**VAAGDEVI COLLEGE OF ENGINEERING**

**(AUTONOMOUS)**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES FOR B.TECH-EEE R20 FOR THE YEAR 2020-2021**

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| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 4** |
| **I Sem**  | **Linear Algebra and Complex Variable** | **B20MA03** | **L/T/P :3/1 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the principles of matrix to calculate the characteristics of system of linear equations using multiple methods |
| 2 | Determine Eigen values, Eigenvectors of matrices |
| 3 | Calculate Partial derivatives, extreme of functions of multiple variables |
| 4 | Analyze the complex function with reference to their analyticity and evaluate using integral theorems |
| 5 | Expand the complex function using power series |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 4** |
| **I Sem**  | **Programming For Problem Solving** | **B20CS01** | **L/T/P : 3/1 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understanding how problems are posed and how they can be analyzed for obtaining solutions |
| 2 | Understanding the fundamentals of C programming |
| 3 | Learning of sequencing, branching, looping and decision-making statements to solve scientific and engineering problems. |
| 4 | Implementing different operations on arrays and creating and using of functions to solve problems |
| 5 | Design and implement different types of file structures using standard methodology. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **I Sem**  | **Fundamentals of Mechanical Engineering** | **B20ME06** | **L/T/P : 3/0 /0** |
| By the end of the course, students will be able to |
| 1 | To understand the various sources of energy and basic terminology of Mechanical systems |
| 2 | To understand the various types of automobile engines |
| 3 |  To understand and appreciate significance of mechanical engineering in different fields of engineering |
| 4 | To understand power transmission elements, and applications of various engineering materials |
| 5 | To understand various manufacturing processes. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **I Sem**  | **Chemistry** | **B20CH02** | **L/T/P :3/0 /0** |
| The basic concepts included in this course will help the student to gain: |
| 1 | The knowledge of electrochemical cells, different batteries |
| 2 | The required principles and concepts of corrosion, control methods. |
| 3 |  The knowledge of water treatment. |
| 4 | The knowledge of polymers and their importance in day to day life |
| 5 | The required principles and concepts of passive devices. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1.5** |
| **I Sem**  | **English Language and Interactive Communication Skills Lab** | **B20EN02** | **L/T/P :0/0 /3** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the nuances of English language through audio-visual experience and group activities. |
| 2 | speak with clarity and confidence which in turn enhances their employability skills |
| 3 | develop their listening skills so that they may appreciate its role in developing LSRW skills language and improve their pronunciation |
| 4 | Involve the students in speaking activities in various contexts. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **I Sem**  | **Programming for Problem Solving Lab** | **B20CS02** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand basic structure of the C Programming, data types, declaration and usage of variables, control structures and all related concepts. |
| 2 | Understand any algorithm and Write the C programming code in executable form |
| 3 | Implement Programs using functions, pointers and arrays |
| 4 | Use the pre-processors to solve real time problems |
| 5 | Use file structures and implement programs on files |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1.5** |
| **I Sem**  | **Engineering and IT Workshop** | **B20ME03** | **L/T/P :0/0 /3** |
| After learning the contents of this subject, the student must be able to |
| 1 | Know the fundamental knowledge of House wiring and soldering and their usage in real time Applications. |
| 2 | Gain knowledge on electronic components and measuring instruments |
| 3 | Use basic concepts of computer hardware for assembly and disassembly. |
| 4 | Use Microsoft tools for exercise |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 4** |
| **II Sem**  | **Differential Calculus and Numerical Methods** | **B20MA05** | **L/T/P :3/1 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Apply the fundamental concepts of ordinary differential equations to real time problems. |
| 2 | Find the complete solution of a non-homogeneous differential equations and applying its concepts in solving physical problems of Engineering |
| 3 | Analyse line, surface and volume integrals using fundamental theorems. |
| 4 | Find a better approximate root of a given equation. |
| 5 | Compute the differential equation using numerical techniques. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 4** |
| **II Sem**  | **Electrical Circuits-I** | **B20EE04** | **L/T/P :3/1 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Learn basics of electrical circuits such as laws, transformation and network reduction techniques. |
| 2 | Explore the basic principles and concepts involved in AC circuits and analyze power in series and parallel AC circuits |
| 3 | Learn the concepts of resonance and the importance of locus diagrams. |
| 4 | Understand various network theorems and its applications in electrical circuits. |
| 5 | Analyze the series and parallel magnetic circuits with basic magnetic principles and laws of electromagnetic induction. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits:4** |
| **II Sem**  | **Basic Electronic devices** | **B20EC01** | **L/T/P :3/1 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyze the characteristics of the PN junction diode and Zener diode |
| 2 | Design the rectifiers with and without filters for specified DC voltage. |
| 3 | Illustrate the voltage- current characteristics of Junction Transistor and different configurations of transistor |
| 4 | Design and analyze the different biasing circuits and amplifier circuits |
| 5 | Acquire knowledge about the construction, theory and characteristics of FET and MOSFET |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **II Sem**  | **Physics** | **B20PH02** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understands the materials on the basis of energy band gap and its device applications |
| 2 | Describes the characteristics and working of lasers and their use in various fields |
| 3 | Analyse and apply the concepts of Electric Fields for accurate determination of Electric flux, Electric flux density, energy stored in electric fields etc |
| 4 | Apply the concepts of the light propagation in optical fibres in optical communication systems |
| 5 | Classify and enumerate the properties of magnetic and Dielectric materials and identifies their role in specific engineering applications |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits:1.5** |
| **II Sem**  | **Electrical Engineering Practice Lab** | **B20EE05** | **L/T/P :0/0 /3** |
| After learning the contents of this subject, the student must be able to |
| 1 | Identify and find the various components and equipment used for electrical engineering applications |
| 2 | Understand the staircase wiring and ceiling fan wiring |
| 3 | Develop the simple electric circuits on bread board and PCB. |
| 4 | Understand the earthing connections and DOL starter connection |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **II Sem**  | **Physics Lab** | **B20PH05** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Estimate the frequency of tuning for and AC supply with the help of stretched strings |
| 2 | Analyze as well as compare the intensity distribution of interference and diffraction patterns |
| 3 | Draw the characteristics of electrical and electronic circuits and evaluate the dependent parameters |
| 4 | Explore and understand the applications of semiconducting devices |
| 5 | Evaluates the wavelength and radius of curvature of Plano convex lens by Newton‘s rings |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 2** |
| **II Sem**  | **Engineering Drawing** | **B20ME01** | **L/T/P :0/0 /4** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand various commands, object properties in AUTOCAD |
| 2 | Analyse the Projections of Points. |
| 3 | Understand the projections of solids |
| 4 | Estimate the use of drawings, dimensioning, scales and conic sections |
| 5 | Modify the applications of this knowledge in computer graphics. |
| 6 | Compare the Conversion of Isometric views to Orthographic views |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1.5** |
| **II Sem**  | **Basic Electronic devices Lab** | **B20EC02** | **L/T/P :0/0 /3** |
| 1 | Demonstrate the characteristics and operation of Semiconductor diodes. |
| 2 | Analyze different rectifier circuits |
| 3 | Demonstrate V-I characteristics of BJT, FET and UJT |
| 4 | Design simple electronic circuits |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **III Sem**  | **Electrical Circuits – II** | **B20EE05** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the basics of network representation, method of analyzing the network and duality of network. |
| 2 | Analyze balanced and unbalanced three phase circuits and measure voltage, current and power in three phase star and delta connections |
| 3 | Study the transient response of series and parallel RLC circuits for DC and sinusoidal excitations. Analyze the response for step, ramp, impulse etc., using Laplace transformation |
| 4 | Study different types of network functions and evaluate the network parameters in two port network using transformed variables |
| 5 | Learn about different types of filters and Fourier analysis applied to AC circuits |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **III Sem**  | **Signals and Systems** | **B20EC03** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyze the spectral characteristics of continuous-time periodic signals using Fourier series |
| 2 | Demonstrate and apply Fourier transform on various signals. |
| 3 | Apply the Laplace transform and Fourier transform for the analysis of continuous-time signal |
| 4 | Analyse systems based on their properties and determine the response of LTI system. |
| 5 | Understand the concepts of convolution and correlation of signals. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **III Sem**  | **Electrical Machines-I** | **B20EE07** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Evaluate the stored and converted energy and also exerted force in electromechanical energy conversion devices. |
| 2 | Able to analyze and design the types of dc generators |
| 3 | Able to select appropriate D.C Generator to meet the requirements of the application in industry |
| 4 | To understand the characteristics and concept s of speed control. |
| 5 | Able to Test the performance and select appropriate D.C machine to meet the requirements of the application in industry. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **III Sem**  | **Electromagnetic Fields** | **B20EE08** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyze the relation between the electric field and the magnetic field, about the various laws such as EFI, Potential and other concepts of these fields |
| 2 | Understand the behavior of conductors and dielectrics, their boundary conditions, Maxwell’s equations with respect to electrostatics. |
| 3 | Understand the magnetic field concepts using Biot-Savart law and Ampere's law |
| 4 | Analyze the relation between two or more conductors when subjected to magnetic fields |
| 5 | Understand the concepts of time varying fields in both electric and magnetic fields and their relationship in evaluating power |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 2** |
| **III Sem**  | **Python Programming** | **B20CS03** | **L/T/P :2/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Defining the fundamentals of writing Python scripts. |
| 2 | Expressing the Core Python scripting elements such as variables and flow control structures. |
| 3 | Apply Python functions to facilitate code reuse. |
| 4 | Extending how to work with lists and sequence data |
| 5 |  Implement file operations such as read and write and Adapting the code robust by handling errors and exceptions properly |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 2** |
| **III Sem**  | **English for Effective Communication** | **B20EN01** | **L/T/P :2/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Skim and scan the digital text to summarize it for future reference. |
| 2 | Read the text to make notes according to their needs |
| 3 | Use English language effectively in spoken and written forms. |
| 4 | Communicate confidently in various contexts and different cultures. |
| 5 | Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **III Sem**  | **Electrical Circuits Lab** | **B20EE09** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Explain the concept of circuit laws |
| 2 | Verify network theorems |
| 3 | Determine Z, Y and ABCD parameters for a given two port network. |
| 4 | Evaluate the time response and frequency response characteristics of RLC series circuit and their resonance conditions. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **III Sem**  | **Python Programming Lab** | **B20CS07** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Expressing the Core Python scripting elements such as variables and flow control structures. |
| 2 | Apply Python functions to facilitate code reuse |
| 3 | Extending how to work with lists and sequence data. |
| 4 | Implement file operations such as read and write and Adapting the code robust by handling errors and exceptions properly |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **IV Sem**  | **Power Systems – I** | **B20EE06** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Gain the knowledge on operation of Hydro Electric generation. |
| 2 | Acquire and interpret fundamental concepts Thermal generation |
| 3 | Understand various economic aspects of the Power system and tariff |
| 4 | Acquire knowledge on power system distribution systems and substation |
| 5 | Understand design of underground cables |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **IV Sem**  | **Electrical Machines-II** | **B20EE12** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the concepts and performance of single phase transformer. |
| 2 | Test the performance of single phase Transformer |
| 3 | Choose a suitable three phase transformer based on its application and also convert three phase to two phases or vice versa. |
| 4 | Understand the concepts of Construction, operation characteristics, testing (concept of circle diagram) and speed. |
| 5 | Analyze speed torque characteristics and control the speed of induction motors |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **IV Sem**  | **Electrical Measurements and Instrumentation** | **B20EE13** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Different types of measuring instruments their construction operation and characteristics |
| 2 | Resistance voltage current measurements through potentiometers, voltage current measurements through instruments transformers. |
| 3 | Power and energy measurements through watt and energy meters with examples |
| 4 | Resistance measurements through DC bridges, capacitance and inductance measurements through AC bridges, different types of transducers. |
| 5 | Measurement of frequency and phase through CRO, range extension of measuring instruments and different types of errors & their reduction methods in measuring instruments. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **IV Sem**  | **OOPS through JAVA** | **B20CS27** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the use of OOP concepts and solve real world problems using OOP techniques. |
| 2 | Solve the inter-disciplinary applications using the concept of inheritance. |
| 3 | Develop robust and faster applications by applying different exception handling mechanisms. |
| 4 | Understand the multithreading concepts and develop efficient applications |
| 5 | Design GUI based applications and develops applets for web applications. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **IV Sem**  | **Analog and Digital Electronics** | **B20EC21** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Construct and analyze the single stage transistor amplifier. |
| 2 | Design and construct the negative feedback amplifiers and oscillators according to the required specifications. |
| 3 | Understand the Op Amp and its applications. |
| 4 | Design different combinational circuits using minimization techniques |
| 5 | Analyze basic sequential circuits and also able to understand various ADC and DAC techniques. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **IV Sem**  | **Analog and Digital Electronics Lab** | **B20EC22** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the applications of diode as integrator, differentiator, clipper and clamper circuits. |
| 2 | Design circuits using operational amplifiers for various applications. |
| 3 | Analyze the VCO circuit. |
| 4 | Understand and implement DAC conversions using OP-AMP. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1.5** |
| **IV Sem**  | **Electrical Machines Lab-I** | **B20EE15** | **L/T/P :0/0 /3** |
| After learning the contents of this subject, the student must be able to |
| 1 | Select range of apparatus based on the ratings of DC Machines. |
| 2 | Determine Characteristics of DC machines by conducting tests |
| 3 | Evaluate the efficiency of the machine by analyzing test results. |
| 4 | Study speed control methods for dc machines |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1.5** |
| **IV Sem**  | **OOPS through JAVA Lab** | **B20CS28** | **L/T/P :0/0 /3** |
| After learning the contents of this subject, the student must be able to |
| 1 | Use the Java SDK environment to create, debug and run simple Java programs. |
| 2 | Write Java programs to implement error handling techniques using exception handling |
| 3 | Develop multithreaded applications with synchronization. |
| 4 | Design simple Graphical User Interface applications and event driven programming |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Electrical Machines-III** | **B20EE15**  | **L/T/P :3/0/0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Demonstrate basic concepts of AC machines. |
| 2 | Analyze the concepts of regulation of synchronous generators |
| 3 | Evaluate performance characteristics of synchronous machines. |
| 4 | Analyze the operating characteristics of synchronous motors |
| 5 | Identify the Construction, operation and characteristics of single-phase motor and special machines |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Power Electronics** | **B20EE16** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the differences between signal level and power level devices |
| 2 | Examine single phase-controlled rectifier circuits. |
| 3 | Understand three phase-controlled rectifier circuits. |
| 4 | Learn the operation of DC-DC choppers |
| 5 | Study the operation of DC-AC converters and AC-AC voltage regulators |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Control Systems** | **B20EE17** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the concept of feedback and analyze the control system components by their Mathematical modeling |
| 2 | Estimate the time domain specifications and steady state error |
| 3 | Apply various time domain and frequency domain techniques to assess the system performance. |
| 4 | Improve the system performance by designing a suitable controller and/or a compensator for a specific application |
| 5 | Test system Controllability and Observability using state space representation and applications of state space representation to various systems. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Power Systems-II** | **B20EE18** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Gain knowledge on computing transmission line parameters like inductance and capacitance |
| 2 | Evaluate performance of short, medium transmission lines |
| 3 | Evaluate performance of long transmission lines and describe travelling wave and transients in power system |
| 4 | Describe various effects on transmission system and compute sag on overhead transmission system |
| 5 | Gain knowledge on power factor and voltage control in transmission system |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Renewable Energy Systems** | **B20EE19** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Apply the technology to capture the energy from the renewable sources like sun, wind, ocean, biomass, geothermal. |
| 2 | Use different renewable energy sources to produce electrical power. |
| 3 | Minimize the use of conventional energy sources to produce electrical energy. |
| 4 | Identify the fact that the conventional energy resources are depleted. |
| 5 | Explore the direct energy sources. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Industrial Instrumentation** | **B20EE20** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Get knowledge on transducers |
| 2 | Understand the strain gauge and strain measurement. |
| 3 | Know the displacement measurement techniques. |
| 4 | Understand the temperature measurement |
| 5 | Gains knowledge on digital acquisition systems and control |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **V Sem**  | **Computer Organization** | **B20EC16** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Describe the fundamental organization of a computer system |
| 2 | Understand the concepts of register transfer logic and arithmetic operations. |
| 3 | Understand the concepts of Hardwired control and micro programmed control. |
| 4 | Explain the I/O and memory organization in depth |
| 5 | Understand the concepts of parallel processing, pipelining and inter processor communication |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **V Sem**  | **Electrical Machines Lab-II** | **B20EE21** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Select range of apparatus based on the ratings. |
| 2 | Draw the Equivalent circuits and analyze various AC machines |
| 3 | Determine performance and Characteristics of AC machinery |
| 4 | Evaluate the efficiency of the machine by analyzing test results |
| 5 | Evaluate the performance of transformers. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **V Sem**  | **Electrical Measurements and Instrumentation Lab** | **B20EE22** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Compare performance of MC, MI and Dynamometer types of measurements, Energy meter. |
| 2 | Determine the circuit parameters using AC and Dc bridges. |
| 3 | Compute the errors CT‘s and PT‘s. |
| 4 | Understand the performance of industrial instruments. |
| 5 | Determine the LVDT characteristics |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **V Sem**  | **Electrical Simulation Lab** | **B20EE23** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Get the knowledge simulation of electrical circuits |
| 2 | Observe the time response analysis in simulation |
| 3 | Know the transmission line parameters using Simulink |
| 4 | Know the simulation power electronic converters |
| 5 | Get the knowledge on different simulation software |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 0** |
| **V Sem**  | **Human Values and Professional Ethics** | **B20MC04** | **L/T/P :2/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | It ensures students sustained happiness through identifying the essentials of human values and skills. |
| 2 | It facilitates a correct understanding between profession and happiness |
| 3 | It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature |
| 4 | Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Computer Methods in Power Systems** | **B20EE25** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Determine the bus impedance and admittance matrices for power system network |
| 2 | Calculate various parameters at different buses using load flow studies |
| 3 | Discuss per unit system representation and symmetrical component theory. |
| 4 | Discuss fault analysis on power system |
| 5 | Understand the steady state stability of power system and analyse the transient stability of power system. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Power Semiconductor Drives** | **B20EE26** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyze the operation of converter fed dc motors and four quadrant operations of dc motors using dual converters |
| 2 | Describe the chopper fed dc motors in various quadrants of operation |
| 3 | Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters. |
| 4 | Differentiate the stator side control and rotor side control of three phase induction motor. |
| 5 | Explain the speed control mechanism of synchronous motors. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Managerial Economics and Financial Analysis** | **B20MB01** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the nature, scope and importance of Managerial Economics. |
| 2 | Know what is demand, analyze demand and how elasticity of demand is used for pricing decisions and to evaluate methods for forecasting demand |
| 3 | Know how production function is carried out to achieve least cost combination of Inputs and how to analyze cost. |
| 4 | Understand the characteristics of different kinds of markets and outline different form of business organization and analyze how capital budgeting techniques are used for investment decisions. |
| 5 | Know how to prepare final accounts and how to interpret them, analyze and interpret financial statements using ratio analysis |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Electrical Distribution Systems** | **B20EE27** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand design of various load |
| 2 | Analyze the need of substations and there erection and site selection |
| 3 | Understand protection of distribution system |
| 4 | Acquire knowledge of power factor improvement. |
| 5 | Calculate the distribution voltage drop calculations |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Electrical Engineering Materials** | **B20EE28** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Impart the knowledge on electrical engineering materials classification and their applications |
| 2 | Study the performance characteristics of various semiconducting, dielectric and insulation materials and their applications in design of electrical and electronic devices. |
| 3 | Identify various magnetic materials and their classification |
| 4 | Learn various special purpose of materials |
| 5 | Design various electronic components |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VI Sem**  | **Digital Signal Processing** | **B20EC24** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Identify the different types of the discrete signals and systems |
| 2 | Understand the inter relationship between DFT and various transforms and fast computation of DFTand appreciate the FFT processing |
| 3 | Understand the characteristics of FIR filters and classify the different types of windowing techniques. |
| 4 | Design a IIR digital filters for a given specifications and Apply the knowledge to real world processing applications. |
| 5 | Understand different types of signal processing architectures |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VI Sem**  | **Power Electronics Lab** | **B20EE29** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Study Characteristics of various Power Semiconductor devices |
| 2 | Analyze AC/AC and AC/DC Converters |
| 3 | Analyze the behavior of various DC/DC and DC/AC converters |
| 4 | Understand types of Power Electronic converters and identify their applications |
| 5 | Know the PWM techniques used for power converters |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VI Sem**  | **Control Systems Lab** | **B20EE30** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyze the time & Frequency response of control systems |
| 2 | Evaluate the performance of feedback control systems |
| 3 | Examine the response of PID controllers. |
| 4 | Identify the Performance of AC & DC servo motors |
| 5 | Know the magnetic amplifier |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VI Sem**  | **Electronics Design Lab** | **B20EE31** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Design the various regulated power supplies for control boards |
| 2 | Gain knowledge on designing of various triggering circuits for SCR. |
| 3 | Develop scaling and conditioning circuits for various sensors. |
| 4 | Develop PWM control and gate driver circuits for various power electronic applications |
| 5 | Develop the zero-crossing detector. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 0** |
| **VI Sem**  | **Logical Reasoning and Quantitative Aptitude** | **B20MC05** | **L/T/P :2/0/0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems. |
| 2 | Apply quantitative correctly arrive at meaningful conclusions regarding their answers and manipulate equations and formulas in order to solve for the desired variable |
| 3 | Interpret given information correctly, determine which mathematical model best describes the data, and apply the model correctly |
| 4 | Correctly apply mathematical language and notation to explain the reasoning underlying their conclusions when solving problems using mathematical or statistical techniques |
| 5 | Improve their mathematical skills in various general aspects to solve real time problems. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Power System Operation And Control** | **B20EE33** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyse economic operation of power system. |
| 2 | Understand the working of hydrothermal coordination. |
| 3 | Analyse load frequency control of Single area and Two area power system. |
| 4 | Acquire knowledge on reactive power control |
| 5 | Understand the working of deregulated electricity markets |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Power System Protection** | **B20EE35** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the basic construction and principle of arc interruptions in Circuit Breaker and its types. |
| 2 | Understand the basic principle of electromagnetic Relay Operation and its various types to different applications. |
| 3 | Explore the various schemes of protecting generator and transformers. |
| 4 | Explore various relaying operation in protecting the transmission line and bus bar. |
| 5 | Learn the necessity of neutral grounding and protection against overvoltage. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Microprocessors and Microcontrollers** | **B20EC32** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Illustrate the internal organization of popular 8086/8051 microprocessors/microcontrollers. Contrast hardware and software interaction and integration. |
| 2 | Design microprocessors and microcontrollers-based systems and develop microcontroller based systems for real time applications. |
| 3 | Understand microcontroller 8051 and its programming. |
| 4 | Explain the Memory organization, classification and their applications and |
| 5 | Assess programming, interfacing etc of various devices with microprocessors and external world. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **High Voltage Engineering** | **B20EE35** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand Transients in power system. |
| 2 | Acquire the knowledge on breakdown in solid, Liquid and gaseous dielectrics |
| 3 | Understand the generation of high voltage and current. |
| 4 | Identify the measurement of high voltage and current. |
| 5 | Analyze power apparatus and insulation coordination |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Advanced Power Electronics** | **B20EE36** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Classify driver circuits for various power semiconductor devices. |
| 2 | Analyze the operation of multi-pulse converters. |
| 3 | Understand the operation of resonant converters. |
| 4 | Know the differences between VSI and CSI. |
| 5 | Gain knowledge on the operation of multilevel inverters. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Advanced Control Systems** | **B20EE37** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand different non linearities and their describing functions. |
| 2 | Describe the methods of Phase-plane trajectory of nonlinear control systems. |
| 3 | Apply various theorems for stability analysis of linear and nonlinear systems. |
| 4 | Implement modal control and calculus of variations |
| 5 | Formulate and solve optimal control problems |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Electrical Machine Design** | **B20EE38** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand the basic design consideration, standards. Study the heat dissipation, cooling characteristics and electrical characteristics of various dielectric materials. |
| 2 | Understand the design, choice of materials and specifications in DC machines |
| 3 | Understand and design the main dimensions of each part of a transformers |
| 4 | Design the constructional features of induction motors and estimate their currents and reactance |
| 5 | Design the constructional features of synchronous motors |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Advanced Electrical Drives** | **B20EE39** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Analyse the operation of three phase converter fed dc motors |
| 2 | Describe the VSI and CSI fed induction motor operation. |
| 3 | Know the concept of vector control of induction motor drive. |
| 4 | Understand the concept of direct torque control for three phase induction motor. |
| 5 | Gain knowledge on vector control of PMSM drives and introduction to BLDC drives. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **AI Techniques in Electrical Engineering** | **B20EE40** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 |  Identify and describe AI techniques and their roles in building intelligent machines. |
| 2 | Understand the working of multilayer neural networks. |
| 3 | Explore fuzzy logic and reasoning. |
| 4 | Learn genetic algorithms to optimization problems |
| 5 | Evaluate and compare solutions by AI approaches for a given problem in matlab simulink |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Utilization of Electrical Energy** | **B20EE41** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Choose a right drive for a particular application. |
| 2 | Identify Heating and welding schemes for given application. |
| 3 | Explain the basics of lighting and methods of illumination and its parameters |
| 4 | Understand the different schemes of traction systems, its characteristics and its main components. |
| 5 | Analyze electrical energy consumption for traction system |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **High Voltage DC Transmission** | **B20EE42** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Know the basic concepts of HVDC transmission. |
| 2 | Understand the complete operation of HVDC Converter stations |
| 3 | Understand the power flow control on HVDC Transmission system |
| 4 | Understand the Operation of the controller for HVDC in worst and normal operations |
| 5 | Design the Various filters. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VII Sem**  | **Microprocessors and Microcontrollers Lab** | **B20EC42** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Demonstrate experimentally basic programming of Microprocessor. |
| 2 | Recall the microprocessor interfacing with various peripherals for various applications |
| 3 | Apply the basic programming of microcontroller. |
| 4 | Examine microprocessor interfacing with various peripherals for various applications |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VII Sem**  | **Power Systems Lab** | **B20EE43** | **L/T/P :0/0 /2** |
| After learning the contents of this subject, the student must be able to |
| 1 | Calculate Transmission line parameters, efficiency and regulation. |
| 2 | Evaluate the Performance analysis of Over/Under Voltage Relay. |
| 3 | Understand the Analysis and performance testing of Feeder Protection System |
| 4 | Calculate Sequence Reactance of 3-Φ Transformer |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 2** |
| **VII Sem**  | **Mini Project & Internship** | **B20EE44** | **L/T/P :0/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Students will be able to practice acquired knowledge within the chosen area of technology for project development |
| 2 | Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. |
| 3 | Reproduce, improve and refine technical aspects for engineering projects |
| 4 | Work as an individual or in a team in development of technical projects & Communicate and report effectively project related activities and findings. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 4** |
| **VII Sem**  | **Major Project Phase-1** | **B20EE45** | **L/T/P :0/0 /8** |
| After learning the contents of this subject, the student must be able to |
| 1 | Identify the problem by applying acquired knowledge. |
| 2 | Ability to plan and implement an investigative or developmental project.  |
| 3 | In-depth skill to use some laboratory, modern tools and techniques |
| 4 | Ability to communicate results, concepts, analyses and ideas in written and oral form & Conduct an extended independent investigation that results in the production of a research thesis. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Soft Computing Techniques** | **B20EE46** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | To know basic idea of modern engineering techniques which are useful for solving non-linear and complex functions that may come across dissertation/research work |
| 2 | To understand optimization problem |
| 3 | Understand the concept of multi-objective optimization problems (MOOPs) and issues of solving it. |
| 4 | Knowing Adaptive Neuro-Fuzzy Inference Systems |
| 5 | Evaluate and compare solutions by soft computing techniques for a given problem in matlab Simulink |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Digital Control Systems** | **B20EE47** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Acquire a strong foundation in sampling and reconstruction Z-transforms |
| 2 | Apply knowledge of Mathematics, Z-plane analysis to discrete time control systems. |
| 3 | Replace the conventional control system with Digital control system. |
| 4 | Evaluate and apply Z-plane analysis of discrete time control systems |
| 5 | Apply state feedback controllers and observers |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Flexible AC Transmission Systems** | **B20EE48** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Know the concept of flexible AC transmission systems. |
| 2 | Understand the voltage source converters used in FACTS |
| 3 | Get the exposure on static shunt compensation. |
| 4 | Understand the SVC and STATCOM. |
| 5 | Get the exposure on static series compensation. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **VLSI Design** | **B20EC33** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Design digital applications using Verilog HDL |
| 2 | Understand IC technology and basic electrical properties of MOS and BiCMOS |
| 3 | Design the layout of circuits using various design rules. Develop and design the gate level circuits |
| 4 | Gain the knowledge to design data path subsystems like Adders, Shifters, and ALUs etc. |
| 5 | Illustrate different programmable logic devices and CMOS testing. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Power Quality** | **B20EE49** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Know the terminology, definitions, causes, effects and analysis of various power quality problems |
| 2 | Define and understand the components of current/power in sinusoidal/non-sinusoidal singlephase supply/load systems |
| 3 | Define and understand the components of current/power in sinusoidal/non-sinusoidal three phase supply/load systems |
| 4 | Know design, operation and Analysis of passive shunt and series compensators |
| 5 | Know design, operation and analysis of passive shunt/series power filters |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VII Sem**  | **Electric and Hybrid Vehicles** | **B20EE50** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Know the fundamentals of Electric Vehicles. |
| 2 | Gain the knowledge on battery technology used in EVs. |
| 3 | Understand the AC DC motor requirements for EVs |
| 4 | Know the drive train components |
| 5 | Get the exposure on fundamentals of Hybrid EVs design. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Smart Grids** | **B20EE51** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand technologies for smart grid and features of Smart Grid in the context of Indian Grid. |
| 2 | Assess the role of automation in Transmission/Distribution/substation. |
| 3 | Know various communication technologies involved in smart grids and importance of PMUs, EMS, WAMS, SCADA |
| 4 | Classify various Smart Distribution Technologies |
| 5 | Clarify the regulations and market models for smart grid and various tariffs |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 3** |
| **VIII Sem**  | **Embedded Systems** | **B20EC45** | **L/T/P :3/0 /0** |
| After learning the contents of this subject, the student must be able to |
| 1 | Understand and design embedded systems. |
| 2 | Understand the architecture of Arm processors |
| 3 | Develop a system using IO devices and interfacing to external world |
| 4 | Understand types of memory |
| 5 | Understand embedded firmware design approaches |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 1** |
| **VIII Sem**  | **Technical Seminar** | **B20EE52** | **L/T/P :0/0 /2** |
| 1 | Identify and analyze the real time Electrical Engineering problems |
| 2 | Acquire awareness on latest technology and current trends in the field of Electrical Engineering. |
| 3 | Participate in discussions for enhancement of knowledge |
| 4 | Apply communication skills & Document and present technical reports following professional ethics. |
| **Course Outcome** | **Semester**  | **Subject Name** | **Subject Code** | **No. of Hours** | **Credits: 8** |
| **VII Sem**  | **Project Stage – II** | **B20EE53** | **L/T/P :0/0 /16** |
| 1 | Identify the problem by applying acquired knowledge. |
| 2 | Ability to plan and implement an investigative or developmental project.  |
| 3 | In-depth skill to use some laboratory, modern tools and techniques |
| 4 | Ability to communicate results, concepts, analyses and ideas in written and oral form & Conduct an extended independent investigation that results in the production of a research thesis. |