

**P. R.POTE (PATIL) COLLEGE OF ENGINEERING AND MANAGEMENT, AMRAVATI.**  
**Electrical Engineering Department**  
**CO List (session 2020-21)**

**Third Semester**

<b>Second Year (Third Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Network Analysis</b>		<b>Course Code: 3EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP02.1	Understand & apply concepts of electric network topology, nodes, branches, loops to solve circuit problems of Mesh Analysis & Nodal Analysis.	
3EP02.2	To formulate & analyze the incidence matrices & to form network equilibrium equations for any electrical network by applying the knowledge of graph theory.	
3EP02.3	Understand & apply the concepts of different theorems use for analyzing the electrical networks.	
3EP02.4	Understand and analysis transient and steady-state response of any electrical circuit/network by applying different circuit analysis methods.	
3EP02.5	Understand & Develop steady state solutions for non sinusoidal inputs using fourier series and to analyze the effect of harmonics in circuits	
3EP02.6	Discuss & develop the equivalent circuits by applying the concepts of two port networks	

<b>Third Year (Third Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: ENERGY RESOURCES AND GENERATION</b>		<b>Course Code: 3 EP03</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP03.1	Explain the operation of Thermal and Hydro power plants.	
3EP03.2	Understand the operation and working of Nuclear and Diesel power plants.	
3EP03.3	Summarize solar energy conversion, solar radiation measuring instruments.	
3EP03.4	Outline the principle and operation of fuel cells, wind energy conversion and their applications.	
3EP03.5	Understand the principle and operation ocean & tidal energy conversion	
3EP03.6	Understand the principle and operation other non-conventional energy resources like MHD, biogas, geothermal energy etc.	

<b>Second Year (Third Semester)</b>		<b>Academic Year: : 2020-21</b>
<b>Course/Subject: ELECTRONIC DEVICES AND CIRCUITS</b>		<b>Course Code: 3EP04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
CO1	Assess and solve basic circuits and numerical based on current and temperature dependence of semiconductor diodes and study of DC power supply.	
CO2	Evaluate various parameters of Bipolar junction transistor which will provides the knowledge of designing amplifiers for various frequencies.	
CO3	Study of various amplifier circuits with their properties and gain.	
CO4	Compare the various power amplifier circuits with respect to efficiency and position of Q-point, and understand the concept of oscillator and its criteria for sustain oscillations.	
CO5	Acquire knowledge in the field of optoelectronic devices and circuits	
CO6	Evaluate various parameters of Junction field effect transistor and Metal oxide field effect transistor which will provides the knowledge of designing amplifiers for various frequencies..	

<b>Second Year (Third Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electrical Measuring Instrument's</b>		<b>Course Code: 3EP05</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP05.1	Understand the measuring instruments and their types, as well as its classification, types of torque, working principle and its operation.	
3EP05.2	Understand the theory of operation, torque equation, errors & demerits Electro dynamic & Induction type, Electronic energy meter, the Blondel's Theorem.	
3EP05.3	Understand constructional features, operation and applications Special Measuring Instruments also about CT & PT, Theory & construction, Phasor diagram, Ratio & Phase angle error.	
3EP05.4	Understand the various types various types of AC & DC bridges also about the various Measurement of circuit parameters.	
3EP05.5	Understand and acquire knowledge about Generalized instrumentation system, also the characteristics of measurement & instrumentation system Transducers.	
3EP05.6	Understand and acquire knowledge Various types of transducers for pressure & temperature.	

<b>Second Year (Third Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: ELECTRONIC DEVICES AND CIRCUITS-LAB</b>		<b>Course Code: 3EP07</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>CO</b>	<b>Outcomes</b>	
CO1	Acquiring basics of parameters and operation of various semiconductor devices.	
CO2	Implementation of basic circuits using electronic devices.	
CO3	Verification and analysis of performance of electronic circuits	

<b>Second Year (Third Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electrical Measuring Instruments -LAB</b>		<b>Course Code: 3EP08</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>CO</b>	<b>Outcomes</b>	
CO1	Student's should be able to calculate the various value of circuit parameters by using various Bridges.	
CO2	Students should be able to calculate the various physical quantities by using various devices.	
CO3	Students should be able to study the working and there performance of various measuring instruments.	

#### Fourth Semester

<b>Second Year (Fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: ELECTRICAL MACHINE-I</b>		<b>Course Code: 4EP01</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
4EP01.1	Apply knowledge of mathematics and fundamentals for analysis of dc machines, armature winding, and armature reaction and commutation method.	
4EP01.2	Have ability to Define, sketch and compare different DC generator on the basis of their different performance characteristics.	
4EP01.3	Understand and Apply knowledge of different DC motor on the basis of their different performance characteristics, speed control method, breaking method and starting methods.	
4EP01.4	Apply mathematical and Engineering knowledge of the equivalent circuit and phasor diagram of 1-phase transformer and analyze their performance using the equivalent circuit and by performing different test on transformer.	
4EP01.5	Describe and classify parallel operation of 3-phase transformer and analyze their performance by performing different test on 3-phase transformer.	
4EP01.6	Have ability to describe, sketch and compare 3-phase to 2-phase, 6-phase and 12-phase conversion and define inrush current phenomena.	

<b>Second Year (Fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electromagnetic Theory</b>		<b>Course Code: 4EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
4EP02.1	To describe the Vector algebra and Vector calculus, the coordinate systems and their transformation and theorems such as Divergence theorem, Stoke's theorem.	
4EP02.1	To explain fundamental laws governing electrostatic fields and will be able to calculate the physical quantities of electrostatic fields (Field intensity, flux density etc.)	
4EP02.3	To describe static electric fields in Dielectrics, associated laws, boundary conditions and determine capacitance and electrical energy.	
4EP02.4	To explain fundamental laws governing magneto-static fields and calculate the associated physical quantities. (Field intensity, magnetic potential etc.)	
4EP02.5	To describe and explain magnetic fields in material and derive boundary conditions between magnetic materials, inductance and electromagnetic energy.	
4EP02.6	To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory and to describe time varying fields, propagation of electromagnetic waves in different media, Poynting theorem	

<b>Second Year (fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Analog and Digital Circuit</b>		<b>Course Code: 4EP03</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
4EP03.1	Learn the basic concepts of linear integrated circuits to solve engineering problems.	
4EP03.2	To understand application of opamp such as adder, subtractor .	
4EP03.3	State & derive PLL and other IC such as timer, regulator its application.	
4EP03.4	To understand the fundamental concepts and techniques used in digital electronics.	
4EP03.5	Analyze and implement combinational logic circuits.	
4EP03.6	Analyze different types of sequential circuits for particular application.	

<b>Second Year (fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Engineering Mathematics IV</b>		<b>Course Code: 4EP04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>4EP04.1</b>	Understand the defining concepts of Analyticity of a complex valued functions Necessary & sufficient conditions of analytic functions (Cauchy-Riemann) ,Harmonic functions & Milne's methodology of separation of real & imaginary parts & determination of an analytic functions. Understanding the defining concept of Conformal mappings, Types of conformal mappings & Determination of mappings of different types of curves & regions under Bilinear transformation.	
<b>4EP04.2</b>	Understanding the concept of expansion of complex values functions, Singular points, Expansions in the Taylor's series, Laurent's series. Understanding the defining concepts of Integral of complex valued function along the curve or contour. Evaluation of various types of integrals by various methodologies of Cauchy's Integral theorem, formula & Residue theorem.	
<b>4EP04.3</b>	Understanding the different methods of solutions to the Linear, Non linear p.d.e. & Homogeneous p.d.e. of $n^{\text{th}}$ order.	
<b>4EP04.4</b>	Understanding the specialised class of Engineering functions called Bessel's , Legendre's functions their properties & Rodrigue's formula.	
<b>4EP04.5</b>	Understanding the defining concepts of probability of different types of events by definitions, Bayes theorem. Understanding the three basic types of Probability distributions viz. Binomial, Poisson & Normal distributions.	
<b>4EP04.6</b>	Understanding the method of Least squares of Curve fitting to the given Numerical data, Fittings of straight lines & parabola , Sylvester's theorem of directly computing powers of matrix & Solving Linear differential equations by the Matrix method.	

<b>Second Year (Fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: ELECTRICAL MACHINE-I LAB</b>		<b>Course Code: 4EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
4EP06.1	Have ability to analyze the performance of dc generator and sketch different characteristics by performing resistance measurement test, OCC and load test on dc generator.	
4EP06.2	Have ability to analyze the performance of dc motor and sketch different characteristics by performing Load test on dc motor and also compare speed control method using demonstration.	
4EP06.3	Have ability to analyze the performance of transformer and sketch performance characteristics by performing OC & SC test and load test on transformer.	
4EP06.4	Have ability to analyze the different transformer connections by performing polarity marking test, two winding transformer to auto transformer, scot connection etc.	

<b>Second Year (fourth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Analog and Digital Circuit(Lab)</b>		<b>Course Code: 4EP07</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
4EP07.1	Learn the basic concepts of linear integrated circuits to solve engineering problems.	
4EP07.2	To understand application of opamp such as adder, subtractor .	
4EP07.3	State & derive PLL and other IC such as timer, regulator its application.	
4EP07.4	To understand the fundamental concepts and techniques used in digital electronics.	
4EP07.5	Analyze and implement combinational logic circuits.	
4EP07.6	Analyze different types of sequential circuits for particular application.	

## Fifth semester

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Control System - I</b>		<b>Course Code: 5EP01</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
5EP01.1	Formulate transfer function for given control systems, and interpret the data of physical system to construct its equivalent electrical model.	
5EP01.2	Explain various control system components and analyse its functional and operating characteristics by formulating its transfer function	
5EP01.3	Identify the type and order of system and Analyze the performance of time domain systems for various types of inputs.	
5EP01.4	Analyze performance of dynamic systems using Routh locus and Routh Hurwitz criteria to explain the nature of stability of the system	
5EP01.5	Analyze system's absolute, relative and marginal stability using various frequency response methods	
5EP01.6	Formulate frequency domain control system and explain the nature of stability	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Microprocessor and microcontroller</b>		<b>Course Code: 5EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>5EP02.1</b>	Basic binary math operations using the microprocessor and explain the microprocessor's internal architecture and its operation within the area of manufacturing and performance.	
<b>5EP02.2</b>	Knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor	
<b>5EP02.3</b>	Capable of interfacing of different peripheral devices with Microprocessor depending upon applications	
<b>5EP02.4</b>	Electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices for measurement of various electrical quantities.	
<b>5EP02.5</b>	Understand architecture of 8051 Microcontroller & difference between Microprocessor & Microcontroller	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electrical Machine II</b>		<b>Course Code: 5EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
5EP02.1	Understand & analyze different types of windings & slots in ac machines.	
5EP02.2	Acquire the knowledge of construction, working of alternator & analyze the different methods for calculation of regulation of alternator.	
5EP02.3	Understand the construction, working of synchronous motor & learn the process of synchronisation of generator to the live bus bar.	
5EP02.4	Understand the construction, working of three phase induction motor & analyze the different parameter of induction motor from circle diagram.	
5EP02.5	Understand & perform the different speed control method on induction motor as per the I S	
5EP02.6	Understand & identify different types of single phase induction motor & other small motors.	

<b>Third Year (5th Semester)</b>		<b>Academic Year:2020-21</b>
<b>Course/Subject: Signals and Systems</b>		<b>Course Code: 5EP04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
5EP04.1	Define signal and apply the knowledge of mathematics, design and analyze the continuous and discrete signals and systems, calculate linear convolution	
5EP04.2	Apply the knowledge of engineering fundamentals for converting time domain signal into frequency domain by using appropriate properties of fourier transform and analyze the problem using ft and inverse ft	
5EP04.3	Analyze the properties of convolution sum and evaluate the convolution of discrete time lti system and solve the difference equation	
5EP04.4	Design and derive a sampled signal from continuous time signal and interpretation of nyquist theorem for reconstruction of signals.	
5EP04.5	Interpret the dt systems through z transform and determine z transform, analyze region of conversion for the system along with derivation the properties of it	
5EP04.6	Interpret and analyze properties of various transforms and calculate dft, dtft, fft	



<b>Third Year (Fifth Semester)</b>	<b>Academic Year: 2020-21</b>
------------------------------------	-------------------------------

<b>Third Year (Fifth Semester)</b>	<b>Academic Year:2020-21</b>
------------------------------------	------------------------------

<b>Course/Subject: Introduction of earthquake engineering</b>		<b>Course Code: 5FECE05</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>5FECE05.1</b>	To introduce the interior of earth, Engineering geology of earthquakes, plate tectonics, Seismicity of the world, Faults, and the propagation of earthquake waves	
<b>5FECE05.2</b>	To apply the knowledge of earthquake and seismology of earth, Quantification of earthquake and Ground motion	
<b>5FECE05.3</b>	To give the information of the guidelines of seismic resistant planning, selection of sites, importance of architectural features in earthquake resistant buildings	
<b>5FECE05.4</b>	To give the advice about the special construction features and the Seismic effect on structure.	
<b>5FECE05.5</b>	To discuss about the behavior of masonry structure during earthquake.	
<b>5FECE05.6</b>	Design and information about the RC structure and Concept of earthquake Resistant design, Introduction to IS: 1893	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Communication Skill</b>		<b>Course Code: 5EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP06.1	The candidate should be able to understand adequate skills in Verbal, Non verbal and written Communication.	
3EP06.2	To memorize and rewrite words. Assignments and tests for vocabulary building and sentence construction.	
3EP06.3	Candidate should actively practice group discussions and interviews. They should understand the public speaking in detail.	

<b>Course/Subject: Control System – I Lab</b>		<b>Course Code: 5EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
5EP06.1	Understand practical working of potentiometer and synchros as error detector	
5EP06.2	Perform functional analysis of control system components	
5EP06.3	Analysis of system from transfer function using software tools	
5EP06.4	Analysis of time response specification using software tools.	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Microprocessor and microcontroller(LAB)</b>		<b>Course Code: 5EP08</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Course Outcome</b>	
<b>5EP02.1</b>	Develop skill of writing programs in ALP for various applications of 8085.	
<b>5EP02.2</b>	Interface various peripherals with 8085.	
<b>5EP02.3</b>	Develop skill of writing programs in ALP for various applications of 8051.	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Machine-II( Lab)</b>		<b>Course Code: 5EP09</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
1	Explain and demonstrate direct loading and OC,SC test to find out voltage regulation of an alternator	
2	Explain and demonstrate starting, reversal and V-curves of synchronous motor.	
3	Explain and demonstrate to measure slip by using tachometer, speed control, Blocked rotor and no load test and load test on slip ring induction motor.	
4	Explain or demonstrate load test on single phase Induction Motor & to plot the performance characteristics.	
5	Study special type of induction motor.	

<b>Third Year (Fifth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Communication Skill(LAB)</b>		<b>Course Code: 5EP10</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP10.1	Students should be able to learn the self introduction and Resume Preparation.	
3EP10.2	Students should develop the public speaking skills which will help them to crack Group Discussion and personal interview.	
3EP10.3	Students should be able to prepare sentences and they should learn the vocabulary building.	

## Sixth semester

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electrical power I</b>		<b>Course Code:6EP01</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
6EP01.1	Understand & Analyze Various Parameter of Transmission Line	
5EP01.2	Analyze v-I characteristics of short, medium and long lines and understand basics of corona ,proximity and other problem Arises in Transmission line Introduce the per unit system	
5EP01.3	Understand the Voltage Control & power factor Improvement & Analyze the process of Power circle Diagram	
5EP01.4	Understand the basic concept Load flow analysis and Illustrate Gauss-Seidel And Newton- Raphson Method	
5EP01.5	Understand & identify different types of insulator and Illustrate the overhead Transmission line	
5EP01.6	Understand Different types & characteristic of cable	

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Optimization Technique</b>		<b>Course Code: 6EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
3EP02.1	Understand the applications and scope of optimization techniques. and apply classical optimization techniques to solve the problems	
3EP02.2	Apply the knowledge for formalization of various type of linear optimization problem and also to find the solution using modern optimization tools	
3EP02.3	Evaluate and formulate linear programming problem that are appropriate for solving realistic engineering problems.	
3EP02.4	Apply and acquire knowledge of different types of algorithm for evaluating non-linear programming problems and also to solve the problem using modern optimization tools	
3EP02.5	Understand the network representation of project and solve the problem by interpreting project data by using appropriate technique	
3EP02.6	Understand and apply the Dynamic Programming techniques to solve the engineering problems.	

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Power Electronics</b>		<b>Course Code: 6EP03</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
6EP03.1	To understand the terminal characteristics of voltage, current and switching speed capabilities of currently available power devices to select their application in perspective of new converter topologies.	
6EP03.2	Students will be able to understand the need for a series-parallel operations of switches with estimation and calculation of their protection circuits parameters.	
6EP03.3	Understand the need and methods for power conversion from AC to DC to apply this for the control of electrical energy to match the load requirements.	
6EP03.4	Understand steady state performance of different DC to AC converter topologies and classification of commutation circuits.	
6EP03.5	Understand need of DC-DC converter circuits and learn to select suitable power converter topology by assessing the requirements of application fields.	
6EP03.6	Understand the areas of application and select suitable power converters to control Electrical Motors efficiently.	

<b>Third Year (Six Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Computer Aided Electrical Machine Design</b>		<b>Course Code: 6EP04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
6EP04.1	Understand the type, Construction & specification of Transformer and induction Motor. Design & analysis approaches of various Magnetization Curves & their problem.	
6EP04.2	Understand various Designing of transformer core & yoke cross sections and also problem associated with Design of core.	
6EP04.3	Understand various Winding types and design and their magnetizing current calculation and also understand cooling methods their designing .	
6EP04.4	Understand Induction motor stator design, winding - types and slot design and importance specific electric and magnetic loadings selection.	
6EP04.5	Understand rotor design shapes, bar and ring dimensions; slip ring rotor winding design of Induction Motor.	
6EP04.6	Understand the various performance parameters of induction motor along with Magnetizing current calculation.	

<b>Third Year (SIXTH Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: NCES</b>		<b>Course Code: 6FEMO5</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
6FEMO5.1	Students should be able to differentiate which is renewable and nonrenewable energy source and to know the basic earth sun angles.	
6FEMO5.2	Students should be able to categorize the flat plate collector and concentrate solar collector with the summarize absorption, reflection and transmission of radiation.	
6FEMO5.3	Students should be able to identify the use of solar energy for various types of solar energy application and compare them for domestic and industries purpose like heating cooling, distillation power generation, drying and cooking etc with the use of various heat storage systems.	
6FEMO5.4	Students should be able to explain and compare ocean ,tidal and wind energy ,their prospects , benefits and drawbacks	
6FEMO5.5	Students should be able to prepare bio diesel for engine and to analyze bio gas plant and different types of gasifieres, mechanism of green plant photosynthesis. .	
6FEMO5.6	Students should be able to explain photo voltaic cell, fuel cell and geothermal energy and differentiate them, getting knowledge of total flow concept for power generation..	

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: EEU</b>		<b>Course Code: 6EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
5EP02.1	Understand & classify different electric drive and its industrial application.	
5EP02.2	Understand & analyse duty cycle, flywheel & their calculation & different test on induction motor as per IS.	
5EP02.3	Understand & Analyze characteristics, speed control, starting & braking of I.M	
5EP02.4	Understand & Analyse traction system, system of track electrification, speed time curve & calculation of tractive effort.	
5EP02.5	Understand about traction motor & overhead equipment used for the traction.	
5EP02.6	Illuminations, different lighting schemes, heating & welding.	

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Power Electronics Lab</b>		<b>Course Code: 6EP07</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>6EP07.1</b>	To test and analyze characteristics of different power electronics switches.	
<b>6EP07.2</b>	To perform and analyze performance of controlled converters using simulation.	
<b>6EP07.3</b>	To perform and analyze performance of DC to DC converters, Dc to AC converters and understand working of AC to AC converters.	
<b>6EP07.4</b>	To perform application of different power switches for power control.	

<b>Third Year (Sixth Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Power Electronics Lab</b>		<b>Course Code: 6EP07</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>6EP08.1</b>	Explain and demonstrate load test, braking test & speed control on three phase induction motor.	
<b>6EP08.2</b>	Explain and demonstrate load test, braking test & speed control on DC shunt motor.	
<b>6EP08.3</b>	Explain or illustrate the performance characteristics of DC shunt motor & obtain efficiency.	
<b>6EP08.4</b>	Explain or illustrate the performance characteristics of Single phase induction motor.	
<b>6EP08.5</b>	Study the electrical heating & illumination system.	

## Seventh semester

<b>Final Year (Seventh Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Control System II</b>		<b>Course Code: 7EP01</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>Sr.No.</b>	<b>Outcomes</b>	
<b>7EP01.1</b>	Apply the knowledge of classical control system for designing of Compensators.	
<b>7EP01.2</b>	Understand and analyze SISO/MIMO linear systems state variable models by applying the knowledge of mathematics and engineering fundamentals	
<b>7EP01.3</b>	Understand and analyze controllable and observable systems using Gilbert's method and Kalman's test and develop the state feedback.	
<b>7EP01.4</b>	Understand and analyze sampled data control systems and digital controllers by applying the knowledge of mathematics and engineering fundamentals	
<b>7EP01.5</b>	Understand and analyze nonlinear control system using the knowledge of mathematics for the solution of complex problems.	
<b>7EP01.6</b>	Examine the performance of the non-linear systems by using graphical techniques and modern tool for computation of stability of nonlinear control system.	

<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: PSOC</b>		<b>Course Code: 7EP02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>7EP02.1</b>	Apply knowledge of mathematics and fundamentals for analysis of Economic operation of power system and interpretation of system.	
<b>7EP02.2</b>	Have ability to understand and apply knowledge of mathematics and engineering for analysis and solving problems on concept of automatic load dispatch also in context to the future professional growth.	
<b>7EP02.3</b>	Understand and Apply knowledge of generator control loops and Automatic voltage regulator in context to the future professional growth.	
<b>7EP02.4</b>	Apply mathematical and Engineering knowledge to understand and explain automatic load frequency control loop to solve problems and acquire knowledge in context to future professional growth.	
<b>7EP02.5</b>	Apply mathematical and Engineering knowledge to understand and describe control area concept for its physical interpretation.	
<b>7EP02.6</b>	Apply knowledge of mathematics and engineering to understand and explain steady state instabilities.	

<b>Final Year (Seven Semester)</b>	<b>Academic Year: 2020-21</b>
<b>Course/Subject: Electrical Power- II</b>	<b>Course Code: 7EP03</b>
<b>On completion of this Subject/Course the student shall be able to</b>	
<b>SN</b>	<b>Outcomes</b>
7EP03.1	Understand the sequence components, power invariance, line and phase sequence quantities relations, three phase delta/star transformer bank-sequence voltages and currents relationship; power system elements – sequence impedance and sequence networks .
7EP03.2	Understand three phase symmetrical short circuit at alternator terminals, transformer transmission line & Power system fault calculations, short circuit MVA calculation for deciding rating of Circuit breaker.
7EP03.3	Understand various unsymmetrical faults at unloaded generator terminals, transmission line, transformer & Equivalent sequence network diagram, Fault impedance, Unsymmetrical faults through impedance
7EP03.4	Understand the Causes – internal and external over voltage, Basic insulation level, Protection for over voltage – earthing screen, overhead ground wire, lightning arresters.
7EP03.5	Understand Basic principle of HVDC transmission , Transmission equipments, Comparison with AC links, Inverters – reactive power requirement; Converters, DC links, Circuit breaking, ground return, Economic distance, modern developments.
7EP03.6	Understand the FACTS concept, Elements, Controllers, Comparison with Conventional AC Transmission system.



<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: SwitchGear&amp; Protection</b>		<b>Course Code: 7EP04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>7EP04.1</b>	describe circuit Interruption theory related to Circuit Breaker.	
<b>7EP04.2</b>	explain and demonstrate about constructional features, operation, characteristics and applications of Fuses and Circuit Breakers.	
<b>7EP04.3</b>	understand and explain about constructional features, operation, and applications of SF6, Vacuum, Miniature, Earth leakage Circuit Breakers and compare merits and demerits of it. Also apply knowledge in designing, testing, installations, and maintenance of various Circuit Breakers.	
<b>7EP04.4</b>	understand and explain protective relaying principle, its components, features, characteristics, and various types of electromagnetic relays. Also compare merits and demerits of these relays.	
<b>7EP04.5</b>	explain and acquire knowledge related to transmission line protection using relaying schemes i.e. over-current, earth fault, directional, distance and differential. Understand concept and arrangement of parallel feeders, ring mains protection, carrier current relaying, overload, and Power swing.	
<b>7EP04.6</b>	explain and acquire knowledge about Transformer, Motor, Generator and Bus protections. Understand basic theory explain construction of static overcurrent, directional, differential, distance, and microprocessor based relaying systems.	

<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Computer Methods In Power System Analysis</b>		<b>Course Code: 7EP05</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>7EP05.1</b>	To Understand & apply the knowledge of power system components for the representation of power system analysis.	
<b>7EP05.2</b>	To formulate & analyze the incidence and network matrices for any power system network by applying the knowledge of Singular & non singular transformation	
<b>7EP05.3</b>	To formulate Ybus and Zbus for any power system network & apply the different methods for formation of Ybus & Zbus.	
<b>7EP05.4</b>	To analyze and discriminate the different types of faults in power system network	
<b>7EP05.5</b>	To analyze & create power system network using appropriate load flow techniques	
<b>7EP05.6</b>	To analyze & identify stability of power system using various numerical	

	techniques.
--	-------------

<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Project &amp; Seminar</b>		<b>Course Code: 7EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
7EP6.1	Able to show competence in identifying relevant information, defining and explaining topics under discussion in electrical engineering.	
7EP6.2	Able to show effective communication and discussion skills.	
7EP6.3	Able to show depth of knowledge of complex subjects related to seminar topics.	
7EP6.4	Able to demonstrate use of appropriate methodologies to present information in a well-structured and logical sequence and respond respectfully to opposing ideas.	
7EP6.5	Ability to test the strength of their seminar thesis statements, show insight into a topic, appropriate signposting.	
7EP6.6	Able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem.	

<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Switch Gear &amp; Protection Lab</b>		<b>Course Code: 7EP07</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
7EP07.1	understand and list various equipment used in electrical power system/switchgear and protection laboratory.	
7EP07.2	explain and demonstrate Arc extinguish phenomenon using MATLAB tool.	
7EP07.3	explain or illustrate the characteristics of Fuses and Miniature Circuit Breaker used for protection.	
7EP07.4	understand and demonstrate working of Transformer Differential Protection, Overvoltage, Undervoltage, Overcurrent, earth fault and phase protections using Numerical Relays.	
7EP07.5	explain or illustrate the characteristics of IDMT, and directional overcurrentelectromagnetic Relays.	
7EP07.6	simulate Protection of Three phase line against different types of faults using modern tools i.e. MATLAB	

## Eight Semester

<b>Final Year (Seven Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Power system stability</b>		<b>Course Code: 8EP01</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>8EP01.1</b>	Compare different types of power system stabilities and analyze the steady state behaviour of synchronous machine using Park's transformation.	
<b>8EP01.2</b>	Evaluate the power system behaviour under steady state stability using Clarke's diagram and understand the steady-state stability.	
<b>8EP01.3</b>	Understand the steady state stability using various power system components effects.	
<b>8EP01.4</b>	Understand and Evaluate the power system behavior under transient state stability using swing equation.	
<b>8EP01.5</b>	Understand transient state stability by listing the various methods for improving the stability of a power system network.	
<b>8EP01.6</b>	Analyze the generator excitation systems and recognize their role in power system stability control.	

<b>Final Year (8th Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: HVE</b>		<b>Course Code 8EP 02</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>8EP 02.1</b>	Apply theoretical knowledge to understand the breakdown phenomena in gasses.	
<b>8EP 02.2</b>	Apply theoretical knowledge to understand the breakdown phenomena in soild and liquids.	
<b>8EP 02.3</b>	Awareness towards the types and sources of over voltages and to decide appropriate protection scheme. Understand the mechanism of lightning strokes, switching surges and causes of over voltage in power systems and their protection by lightning arresters.	
<b>8EP 02.4</b>	Elucidate the concepts used for the generation of high voltage and currents and get theoretical knowledge about corresponding circuits.	
<b>8EP 02.5</b>	Apply Engineering and science Knowledge to understand the concepts used for measurements of high voltage and currents and design corresponding circuits.	
<b>8EP 02.6</b>	Understand the standard non destructive HV testing of electrical apparatus.	

<b>Final Year (8th Semester)</b>		<b>Academic Year:2020-21</b>
<b>Course/Subject: Digital Signal Processing</b>		<b>Course Code: 8EP03</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
8EP03.1	Apply knowledge of mathematics to define signals and systems , analyze various problems of continuous time and discrete time signals and solve difference equation	
8EP03.2	Apply engineering fundamentals to analyzedtft, idft,dft, fft and interpret its properties	
8EP03.3	Design and develop sampled signal from continuous time signal and interpretation of Nyquist theorem for reconstruction of signals, with analysis of quantization error	
8EP03.4	Design and describe filter by applying appropriate techniques	
8EP03.5	Design and develop analogue filter and by applying appropriate technique convert it into digital filter	
8EP03.6	Design DSP processors along with their various applications and compare it with microprocessor	

<b>Final Year (8th Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Power Quality</b>		<b>Course Code: 8 EP 04</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
<b>8 EP04 .1</b>	To introduce to students the term andDefinition of power quality, disturbances, and their causes.	
<b>8 EP04.2</b>	Understand the causes of power quality problems.	
<b>8 EP 04 .3</b>	To introduce the harmonic sources, passive filters, active filters.	
<b>8 EP 04 .4</b>	To prepare students to know the power quality monitoring method and equipments used for the power quality monitoring.	
<b>8 EP 04 .5</b>	Acquire knowledge on shunt compensation of Power Systems.	
<b>8 EP 04 .6</b>	Develop design capability in control systems for SVC and STATCOM	

<b>Final Year (Eight Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Project &amp; Seminar</b>		<b>Course Code: 8EP05</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
8EP05.1	Able to demonstrate the knowledge learned at institute during their course through the design, analysis, testing and evaluation of project.	
8EP05.2	Ability to use laboratory / workshop equipment to develop , test and observation of project process.	
8EP05.3	Able to explain and demonstrate use of appropriate methodologies to present information in a well-structured, and logical sequence and respond respectfully to opposing ideas.	
8EP05.4	Able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to develop a project.	
8EP05.5	Ability to test the strength of their project thesis statements, show insight into a project topic and appropriate signposting.	
8EP05.6	Able to use modern tools for development, experimentation and design of proposed model.	

<b>Final Year ( Eight Semester)</b>		<b>Academic Year: 2020-21</b>
<b>Course/Subject: Laboratory Digital Signal Processing</b>		<b>Course Code: 8EP06</b>
<b>On completion of this Subject/Course the student shall be able to</b>		
<b>SN</b>	<b>Outcomes</b>	
8EP06.1	Understand the basics of Matlab software	
8EP06.2	Understand concept of Digital signal Processing along with demonstrate basic signal plotting and its operation	
8EP06.3	Demonstrate linear convolution and circular convolution using DFT by MATLAB function	
8EP06.4	Understand the concept of Sampling and its converters	
8EP06.5	Design and implementation of FIR and IIR filter using Matlab.	