# Course Outcome

## Session 2020-21

## Department of Electrical & Electronics Engineering

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**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Introduction to Soft Computing (KOE-036)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remembering neural network architecture, perceptron model architecture, steps of back propagation algorithm, fuzzy set theory, procedures of GA, flow chart of GA, Genetic operators. | 1 |
| 2 | Understanding concepts of artificial neural network, perception and convergence rule, auto associative and hetero-associative memory, learning method, working principle of Genetic algorithm | 2 |
| 3 | Applying backpropagation algorithm, fuzzy set theory, fuzzy algorithms, Fuzzification, Genetic algorithm. | **3** |
| 4 | Analyzing neural network architecture, properties of fuzzy set, interference in fuzzy logic, fuzzy controller, Generational cycle and applications. | **4** |
| 5 | Evaluating activation functions, effect of learning rule coefficients in backpropagation algorithm, fuzzy to crisp and crisp to fuzzy conversion, different operations in fuzzy set theory, defuzzification, optimization in Genetic algorithm. | **5** |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Electronics Engineering (KOE-038)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the concept of PN junction and special purpose diodes. | **2** |
| 2 | Study the application of conventional diode and semiconductor diode. | **1** |
| 3 | Analyze the I-V characteristics of BJT and FET. | **4** |
| 4 | Analyze the application of Op-Amp, amplifiers, integrator, and differentiator. | **4** |
| 5 | Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope. | **2** |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Universal Human Values (KVE-301)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand and apply the essential complementarily between 'VALUES" and 'SKILLS' with its relation of engineering concept. | 1,2,3 |
| 2 | Remember, understand, apply and analyze the sustained happiness and prosperity which are the core aspirations of all human beings keeping social environmental, economic, political scenario. | 1,2,3,4 |
| 3 | Remember, understand, and apply the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. | 1,2,3 |
| 4 | Remember, understand, apply and analyze the value-based living in a natural way using technological advancement. | 1,2,3,4 |
| 5 | Remember, understand, apply and analyze the plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with nature by using engineering, management principle. | 1,2,3,4 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Electromagnetic Field Theory (KEE-301)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remembering different coordinate systems' transformation, properties of static electric and magnetic field, different types of materials based on electric and magnetic properties, Maxwell's equations in differential and integral form. | 1 |
| 2 | Understanding the concept of static electric field, concept of current and properties of conductors, concept of static magnetic field, magnetic scalar and vector potential, forces due to magnetic field, magnetization, magnetic boundary conditions and inductors, displacement current. | 2 |
| 3 | Applying Divergence theorem, Stoke's theorem, Coulamb's law, Poissions' and Laplace's equations, Gauss law, Biot-savert's law, Ampere's circuit law, boundary conditions, Poyniting theorem | 3 |
| 4 | Analyzing static electric and magnetic field, time varying fields, wave propagation in different types of media and transmission lines. | 4 |
| 5 | Evaluating electric field, magnetic field, electric and magnetic flux, capacitance, inductance, parameters of electromagnetic wave transmission, transmission line parameters | 5 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Electrical Measurements & Instrumentation (KEE-302)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember & understand the basic concept electrical measurement and various types of instruments used in measurement process: | 1 |
| 2 | Understand & apply the knowledge of measurement in the measurement of resistance, inductance and capacitance | 1, 3 |
| 3 | Apply & understand the concept of various types of instrument transformers | 1, 3 |
| 4 | Remember & understand various types of instruments used in electronic measurement. | 2, 4 |
| 5 | Understand & analyze various types of transducers and their applications in the field of measurement and instrumentation. | 5, 6 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Basic Signals & Systems (KEE-303)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand different standard signals and their mathematical expression which are useful to formulate and design a system to meet realistic constraint for the study of the systems response. Study the mechanical systems modeling that communicate effectively complex engineering problems and the analogy of mechanical system with electrical system. | 1,2,3,4 |
| 2 | Understand and analyze the responses of LTI system to Fourier series and Fourier transform and its impact on global and economic context and understand methodologies to evaluate their effect on the systems. | 1,2,3,4 |
| 3 | Understand analyze the properties of continuous time signals and system using Laplace transforms by keeping different engineering issues in mind. | 1,2,3,4,5 |
| 4 | Understand and apply concepts related to fundamental concepts and techniques used in state variables concept for modern control system engineering problem and its impact on different application. | 2,3,4 |
| 5 | Understanding to identify basic requirements of Z-transforms and its application effectively used in complex engineering problems. | 2,3,4 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Analog Electronics Lab (KEE-351)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and analyze the characteristics and applications of the Semiconductor devices. | 2,3 |
| 2 | Understand and evaluate the parameters of Operational Amplifier and instrumentation Amplifier with their applications. | 2,5 |
| 3 | Understand and analyze the characteristics of BJT, FET and MOSFET. | 2,3 |
| 4 | Understand and evaluate the V-I characteristics of Power devices like SCR, TRIAC. | 2,5 |
| | | |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Electrical Measurements and Instrumentation Lab (KEE-352)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the importance of calibration of measuring instruments. | 2 |
| 2 | Demonstrate the construction and working of different measuring instruments. | 3 |
| 3 | Demonstrate the construction and working of different AC and DC bridges, along with their applications. | 3 |
| 4 | Ability to measure electrical engineering parameters like voltage, current, power & phase difference in industry as well as in power generation, transmission and distribution sectors. | 2 |
| 5 | Capability to analyze and solving the variety of problems in the field of electrical measurements. | 2 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Electrical Workshop (KEE-353)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand various types of electrical connections. | 1, 2 |
| 2 | Understand and develop small circuits on PCB. | 2, 6 |
| 3 | Understand and analyze the difference between various electrical wires, cables and accessories. | 2, 4 |
| 4 | Understand the layout of electrical substation & various safety measures. | 1, 2 |
| 5 | Remember and understand various types of electrical connections. | 1, 2 |

**Session: 2020-21** **Semester: 3rd**

**Subject Name (Code): Mini Project or Internship Assessment (KEE-354)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and apply the knowledge of the industry in which the internship is done. | 2,3 |
| 2 | Remember and apply the knowledge and skills learned in the classroom in a work setting. | 1,3 |
| 3 | Understand and analyze the activities and functions of business professionals. | 2,4 |
| 4 | Understand and evaluate the areas for future knowledge and skill development. | 2,5 |
| 5 | Analyze and develop a greater understanding about career options while more clearly defining personal career goals. | 2,4 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Mathematics-IV (KAS-402)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Identify the application of partial differential equations and apply for solving Linear and non-linear partial differential equations | 2,3,4 |
| 2 | Understand the classification of second order partial differential equations and by using the method of separation of variables to evaluate the general solution of Heat, Wave, Laplace equations and Transmission lines. | 1,2,3 |
| 3 | Remember the concept of moments, skewness, kurtosis and moment generating function and analyze the linear and non-linear regression. | 2,3,4 |
| 4 | Remember the concept of probability, random variable and apply for solving the problem related to discrete and continuous probability distribution | 2,3,4 |
| 5 | Understand the statistical method of data samples, hypothesis testing and applying the study of control chart and their properties. | 1,2,3 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Technical Communication (KAS-301)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the basics, process, level and flow of communication without barrier and enhance interpersonal skills of students. | 2 |
| 2 | Learn and use principles of business communication and practice them in proper formats using appropriate structure in order to develop professional attitude among students. | 5,6 |
| 3 | Explore and imbibe various nuances and ethics of delivery in presentation along with audio-visual aids and also learn to effectively work as an individual as well as in team. | 3 |
| 4 | Appear in group discussion, interviews and various other activities at workplace effectively with grammatical and socio-linguistic competence and appropriate verbal and non-verbal cues. | 2,5 |
| 5 | Understand and imbibe voice-dynamics appropriately | 4 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Digital Electronics (KEE-401)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand & apply concepts of Digital Binary System and implementation of Gates. | 2,3 |
| 2 | Analyze and design of Combinational logic circuits. | 4 |
| 3 | Analyze and design of Sequential logic circuits with their applications. | 4 |
| 4 | Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits. | 3 |
| 5 | Apply the concept of Digital Logic Families with circuit implementation. | 3 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Electrical Machines-I (KEE-402)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand and analyze the working of EMEC devices, Singly and doubly excited systems. | 1,2,3 |
| 2 | Remember, understand and analyze the response of the dc machine on the basis of Armature Reaction and commutation. | 1,2,3 |
| 3 | Remember and understand the concept of starters and speed control of dc motors and evaluate the performance of dc machine by performing Swinburne' and Hopkinson's test. | 1,2 |
| 4 | Remember, understand and evaluate the performance of single-phase transformer by performing open circuit test, short circuit test and Sumpner's test. | 1,2,5 |
| 5 | Understand and apply the suitable connection of 3 phase transformers in 3 phase systems and analyze the effect of harmonics in transformers. | 2,3 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Network Analysis & Synthesis (KEE-403)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and apply the concept of graph theory, loop and nodal method in electrical engineering problems. | 1, 2, 3 |
| 2 | Understand and apply various network theorems and evaluate complex electrical circuit problems. | 1, 2, 3 |
| 3 | Understand and evaluate the network response to different inputs (AC and DC) using various techniques to meet desired needs in real field applications. | 2, 5 |
| 4 | Understand and analyze the two port networks which connect the concept to real engineering practices | 2, 4 |
| 5 | Understand and remember the basic idea of network synthesis and designing the filters and their impact on various applications. | 1, 2 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Circuit Simulation Lab (KEE-451)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand and analyze circuit responses. | 1,2,3,4 |
| 2 | Understand and analyze signal generation in different systems. | 1,2,3,4 |
| 3 | Understand analyze network by various techniques. | 1,2,3,4,5 |
| 4 | Understand and apply concepts related to fundamental concepts and techniques of circuit responses. | 2,3,4 |
| 5 | Understanding and analyze bridge rectifiers | 2,3,4 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Electrical Machine-I Lab (KEE-452)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the experiment to plot magnetization curve of dc generator. | 1,2 |
| 2 | Understand to perform the speed control of dc motor above and below the rated speed. | 1,4 |
| 3 | Perform load test of dc motor and to evaluate the efficiency of dc motor. | 2,5 |
| 4 | Analyze load test of transformer and also to evaluate the efficiency of dc transformer. | 2,5 |
| 5 | Evaluate the performance of transformer under short circuit test, open circuit test and Sumpner's Test. | 5 |
| 6 | Understand Scott's Connections of transformer. | 1,2 |

**Session: 2020-21** **Semester: 4th**

**Subject Name (Code): Digital Electronics Lab (KEE-453)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand Digital Binary System and implementation of Gates. | 1,2 |
| 2 | Design the Sequential circuits with the help of combinational circuits and feedback element. | 3,4 |
| 3 | Design data selector circuits with the help of universal Gates. | 3,4 |
| 4 | Design the counters with the help of sequential circuit and basic Gates. | 3,4 |
| 5 | Implement the projects using the digital ICs and electronics components. | 3,5 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Power System-I (KEE-501)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Describe the working principle and basic components of conventional power plants as well as the other aspects of power generation. | **2** |
| 2 | Recognize elements of power system and their functions, as well as compare the different types of supply systems. Illustrate different types of conductors, transmission lines and various performance parameters of transmission line for short, medium and long transmission line. | **4** |
| 3 | Calculate sag and tension in overhead lines with and without wind and ice loading. Classify different type of insulators, determine potential distribution over a string of insulator, string efficiency and its improvement. | **4** |
| 4 | Compute the inductance and capacitance of single phase, three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and understand the effect of earth on capacitance of transmission lines. | **4** |
| 5 | Elucidate different types of cables and assess the Resistance and capacitance parameters of cables, grading of cables and compare overhead lines and cables. | **4** |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Control System (KEE-502)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand and apply knowledge of mathematics to find closed loop transfer functions of control system by Block Diagram Reduction Algebra and Signal flow graph | 1,2,3 |
| 2 | Remember, understand, apply and analyze the time response of first and second order systems, steady state errors and dynamic error constants with and without use of controllers | 1,2,3,4 |
| 3 | Remember, understand, apply and evaluate the use of techniques to find stability in by Routh-Hurwitz & Root Locus method with analyses of pole zero cancellation | 1,2,3 |
| 4 | Remember, understand, apply, analyze and evaluate the use modern technique to find stability in frequency domain by Polar plot, Nyquist plot and Bode's plot | 1,2,3,4 |
| 5 | Remember, understand, apply, analyze the design of compensators and use of state space method for control system to meet the desired needs within realistic constraints such as economic, manufacturability and sustainability | 1,2,3,6 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Electrical Machines-II (KEE-503)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand the fundamental concepts of construction, working principle and operation on infinite bus bar of synchronous machine, also learn techniques of determining the voltage regulation of synchronous generator. | 1,2 |
| 2 | Understand, formulate and solve problems related to modeling of salient pole machine using two reaction theory, power flow equations, and dynamics of operation and also learn starting of synchronous motor, plotting of V curves. | 2,3,4 |
| 3 | Understand and analyze the concept of rotating magnetic field and hence principle of operation, phasor diagram, equivalent circuit, torque – slip characteristic of three phase induction motor, also learns to evaluate the testing of three phase induction motor and industrial applications of induction motor. | 3,4,5 |
| 4 | Understand and apply methods of starting and speed control of three phase induction motor. And will also learn the effects of Harmonics-Cogging & Crawling. | 3,4 |
| 5 | Learn and analyze the principle of operation of single – phase induction motor using double revolving field theory, equivalent circuit, testing of machine, methods of starting, different types of single phase induction motors such as reluctance, repulsion, single phase AC series, universal, stepper motor etc. | 2,3 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Robotics (KEE-051)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Learn the basic terminology used in robotics. | 2 |
| 2 | Conceptualize 3-D translation & orientation of robot arm kinematics. | 2 |
| 3 | Understand different robotic actuators and power transmission systems. | 2 |
| 4 | Classify the types of robotic grippers used in automation industries | 2 |
| 5 | Realization of robotic sensorics system and their interfacing with robot controller. | 4 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Sensors & Transducers (KEE-052)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | On completion of the course students will be able to apply the working of commonly used sensors in industry for measurement of displacement force and pressure. | **3** |
| 2 | On completion of the course students will be able to apply the working of commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. | **3** |
| 3 | On completion of the course students will be able to understand the application of machine vision. | **2** |
| 4 | On completion of the course students will be able to understand signal conditioning and data acquisition methods. | **2** |
| 5 | On completion of the course students will be able to analyze smart sensors and their applications in automation systems. | **4** |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Neural Network & Fuzzy System (KEE-056)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Apply the concepts of feed forward neural networks and their learning techniques. | 3 |
| 2 | Comprehend the architecture, develop algorithms and apply the concepts of back propagation networks. | 6 |
| 3 | Differentiate between the fuzzy and the crisp sets, apply the concepts of fuzziness and the fuzzy set theory. | 2,3 |
| 4 | Select the membership functions, write rules and develop the fuzzy controller for Industrial applications. | 2,5 |
| 5 | Demonstrate the working of fuzzy neural networks and identify its applications. | 2,4 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Analog & Digital Communication (KEE-058)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the Amplitude Modulation in communication system. | 2 |
| 2 | Comprehend the Frequency & Phase modulation. | 2 |
| 3 | Realize the Pulse Modulation Techniques. | 2 |
| 4 | Get the Digital Modulation Techniques and their use in communication system. | 2 |
| 5 | Apply the concept of Information Theory in Communication Engineering. | 3 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Constitution of India (KNC-501)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Identify and explore the basic features and modalities about Indian constitution. | 1,2 |
| 2 | Differentiate and relate the functioning of Indian parliamentary system at the center and state level. | 2, 3 |
| 3 | Demonstrate different aspects of Indian Legal System and its related bodies. | 2,3 |
| 4 | Discover and apply different laws and regulations related to engineering practices. | 1,2,3 |
| 5 | Interpret and evaluate the role of engineers with different organizations and governance models | 2,5 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Power System Lab-I (KEE-551)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the basics of power systems and role of experiments. | 2 |
| 2 | Create the software-based simulation of transmission lines and evaluate the parameters. | 5,6 |
| 3 | Apply the concepts of power system analysis and evaluate the performance of transmission lines. | 3,5 |
| 4 | Analyze the effect of corona, Ferranti, Sag & Tension on performance of transmission lines. | 4 |
| 5 | Understand the installation and operational guidelines of overhead and underground transmission systems. | 2 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Control System Lab (KEE-552)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and analyze first order and second order systems for step input using linear simulator unit. | 2,4 |
| 2 | Understand and analyze lag, lead and lead-Lag compensators | 2,4 |
| 3 | Understand and analyze control characteristics of synchros and servo stabilizer. | 2,4 |
| 4 | Understand, analyze and evaluate the system for its time & frequency domain specifications. | 2,4,5 |
| 5 | Understand and analyze the characteristics and control of dc motor, potentiometer and magnetic amplifiers. | 2,4 |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Electrical Machines-II Lab (KEE-553)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the working of induction motor and effect of loading on the performance characteristics. Parameters and visualize its effect on the performance of induction motor. | 1,2 |
| 2 | Understand the speed control the motor by cascade connection and hence to evaluate its slip. | 2,5 |
| 3 | Evaluate the voltage regulation by EMF and MMF methods. | 5 |
| 4 | Analyze the effects of excitation on the performance of synchronous motor. | 2,5 |
| | | |

**Session: 2020-21** **Semester: 5th**

**Subject Name (Code): Mini Project or Internship Assessment (KEN-554)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and analyze research papers for exploring new fields, in the absence of a textbook, to summarize and review them. | 4 |
| 2 | Evaluate and apply promising new directions of various cutting-edge technologies. | 5 |
| 3 | Remember and create various skills by preparing detailed report describing the project and results. | 1 |
| 4 | Effectively communicate by making an oral presentation before an evaluation committee. | 5 |
| 5 | Create various skills by preparing detailed report describing the project and results. | 6 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Power System-II (KEE-601)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Identify power system components on one line diagram of power system and its representation including the behavior of the constituent components and sub systems and Analyze a network under both balanced and unbalanced fault conditions and design the rating of circuit breakers. | 1, 2, 3, 4 |
| 2 | Perform load flow analysis of an electrical power network and interpret the results of the analysis. | 1, 2, 3, 4 |
| 3 | Describe the concept of travelling waves in transmission lines and use the travelling wave theory to determine the over voltage caused by surge propagation in transmission networks. | 1, 2, 3, 4 |
| 4 | Assess the steady state and transient stability of the power system under various conditions. | 1, 2, 3, 4 |
| 5 | Describe Operating Principle of a relay and classify them according to applications. Explain working principle of Circuit breaker and phenomenon of arc production and quenching. | 1, 2 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Microprocessor & Microcontroller (KEE-602)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Student will be able to demonstrate the basic architecture of 8085 & 8086 microprocessors. | 1,2 |
| 2 | Student will be able to illustrate the programming model of microprocessors & write program using 8085 microprocessors | 1,2 |
| 3 | Student will be able to interface different external peripheral devices with 8085 microprocessors | 2,3 |
| 4 | Student will be able to comprehend the architecture of 8051 microcontroller | 2,4 |
| 5 | Student will be able to compare advance level microprocessor & microcontroller for different applications | 2,4 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Power Electronics (KEE-603)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Demonstrate the characteristics as well as the operation of BJT, MOSFET, IGBT, SCR, TRIAC and GTO and identify their use in the power switching applications. | 1.2 |
| 2 | Comprehend the non-isolated DC-DC converters and apply their use in different Power electronics applications. | 2 |
| 3 | Analyze the phase controlled rectifiers and evaluate their performance parameters. | 2,3 |
| 4 | Apprehend the working of single-phase ac voltage controllers, cyclo-converters and their various applications | 5 |
| 5 | Explain the single-phase and three phase bridge inverters differentiate between CSI and VSI and apply PWM for harmonic reduction. | 2.4 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Special Electrical Machines (KEE-061)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand the concepts of the construction, performance and control of poly phase AC machines | 1,2 |
| 2 | Understand and analyze the operation, performance and characteristics of SEIG, DEIG and two phase AC servomotors. | 2,4 |
| 3 | Understand the construction, working, performance of different types of motors used in industrial application like stepper motor, switched reluctance motor etc. | 2 |
| 4 | Understand and apply the concept of permanent magnet machine and single-phase synchronous motor. | 2,3 |
| 5 | Understand the working of single-phase commutator motor and evaluate the characteristics of repulsion motor and linear induction motor. | 2,5 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Embedded Systems (KEN-062)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Students will be able to Understand the concepts of elements of embedded system. | **2** |
| 2 | Students will be able to Apply the concepts of real time operating system, timing & clocks in embedded system and real time operating system issues. | **3** |
| 3 | Students will be able to Analyze the various aspects of signals and embedded computational system. | **4** |
| 4 | Students will be able to Understand the concepts of embedded control & control hierarchy and communication strategies of embedded system. | **2** |
| 5 | Students will be able to Describe the trends and development in embedded system. | **1** |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Object Oriented Programming (KOE-064)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the application development and analyze the insights of object-oriented programming to implement application. | 1,2,4 |
| 2 | Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural). | 2,3,4 |
| 3 | Learn the structured analysis / structured design and analyze the oops programming style. | 2,4 |
| 4 | Apply and evaluate the concepts of C++ for the implementation of object-oriented concepts. | 3,5 |
| 5 | Design and evaluate the programming concepts to implement object-oriented modeling in C++. | 5,6 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Understanding the Human Being Comprehensively (KOE-069)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | On completion of the course students will be able to remember, understand aspiration, goal and purpose of life and also able to analyze the problems and find the solutions | 1,2 |
| 2 | On completion of the course students will be able to remember, understand, apply and analyze about harmony of nature and existence | 1,2,3 |
| 3 | On completion of the course students will be able to remember, understand, apply and evaluate activities of self. | 1,2,3,4 |
| 4 | On completion of the course students will be able to remember, understand, apply, analyze and evaluate coexistence in all four orders. | 1,2,3,4 |
| 5 | On completion of the course students will be able to remember, understand, apply and analyze human traditions from self to entire existence. | 1,2,3,4 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Indian Traditions, Cultural and Society (KNC-602)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | To identify the roots and details of some of the contemporary issues faced by our nation and try to locate possible solutions to these challenges by digging deep into our past. | 1,2 |
| 2 | To understand the importance of our surroundings and encourage the students to contribute towards sustainable development. | 2,3 |
| 3 | To make aware of holistic life styles of Yogic-science and wisdom capsules in Sanskrit literature that are important in modern society with rapid technological advancements and societal disruptions. | 3,4 |
| 4 | To sensitize towards issues related to 'Indian' culture, tradition and its composite character. | 3,4 |
| 5 | To acquaint with Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system. | 5,6 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Power System-II Lab (KEE-651)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Test various relays for different characteristics and compare with the performance characteristics provided by manufacturers. | 1, 2, 3, 4 |
| 2 | Select the power system data for load-flow and fault studies and to develop a program to solve power flow problem using NR and GS methods | 1, 2, 3, 4, 5, 6 |
| 3 | Analyze various types of short circuit faults. | 1, 2, 3, 4 |
| 4 | Demonstrate different numerical integration methods and factors influencing transient stability. | 1, 2, 3, 4 |
| 5 | Determine the effect of load in long transmission line. | 1, 2, 3, 4 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Microprocessor & Microcontroller Lab (KEE-652)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and remember the basic concepts of 8085 microprocessor, its internal architecture and pin configuration. | 1,2 |
| 2 | Understand and remember the basic concepts of 8086 microprocessor, its internal architecture and pin configuration. | 1,2 |
| 3 | Understand and apply the basic concepts to develop a program using assembly language for 8085 microprocessors to perform the basic mathematical and logical operations. | 2,3 |
| 4 | Understand and analyze the interfacing of 8085 kit with external devices and control their operations. | 2,4 |
| 5 | Understand and analyze the interfacing microprocessor with UART/USART. | 2,4 |
| 6 | Understand and analyze the interfacing of microprocessor with programmable peripheral interface. | 2,4 |

**Session: 2020-21** **Semester: 6th**

**Subject Name (Code): Power Electronics Lab (KEE-653)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand the V-I characteristics and basic operation of SCR. | 1,2 |
| 2 | Analyze a single-phase half wave, fully controlled and half controlled rectifier circuit with different load conditions (i) resistive load (ii) inductive load. | 4 |
| 3 | Apply the basic principle of AC-AC converter with resistive and inductive loads. | 3 |
| 4 | Evaluate the performance of AC-AC converter with various loads and operations. | 5 |
| 5 | Create the DC-DC converter circuits for different applications. | 6 |
| 6 | Analyze DC-AC inverter circuit. | 4 |
| 7 | Understand and apply the MATLAB in power electronics devices and circuits. | 2,3 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Introduction to Smart Grid (ROE-072)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and remember the basic concepts, definitions, functions and opportunities of Smart Grid. | 1,2 |
| 2 | Understand and analyze Smart Meters, AMR, Hybrid Vehicles, V2G and Automation. | 2,4 |
| 3 | Understand and evaluate the concept of various Smart Grid Technologies. | 2,5 |
| 4 | Understand and evaluate the concept of Microgrid and Distributed Energy Resources. | 2,5 |
| 5 | Understand and evaluate Power Quality issues and Management in Smart Grid. | 2,5 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Understanding the Human Being Comprehensively Human Aspiration Audits Fulfilment (ROE-074)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand aspiration, goal and purpose of life and also able to analyze the problems and find the solutions. | 1,2 |
| 2 | Remember, understand, apply and analyze about harmony of nature and existence. | 1,2,3,4 |
| 3 | Remember, understand, apply and evaluate activities of self. | 1,2,3,5 |
| 4 | Remember, understand, apply, analyze and evaluate coexistence in all four orders | 1,2,3,4 |
| 5 | Remember, understand, apply and analyze human traditions from self to entire existence. | 1,2,3,4 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Utilization of Electrical Energy & Electric Traction (REE-071)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand different types of electric heating. | 1,2 |
| 2 | Understand and analyze concept of electric welding and electrolyte process. | 2,4 |
| 3 | Understand the design of interior and exterior lighting systems- illumination levels for various purposes light fittings- factory lighting- flood lighting-street lighting. | 2,5,6 |
| 4 | Understand and apply concepts related to the fundamental concepts of electric traction. | 2,3 |
| 5 | Understanding to apply the knowledge of power electronics converters in Electric Traction. | 3,5 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Energy Efficiency & Conservation (REE-076)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and apply the energy conservation techniques in the surrounding and industries and familiarization with energy conservation legislation. | **2,3** |
| 2 | Understand and analyze the aim and strategy of energy audit, can use the instruments for it and explain HVAC systems. | **2,4** |
| 3 | Understand and analyze of strategy and application of Demand Side Management (DSM). | **2,4** |
| 4 | Understand and apply the concept of calculation and control of various parameters of voltage and reactive power. | **2,3** |
| 5 | Analyze and about load scheduling, testing and controlling of energy efficient motors and also different parameter control of lighting system. | **4** |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Communication Systems (REN-701)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Describe Amplitude modulation & demodulation schemes, AM transmitters and receivers. | 2 |
| 2 | Define Frequency modulation and phase modulation, Generation & detection of FM and Noise. | 1 |
| 3 | Illustrate Pulse Communication and Digital Modulation techniques. | 3 |
| 4 | Analyze Radio Propagation and Satellite Communication. | 4 |
| 5 | Design TV systems, Fiber Optical Communication systems. | 5,6 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Power System Protection (REE-702)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the power system protection, protection devices and its basic terminology. | 1,2 |
| 2 | Explain and compare about electromagnetic, attracted and induction type relays, thermal relays, thermal relay, gas actuated relay, and deign considerations of electromagnetic relay. | 2,3,4 |
| 3 | Develop an ability and skill to establish the feasible protection systems needed for each main part of a power system and recognize the knowledge of amplitude and phase comparators, over current relays, distance relays, differential relays. | 1,6 |
| 4 | Analyze the use of over current protection, distance protection, pilot wire protection schemes in power system protection and acquire the knowledge of properties of arc, arc extinction theories, re-striking voltage transient, current chopping, resistance switching. | 3,2 |
| 5 | Describe the construction features and operations of bulk oil, minimum oil, air blast SF6, Vaccum and D.C circuit breakers in power system protection. | 1,2 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Industrial Automation & PLC Lab (REE-751)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand automation, its importance, expectations from automation and applications in industry. Understand working of PLC, I/O modules of PLC, Programming languages and instructions of PLC. | 1,2 |
| 2 | Understand and analyze the concept of design of PLC based application by proper selection and sizing criteria, developing GUI and ladder program. Understand and analyze Ladder diagram concept to test digital logic gates, Boolean expression, Demorgan's theorem. | 2,3 |
| 3 | Understand the Ladder program for DOL starter, timers, and counters | 2,4 |
| 4 | Understand evolution and architecture of DCS, hierarchical control in DCS, programming DCS. | 2,5 |
| 5 | Explain the concept of basic igital electronics and data manipulation, basic PLC circuits for entry-level PLC applications. | 2,3 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Power System Lab (REE-752)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Test various relays for different characteristics and compare with the performance characteristics provided by manufacturers. | 3 |
| 2 | Select the power system data for load-flow and fault studies and to develop a program to solve power flow problem using NR and GS methods | 6 |
| 3 | Analyze various types of short circuit faults | 4 |
| 4 | Demonstrate different numerical integration methods and factors influencing transient stability | 3 |
| 5 | Determine the effect of load in long transmission line. | 4 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Industrial Training (REN-753)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand and analyze comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with real corporate exposure. | 2, 4 |
| 2 | Understand and apply skills to enhance students' knowledge in one particular technology. | 2, 3 |
| 3 | Understand and apply practical skills to Increase self-confidence of students and helps in finding their own proficiency | 2, 3 |
| 4 | Understand and evaluate leadership ability and responsibility to perform or execute the given task. | 2, 5 |
| 5 | Understand and evaluate the industrial exposure to provide learners hands on practice within a real job situation. | 2, 5 |

**Session: 2020-21** **Semester: 7th**

**Subject Name (Code): Project-1 (REN-754)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Demonstrate a sound technical knowledge of their selected project topic. | 3,4 |
| 2 | Identification of problem, interpretation and solution. | 1,2 |
| 3 | Formulate engineering solutions to complex problems utilizing a systems approach. | 5,6 |
| 4 | Design and develop an engineering project and communicate with engineers and the community at large in written an oral form. | 5.6 |
| 5 | Demonstrate the knowledge, skills and attitudes of a professional engineer. | 3,4 |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): Renewable Energy Resources (ROE-086)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Understand the various forms of conventional energy resources and field applications of solar energy | 2 |
| 2 | Identify Winds energy as alternate form of energy and to know how it can be tapped | 1,2 |
| 3 | Compare and Understand the Geothermal, MHD &Tidal energy, its mechanism of production and its applications | 1,2,4 |
| 4 | Outline division aspects and utilization of renewable energy sources for both domestics and industrial application | 1,3 |
| 5 | Analyze the environmental aspects of renewable energy resources especially OTEC and Bio mass | 4 |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): Introduction to Power Quality & FACTS (REE-081)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Students will be able understand about the basics of Power Quality, interruption, Sag, Swell; Voltage Imbalance; Notching D C offset and waveform distortion. | **2** |
| 2 | Students will be able to analyze about Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection, Voltage Regulator, Static UPS and Rotary UPS | **4** |
| 3 | Students will be able to understand and analyze about Sources of Transient Over voltages- Atmospheric and switching transients- motor starting transients, pf correction capacitor switching transients, ups switching transients | **2,3** |
| 4 | Students will be able to know and understand about Terms & Definition, Fact Controllers, Type of FACT devices | **2** |
| 5 | Students will be able to know about auses of harmonics; current and voltage harmonics: measurement of harmonics; effects of harmonics on Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices | **1** |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): Optical Fiber Communication (REN-080)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand the optical fiber communication system & principle of optical fiber wave guide. | 1,2 |
| 2 | Understand the Transmission Characteristics, Attenuation & losses in optical fiber communication system. | 2 |
| 3 | Understand and evaluate the Basic concepts Einstein relations and population inversion optical feedback, direct - indirect band gap, Hetero junction & DH structure & Drawback and advantages of LED, DH, LED, LED structures and its characteristics. | 2,5 |
| 4 | Understand the requirement for photo detections p-n photodiode, characteristics of photo detectors, p-i-n, avalanche photodiodes, phototransistors, photoconductors & direct detection receiver performance. | 2 |
| 5 | Understand the principal Components of an optical fiber communication system, automatic gain control and equalization & OTDR and other Optical Power meters. | 2 |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): Power Theft & Energy Management (REE-086)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember, understand and apply the concepts of Energy Demand and Supply, Energy Crisis and power theft (National and Global Scenario) | 1,2,3 |
| 2 | Remember, understand and apply the knowledge to identify the basic techniques for tempering and Power Theft in Electro- mechanical and Electronic Energy Meters | 1,2,3 |
| 3 | Remember, understand and apply the knowledge to assess the different methods of Energy Conservation, Energy Audit and Site Surveys | 1,2,3 |
| 4 | Remember, understand and apply knowledge to discuss and Estimate Electrical Load, Lighting Management and Demand Side Management | 1,2,3 |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): GD & Seminar (REN-851)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Remember and understand the themes, implications of topic, ethical and social understandings on society. | 1,2 |
| 2 | Understand and analyze and explore creative avenues of expression, solve problems, and make consequential decisions. | 2,3 |
| 3 | Understand the objective of GD and seminar is to improve the mass communication. | 2,4 |
| 4 | Understand and apply an opportunity to exercise their rights to express them. | 2,5 |
| 5 | Explore one's life purpose and meaning through transformation experiences that foster an understanding of self and global perspectives. | 2, 4 |

**Session: 2020-21** **Semester: 8th**

**Subject Name (Code): Project-2 (REN-852)**

| S No. | Course Outcomes | BL |
|---|---|---|
| **Student will be able to:** | | |
| 1 | Demonstrate a sound technical knowledge of their selected project topic. | 3,4 |
| 2 | Identification of problem, interpretation and solution. | 1,2 |
| 3 | Formulate engineering solutions to complex problems utilizing a systems approach. | 5,6 |
| 4 | Design and develop an engineering project and Communicate with engineers and the community at large in written an oral forms. | 5.6 |
| 5 | Demonstrate the knowledge, skills and attitudes of a professional engineer. | 3,4 |