **(03 Hrs)**
Unit-V	**:**	**System analysis using Z-transform:** Unilateral and Bilateral Z- Transform and its Properties, Region of Convergence, Inversion of Z-Transform, Transform Analysis of LTI systems. **(04 Hrs)**
Unit-VI	**:**	**State-Space Concept:** Introduction, Definition: State, State variable, State vector and state space, State space representation, Derivation of State model from transfer function. **(04 Hrs)**
Text Books	**:**	1. Signals and Systems by Basu & Natarajan 2. Networks and Systems by D. Roy Choudhury. 3. Linear systems and signals by B. P. Lathi, pub Oxford University press, 2ndEdi, 2005. 4. Signals and systems by M. J. Roberts pub Tata Macgraw Hill 2005. 5. Analysis of Linear Systems by D.K.Cheng.

Reference Books	**:**	1. S. Haykin and B. V. Veen, Signals and Systems, John Wiley and Sons. 2. A. V. Oppenheim and A. S. Wilsky, Signals and Systems, Prentice Hall of India. 3. R. E. Ziemer, W. H. Tranter and D. R. Fannim, Signals and Systems: Continuous and Discrete, IV edition, Prentice-Hall. 4. Signals and systems by C. T. Chen pub Oxford 3rd Edition 2004.
Course Outcomes	**:**	1. Students will be able to describe signals mathematically and understand how to perform mathematical operations on signals. 2. Students will be able to identify and understand various system properties. 3. Students will be able to estimate convolution of continuous signals using Laplace transform and discrete signals using Z transform. 4. Students will be able to compute the Fourier series or Fourier transform of a set of well-defined signals. 5. Students will be able to estimate convolution of Students will be able to compute the response for LTI systems. 6. Students will be able to represent a system in State space model.

Section A: Units I, II, III and Section B: Units IV, V, VI.
Pattern of Question Paper:
The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:
1. Minimum eight questions.
2. Four questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED271 **Credits: 1**

Course : Lab VI- AC Machines

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Familiarization of construction, principles and working with applications of ac machines through practical approach.
List of Practical (Not Less than 10)	**:**	**List of Practical :** 1. Study of Cut section of 3-phase SQ Induction Motor. 2. Speed reversal of SQIM & study of DOL / Star-Delta starters. 3. Speed Control of 3-phase Sq. Cage Induction Motor by VFD Control MMF method. 4. No Load & Blocked rotor test on SQIM and Speed reversal for the same motor. 5. Load test on three phase squirrel cage induction motor. 6. Determination of Squirrel cage induction motor performance from Circle diagram. 7. Load test on three phase Slip ring induction motor. 8. Load test on single phase induction motor. 9. Speed-torque characteristic of single-phase induction motors (split-phase type). 10. Synchronizing of alternators: Lamp Methods and use of synchroscope. 11. Speed-torque characteristic of 3-phase synchronous motor. 12. Efficiency and input power factor of 3-phase synchronous motor.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED272 **Credits: 1**

Course : Lab VII- Network Analysis

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Familiarization of various networks through practical approach.
List of Practical (Not Less than 10)	**:**	**List of Practical :** Any four experiments from the first five of the following and any four experiments from rest of the list. (Any four experiments should be based on simulation software MATLAB along with hardware verification). 1. Verification of Superposition Theorem. 2. Verification of Thevenin's Theorem. 3. Verification of Nortons Theorem. 4. Verification of Maximum Power Transfer Theorem. 5. Plot frequency response of RLC Series Resonance circuit. 6. Plot frequency response of RLC Parallel resonance circuit. 7. Plot frequency response of Low pass filter. 8. Plot frequency response of High Pass filter. 9. Determination of A, B, C, D parameters of Two port Network. 10. Determination of time response of R-L circuit to a step D.C. voltage input. (Rise and decay of current in an inductive circuit). 11. Determination of time response of R-L-C series circuit to a step D.C. voltage input. 12. Determination of parameter of two port network.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED273 **Credits: 1**

Course : Lab VIII- Analog & Digital Circuits

Teaching Scheme: **Term Work: 25 Marks**

Practical/Oral Examination: 25 Marks **Practical: 2 Hrs/week**

Course Objectives	**:**	Familiarization of various analog and digital circuits through practical approach.
List of Practical (Not Less than 10)	**:**	**List of Practical :** 1. Plot V-I characteristics of LED. 2. Transistor as a switch. 3. Design and implementation of variable voltage regulator using IC 317. 4. Design and implementation of astable multivibrator. 5. Design and implementation of monostable multivibrator. 6. Design and implementation of RC phase shift oscillator. 7. Implementing a Binary to Gray, gray to binary or Binary to XS3 code converter using gate ICs. 8. Constructing flip-flops like SR, D, JK and T using all NAND gates. 9. Design of a ripple counter / OR a two bit comparator using gate ICs. 10. Building of a ring counter and twisted ring counter using D flip-flop ICs. 11. Full Adder using Gates.

The assessment shall be done on the basis of the following.

- Continuous assessment.
- Performing the experiments in the laboratory.
- Oral examination conducted on the syllabus mentioned above.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED274 **Credits: 1**
Course : Lab IX- Signals and Systems
Teaching Scheme: **Term Work: 50 Marks**
Practical: 2 Hrs/week

Course Objectives	**:**	To be familiarized with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems using MATLAB programming.
List of Practical (Not less than 10)	**:**	**List of Practical:** 1. Plotting of continuous time a sine waveform. 2. Plotting of continuous time standard signal waveforms. Unit impulse (b) Unit step (c) Exponential. 3. Plotting of discrete ramp signal waveforms. 4. Program for up-sampling and down-sampling of a signal. 5. Computation of Laplace and inverse Laplace transform. 6. Computation of Z-transform and inverse Z-transform. 7. Verification of any one Z-transform properties. 8. Computation of linear convolution of two signals. 9. Computation of cross correlation of two signals. 10. Finding zeros and poles of a transfer function. 11. Program for Magnitude and Phase response of 1st order system. 12. Program for Magnitude and Phase response of 2ndt order system. 13. Computation of DFT & IDFT of a sequence. 14. Program for obtaining power spectrum density of a signal. 15. Program for finding energy and power of a signal.

The assessment shall be done on the basis of the following:
• Continuous assessment.
• Performing the experiments in the laboratory.
• Oral examination conducted on the syllabus mentioned above.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED275 **Credits: 1**

Course : Lab X- DOS III PLC Fundamentals

Teaching Scheme: **Term Work: 50 Marks**

Practical: 2 Hrs/week

Course Objectives	**:**	1. To study the Fundamentals of Programmable Logic Controllers 2. To study the specifications of PLC and wiring diagram. 3. To study the programming and applications related to process control.
List of Practical	**:**	**List of Practical:** 1. To understand and study the Architecture of PLC. 2. To study the different input and output devices. 3. To develop ladder logic program for logic gates. 4. To study the programming languages of PLC. 5. To study the Ladder logic and the instruction set of PLC. 6. To develop the ladder logic for flashing of LEDs. 7. To develop the ladder logic for Traffic signal Controllers. 8. To develop the ladder logic for water level control. 9. Case study of PLC of any make. 10. To study the different communication protocols. .
Reference Books	**:**	1. Garry Denning, "Introduction to Programmable Logic Controller". 2. C. D. Johnson," Process Instrumentation Technology", Prentice Hall Of India. 3. William Boltan , ''Programmable logic Controller'', 4th Edition, Newnes 2009. 4. The open international standard IEC 61131 for programmable logic controllers.

The assessment shall be done on the basis of the following:

• Continuous assessment.

• Performing the experiments in the laboratory.

• Oral examination conducted on the syllabus mentioned above.

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(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED291 **Credits: 4**

Course : Electrical Engineering Materials **Class Test: 20 Marks**

Teaching Scheme: **Theory Examination: 80 Marks**

Theory: 4 Hrs/week **Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Familiarization of various Properties of Insulating Materials. 2. Understanding the various classifications of insulating material. 3. Understanding of different types of magnetic materials. 4. Introductions to the concept of nanotechnology.
Unit-I	**:**	**(A) Dielectric Properties of Insulating Materials:** Static Field, Dielectric Parameters [Dielectric constant, Dipole moment, Polarization, Polarizability, Mechanisms of Polarizations-Electronic, Ionic and Orientation Polarization (Descriptive treatment only), Pyro-Electric & Ferro-Electric Materials, Dielectric Loss and loss tangent. **(B) Optical Properties of Materials & Cells used for Power Generation:** Photo-Conductivity, Photo-Electric Emission, Photo-Voltaic cells [Materials Used, Construction, Equivalent Circuit, Working and Application], Photo-Conductive cells, Photo-Emissive cells. **(10 Hrs)**
Unit-II	**:**	**(A) Insulating Materials, Properties & Application:** Introduction, Characteristics of Good Insulating Material, Classification, Solid Insulating Materials-Paper Press Board, Fibrous Materials, Ceramics, and Mica &Asbestos. Liquid Insulating Materials such as Transformer Oil, varnish, Askarel, Insulating Gases like Air, SF6, Insulating Materials for Power &Distribution Transformers, Rotating Machines, Capacitors, Cables, Line Insulators and Switchgears. **(B) Dielectric Breakdown:** Introduction, Concept of Primary & Secondary Ionization of Gases(Descriptive treatment only), Breakdown Voltage, Breakdown Strength, Factors affecting Breakdown Strengths of Gaseous, Liquid and Solid Dielectric Materials. Breakdown in Vacuum. **(10 Hrs)**
Unit-III	**:**	**Magnetic Materials:** Introduction, Magnetic Parameters-Permeability, Magnetic Susceptibility, Magnetization, Classification of Magnetic Materials, Diamagnetism, Para-magnetism, Ferro-magnetism, Ferri-magnetism, Ferro-magnetic behavior below Critical Temperature, Spontaneous Magnetization & , Anti-ferromagnetism, Ferrites, Applications of Ferro-magnetic Materials, Magnetic materials for Electric Devices such as Transformer Core , Core of Rotating Machines, Soft Magnetic Materials, Hard Magnetic Materials, Magnetic Recording Materials, Compact Discs. **(08 Hrs)**
Unit-IV	**:**	**Conducting Materials**: General Properties of Conductor, Electrical Conducting Materials-Copper, Aluminum and its applications, Materials of High & Low Resistivity -Constantan, Nickel-Chromium Alloy, Tungsten, Canthal, Silver & Silver alloys Characteristics of Copper Alloys (Brass & Bronze), Materials used for Lamp Filaments, Transmission Lines, Electrical Carbon Materials, Material used for Solders, Metals & Alloys for different types of Fuses, Thermal Bimetal & Thermocouple. **(08 Hrs)**

Unit-V	**:**	**Nanotechnology:** Introduction, Concepts of Energy bands & various Conducting Mechanism in Nanostructures, Carbon Nano-structures, Carbon Molecules, Carbon Clusters, Carbon Nano-tubes, Applications of Carbon Nano-tubes, Special Topics in Nano Technology such as Single Electron Transistors, Molecular Machines, BN Nano tubes, Nano wires. **(06 Hrs)**
Unit-VI	**:**	**Testing of Materials:** 1. Measurement of Tangent of Dielectric Loss Angle (tan δ) by Schering Bridge-IS 13585-1994. 2. Measurement of Dielectric Strength of Solid Insulating Material-IS 2584. 3. Measurement of Dielectric Strength of Liquid Insulating Material - IS6798. 4. Measurement of Dielectric Strength of Gaseous Insulating Material - IS2584. 5. Measurement of P.F. and partial discharge of high voltage cables. 6. Testing of high voltage bushing. **7.** Measurement of Flux Density by Gauss-meter. **(06 Hrs)**
Text Books	**:**	1. Nanotechnology - A gentle introduction to next big idea by Mark Ratner & Daniel Ratner, Pearson Education. 2. Introduction to Nanotechnology by Charles P. Poole, Jr. Frank & J. Ownes (Wiley Student Edition).
Reference Books	**:**	1. A Course in Electrical Engineering Materials by S. P. Seth, Dhanpat Rai and Sons, Delhi -6. 2. Electrical Engineering Materials, T.T.T.I, Madras 3. Electrical Engineering Materials by K. B. Raina & S. K. Bhattacharya, S. K. Kataria & Sons, Delhi-06. 4. Nanotechnology - A gentle introduction to next big idea by Mark Ratner & Daniel Ratner, Pearson Education.
Course Outcomes	**:**	1. Students will be able to understand the material properties of optical and dielectrics for Power Generation. 2. Students will be able to introduce about the dielectric breakdown, material properties of insulators and its applications. 3. Students will be able to introduce about the different magnetic materials and its applications. 4. Students will be able to understand the characteristics properties of different conducting materials and materials used for solders. 5. Students will be able to introduce about the concepts of Nanotechnology and its applications. 6. Students will be able to understand the testing of dielectric strength of different insulating materials, measurement of power factor, partial discharge, and flux density.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED292	**Credits: 4**
Course : Energy Audit & Management	**Class Test: 20 Marks**
Teaching Scheme:	**Theory Examination: 80 Marks**
Theory: 4 Hrs/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. Understand importance of energy Conservation and energy security. 2. Understand impact of use energy resources on environment and emission standards. 3. Follow format of energy management, energy policy. 4. Learn various tools of energy audit and management 5. Calculate energy consumption and saving options with economic feasibility.
Unit-I	**:**	**Energy Scenario:** Classification of Energy resources, Commercial and noncommercial sources, primary and secondary sources, commercial energy production, final energy consumption. Energy needs of growing economy, short terms and long terms policies, energy sector reforms, energy security, importance of energy conservation, energy and environmental impacts, emission check standard, salient features of Energy Conservation Act 2001 and Electricity Act 2003. Indian and Global energy scenario. Introduction to IE Rules. Study of Energy Conservation Building Code (ECBC). **(08 Hrs)**
Unit-II	**:**	**Energy Management:** Definition and Objective of Energy Management, Principles of Energy management, Energy Management Strategy, Energy Manager Skills, key elements in energy management, force field analysis, energy policy, format and statement of energy policy, Organization setup and energy management. Responsibilities and duties of energy manager under act 2001. Energy Efficiency Programs. Energy monitoring systems. **(08 Hrs)**
Unit-III	**:**	**Demand Management:** Supply side management (SSM), Generation system up gradation, constraints on SSM. Demand side management (DSM), advantages and barriers, implementation of DSM. Use of demand side management in agricultural, domestic and commercial consumers. Demand management through tariffs (TOD). Power factor penalties and incentives in tariff for demand control. Apparent energy tariffs. Role of renewable energy sources in energy management, direct use (solar thermal, solar air conditioning, biomass) and indirect use (solar, wind etc.) Introduction to Net Metering. **(08 Hrs)**

Unit-IV	**:**	**Energy Audit:** Definition, need of energy audits, types of audit, procedures to follow, data and information analysis, energy audit instrumentation, energy consumption – production relationship, pie charts. Sankey diagram, Cusum technique, least square method and numerical based on it. Outcome of energy audit and energy saving potential, action plans for implementation of energy conservation options. Bench- marking energy, Performance of an industry. Report formats. **(08 Hrs)**
Unit-V	**:**	**Energy Conservation in Applications:** a) Motive power (motor and drive system). b) Illumination c) Heating systems (boiler and steam systems) d) Ventilation (Fan, Blower and Compressors) and Air Conditioning systems e) Pumping System f) Cogeneration and waste heat recovery systems g) Utility industries (T and D Sector). **(08 Hrs)**
Unit-VI	**:**	**Financial analysis:** Financial appraisals; criteria, simple payback period, return on investment, net present value method, time value of money, break even analysis, sensitivity analysis and numerical based on it, cost optimization, cost of energy, cost of generation. **(08 Hrs)**
Text Books	**:**	1. Guide books for National Certification Examination for Energy Managers/Energy Auditors Book, 1-General Aspects (available on line). 2. Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 2 – Thermal Utilities (available on line). 3. Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 3- Electrical Utilities (available on line). 4. Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 4 (available on line).
Reference Books	**:**	1. Success stories of Energy Conservation by BEE (www. Bee-india.org). 2. Utilization of electrical energy by S.C. Tripathi, Tata McGraw Hill. 3. Energy Management by W.R. Murphy and Mackay, B.S. Publication. 4. Generation and utilization of Electrical Energy by B.R. Gupta, S. Chand Publication. 5. Energy Auditing made simple by Balasubramanian, Bala Consultancy Services.
Course Outcomes	**:**	1. To get knowledge of BEE Energy policies, Electricity Acts. 2. Use various energy measurement and audit instruments. 3. Carry out preliminary energy audit of various sectors. 4. Enlist energy conservation and demand side measures for electrical, thermal and utility Systems. 5. To implement various energy conservation techniques. 6. Solve simple problems on cost benefit analysis.

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electrical) Semester-IV

Course Code: EED293	**Credits: 4**
Course : Digital Computational Techniques	**Class Test: 20 Marks**
Teaching Scheme:	**Theory Examination: 80 Marks**
Theory: 4 Hrs/week	**Theory Examination(Duration): 3 Hrs**

Course Objectives	**:**	1. To emphasize the need of computational techniques and analyze errors involved in the computation. 2. To provide sound knowledge of various numerical methods. 3. To apply various numerical methods to obtain solution of different types of equations such as transcendental, simultaneous, ODE etc. and also for interpolation, integration and differentiation. 4. To impart skills to develop programs using C language.
Unit-I	**:**	**Basics of C Language:** **Revision:** Basics of 'C' language - Data types, Operators and its precedence. Control statements: 'if-else' and nested 'if-else', 'for, while and do-while'. **Arrays:** Introduction, one and two dimensional arrays. **Functions:** Types of functions User Defined Functions - declaration and prototypes, Local and Global variables. **Pointers:** Introduction, declaring and initializing pointers. **(08 Hrs)**
Unit-II	**:**	**Numerical Methods , Errors and Concept of root of equation:** **A)** Basic principle of numerical methods. Floating point algebra with normalized floating point technique, Significant digits. **Errors**: Different types of errors, causes of occurrence and remedies to minimize them. Generalized error formula. **B) Concept of roots** of an equation. Descartes' rule of signs, Sturm's theorem,Intermediate value theorem. Synthetic division, Roots of Polynomial Equations using Birge-Vieta method. **(08 Hrs)**
Unit-III	**:**	**Solution of Transcendental and polynomial equation and Curve Fitting:** **A) Solution of Transcendental and polynomial equation:** Bisection, Secant, Regula-Falsi, Chebyeshev and Newton-Raphson methods, Newton-Raphson method for two variables. **B) Curve Fitting** using least square approximation – First order and second order. **(08 Hrs)**
Unit-IV	**:**	**Interpolation and Numerical Differentiation:** **A) Interpolation:** Difference operators, Introduction to interpolation - Newton's forward, backward interpolation formulae, Stirling's and Bessel's central difference formulae, Newton's divided difference formula, Lagrange's interpolation. **B) Numerical Differentiation** using Newton's forward and backward interpolation formulae. **(08 Hrs)**

Unit-V	**:**	**Solution of Ordinary Differential Equation(ODE) and Numerical Integration:** **A) Solution of First order Ordinary Differential Equation (ODE)** using Taylor's series method, Euler's, Modified Euler's methods. Runge-Kutta second and fourth order methods. **Solution of Second order ODE** using 4th order Runge-Kutta method. **B) Numerical Integration:** Trapezoidal and Simpson's rules as special cases of Newton-Cote's quadrature technique for single and double integrals. **(08 Hrs)**
Unit-VI	**:**	**Solution of linear simultaneous equation:** **A) Solution of simultaneous equation:** Direct methods - Gauss and Gauss-Jordan elimination methods, concept of pivoting – partial and complete. Iterative methods – Jacobi and Gauss Seidel methods. **B) Matrix Inversion** using Jordon method and Eigen values using Power method. **(08 Hrs)**
Text Books	**:**	1. M. K. Jain, S.R.K. Iyangar, R. K. Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Publications. 2. T. Veerarajan and T. Ramchandran, "Numerical Methods with Programs in C and C++", Tata McGraw Hill Publication. **3.** P.P. Gupta & G.S Malik, "Calculus of Finite Difference and Numerical Analysis", Krishna Prakashan Media Ltd, Meerut**.** 4. Dr. B. S. Grewal, "Numerical Methods in Engineering & Sciences", Khanna Publishers. 5. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill Publication. 6. E. Balagurusamy, "Numerical Methods", Tata McGraw Hill Publication.
Reference Books	**:**	1. J. B. Scarborough, "Numerical Mathematical Analysis", Oxford & IBH, New Delhi. 2. Steven Chapra, Raymond P. Canale, "Numerical Methods for Engineers", Tata McGraw Hill Publication. 3. Yashwant Kanetkar, "Let us C", BPB Publications. 4. S.S. Sastry, "Introductory methods of Numerical Analysis", PHI Learning Private Ltd. 5. P. Thangaraj, "Computer oriented Numerical Methods", PHI Learning Private Ltd.
Course Outcomes	**:**	1. Develop algorithms and implement programs using C language for various numerical methods. 2. Demonstrate types of errors in computation and their causes of occurrence. 3. Identify various types of equations and apply appropriate numerical method to solve different equations. 4. Apply different numerical methods for interpolation, differentiation and numerical integration. 5. Apply and compare various numerical methods to solve first and second order ODE. 6. Apply and compare various numerical methods to solve linear simultaneous

Section A: Units I, II, III and Section B: Units IV, V, VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.