Hindustan College of Science and Technology

**COURSE OUTCOMES
(SESSION 2021-22)**

SEMESTER-III

Sl. No.	Subject Codes	Subject	Periods			EvaluationScheme			EndSemester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS302	Engg.Science Course/MathsIV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE301	TechnicalCommunication/UniversalHumanvalues	2	1	0	30	20	50		100		150	3
			3	0	0								
3	KEE301	ElectromagneticField Theory	3	1	0	30	20	50		100		150	4
4	KEE302	ElectricalMeasurements&Instrumentation	3	1	0	30	20	50		100		150	4
5	KEE303	BasicSignals&Systems	3	0	0	30	20	50		100		150	3
6	KEE351	AnalogElectronicsLab	0	0	2				25		25	50	1
7	KEE352	Electrical MeasurementsandInstrumentationLab	0	0	2				25		25	50	1
8	KEE353	ElectricalWorkshop	0	0	2				25		25	50	1
9	KEE354	MiniProjector Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	ComputerSystem Security/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs(Essentialfor Hons.Degree)											
		Total										**950**	**22**

TheMiniProjectorinternship(3-4 weeks)conductedduringsummerbreakafterIIsemesterandwillbeassessedduringIIIsemester.

SEMESTERIV

Sl. No.	Subject Codes	Subject	Periods			EvaluationScheme			EndSemester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS402/KOE041-48	Maths IV/ Engg. ScienceCourse	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS401	UniversalHuman Values/Technical Communication	3	0	0	30	20	50		100		150	3
			2	1	0								
3	KEE401	DigitalElectronics	3	0	0	30	20	50		100		150	3
4	KEE402	ElectricalMachines-I	3	1	0	30	20	50		100		150	4
5	KEE403	NetworksAnalysis& Synthesis	3	1	0	30	20	50		100		150	4
6	KEE451	CircuitSimulation Lab	0	0	2				25		25	50	1
7	KEE452	ElectricalMachines-ILab	0	0	2				25		25	50	1
8	KEE453	DigitalElectronicsLab	0	0	2				25		25	50	1
9	KNC402/ KNC401	PythonProgramming/ComputerSystemSecurity	2	0	0	15	10	25		50			0
10		MOOCs(Essentialfor Hons. Degree)											
		Total										**900**	**21**

		SEMESTER V											
Sl. No.	Subject Codes	Subject	Periods			EvaluationScheme				End Semester		Total	Cre dit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KEE501	PowerSystem -I	3	1	0	30	20	50		100		150	4
2	KEE502	ControlSystem	3	1	0	30	20	50		100		150	4
3	KEE503	ElectricalMachines-II	3	1	0	30	20	50		100		150	4
4	KE*051-KE*054	DepartmentalElective-I	3	0	0	30	20	50		100		150	3
5	KEE055-KEE058	DepartmentalElective-II	3	0	0	30	20	50		100		150	3
6	KEE551	PowerSystem-ILab	0	0	2				25		25	50	1
7	KEE552	ControlSystemLab	0	0	2				25		25	50	1
8	KEE553	Electrical Machines - IILab	0	0	2				25		25	50	1
9	KEN554	Mini Project or InternshipAssessment*	0	0	2				50			50	1
10	KNC501/ KNC502	Constitution of India,Law and Engineering /IndianTradition,Culture andSociety	2	0	0	15	10	25		50			
11		MOOCs(EssentialforHons.Degree)											
		Total	17	3	8							950	22

TheMiniProjectorinternship(4 weeks)conductedduringsummerbreakafter IVsemesterand willbeassessedduringVsemester.

DEPARTMENTELECTIVE- I
KEE051   Robotics
KEE052Sensorsand Transducers
KEE053Industrial Automation and ControlKEN051Bio-MedicalInstrumentation

DEPARTMENTELECTIVE- II
KEE055   Optimization TechniquesKEE056Neural Networks & Fuzzy SystemKEE057   Digital Signal ProcessingKEE058Analog&DigitalComm unication

SEMESTER VI

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KEE601	Power System-II	3	1	0	30	20	50		100		150	4
2	KEE602	Microprocessorand Microcontroller	3	1	0	30	20	50		100		150	4
3	KEE603	PowerElectronics	3	1	0	30	20	50		100		150	4
4	KE*06*	DepartmentalElective-III	3	0	0	30	20	50		100		150	3
5	KOE06*	OpenElective-I	3	0	0	30	20	50		100		150	3
6	KEE651	PowerSystem-IILab	0	0	2				25		25	50	1
7	KEE652	Microprocessorand MicrocontrollerLab	0	0	2				25		25	50	1
8	KEE653	PowerElectronicsLab	0	0	2				25		25	50	1
10	KNC601/ KNC602	Constitution of India,Law and Engineering /IndianTradition,Culture andSociety	2	0	0	15	10	25		50			
11		MOOCs(Essentialfor Hons. Degree)											
		Total	**17**	**3**	**6**							**900**	**21**

DEPARTMENTELECTIVE-III

KEE061SpecialElectricalMachinesK

EN 061 Linear Integrated

CircuitsKEE 063 Digital Control

SystemKEN 062EmbeddedSystems

SEMESTER-VII

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU701 /KHU702	HSMC-1[#]/HSMC-2 [#]	3	0	0	30	20	50		100		150	3
2	KEE07X	DepartmentalElective-IV	3	0	0	30	20	50		100		150	3
3	KEE07X	DepartmentalElective-V	3	0	0	30	20	50		100		150	3
4	KOE07X	OpenElective-II	3	0	0	30	20	50		100		150	3
5	KEN751	Industrial Automation &PLCLab	0	0	2				25		25	50	1
6	KEN752	MiniProjectorInternship Assessment*	0	0	2				50			50	1
7	KEN753	ProjectI	0	0	8				150			150	4
8		MOOCs (Essential forHons.Degree)											
		TOTAL	12	0	12							850	18

*The Mini Project or internship (4 - 6 weeks) conducted during summer break after VI semester and will beassessedduring VII semester.

DepartmentElective-IV	**DepartmentElective-V**
KEN070:PowerSystemOperation&Control KEE070: Advanced Micro processors & Micro Controllers KEE071:EnergyConservationandAuditing KEE072: HVDC & AC	KEN071: Electric & Hybrid Vehicles KEE075:Electricdrives KEE077: Power System Protection

SEMESTER-VII

Sl. No.	SubjectCodes	Subject	Periods			Evaluation Scheme				EndSemester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU801/ KHU802	HSMC-2[#]/HSMC-1[#]	3	0	0	30	20	50		100		150	3
2	KOE08X	OpenElective-III	3	0	0	30	20	50		100		150	3
3	KOE08X	OpenElective-IV	3	0	0	30	20	50		100		150	3
4	KEN851	ProjectII	0	0	18				100		300	400	9
5		MOOCs (Essential forHons.Degree)											
		Total	**9**	**0**	**18**							**850**	**18**

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcome (PSOs)

1. To offer students with a good theoretical foundational understanding as well as advanced practical abilities in the electrical and electronics engineering area, so that they may design and develop innovative solutions to real-world social challenges.

2. Students will learn how to design, develop, and implement sophisticated control techniques and strategies in the fields of electrical machines, power systems, electrical measurements, communication systems, and other electrical installations using advanced electrical and electronics engineering tools.

Department: Electrical & Electronics Engineering

Course Outcomes(COs):B.Tech.2nd , 3rdand 4th year

Session:2021-22

	B.Tech:3rd Semester	
Code	**Course Name**	**Course Outcomes**
KAS301	**Technical Communication**	CO1:Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers.
		CO2:Students will utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions.
		CO3:Students would imbibe inputs by presentation skills to enhance confidence in face of diverse audience.
		CO4:Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence
		CO5:It would enable them to evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.
KAS302	**Math IV**	CO1:Remember the concept of partial differential equation and to solve partial differential equations .
		CO2:Analyze the concept of partial differential equations to evaluate the problems concerned with partial differential equations .
		CO3:Understand the concept of correlation, moments, skewness and kurtosis and curve fitting .
		CO4:Remember the concept of probability to evaluate probability distributions.
		CO5:Apply the concept of hypothesis testing and statistical quality control to create control charts.
KEE-301	**Electromagnetic Field Theory (EMFT)**	CO1: Apply different coordinate systems and their application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus.
		CO2: Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors
		CO3: Understand the concept of static magnetic field, magnetic scalar and vector potential
		CO4: Understand the forces due to magnetic field, magnetization, magnetic boundary conditions and inductors.
		CO5: Understand displacement current, time varying fields, propagation and reflection of EM waves and transmission lines.

KEE-302	Electrical Measurements & Instrumentation (EMI)	CO1: Evaluate errors in measurement as well as identify and analyze different types of instruments for the measurement of voltage, current, power and energy.
		CO2: Understand the knowledge of measurement of electrical quantities resistance, inductance and capacitance with the help of bridges
		CO3: Demonstrate the working of instrument transformers as well as evaluate the errors in current and potential transformers
		CO4: Illustrate the working of electronic instruments like voltmeter, multi-meter, frequency meter and CRO.
		CO5: Understand the knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level.
KEE-303	Basic Signals & Systems (BSS)	CO1: Represent the various types of signals & systems and can perform mathematical operations on them.
		CO2: Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis.
		CO3: Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs.
		CO4: Implement the concepts of Z transform to solve complex engineering problems using difference equations.
		CO5: Develop and analyze the concept of state-space models for SISO & MIMO system.
KNC-303	Computer System Security	CO1: To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats
		CO2: To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats.
		CO3: To discover and explain mobile software bugs posing cyber security threats, explain and
		CO4: recreate exploits, and to explain mitigation techniques.
		CO5: To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios
KEE-351	Analog Electronics Lab (AE)	CO1: Understand the characteristics and applications of the Semiconductor devices.
		CO2: Draw the characteristics of BJT, FET and MOSFET.
		CO3: Understand the parameters of Operational Amplifier and instrumentation Amplifier with their applications.
		CO4: Understand the V-I characteristics of Power devices like SCR, TRIAC.
KEE-352	Electrical Measurements & Instrumentation Lab (EMI)	CO1: Understand the importance of calibration of measuring instruments.
		CO2: Demonstrate the construction and working of different measuring instruments.
		CO3: Demonstrate the construction and working of different AC and DC bridges, along with their applications
		CO4: Ability to measure electrical engineering parameters like voltage, current, power & phase difference in industry as well as in power generation, transmission and distribution sectors.
		CO5: Capability to analyze and solving the variety of problems in the field of electrical measurements.
KEE-353	Electrical Workshop Lab (EW)	CO1: Perform various types of Electrical connections.
		CO2: Develop small circuits on PCB
		CO3: Differentiate between various electrical wires, cables and accessories.
		CO4: Demonstrate the layout of electrical substation & various safety measures.

KEE-354	**Mini Project (MP)**	CO1: Understand research papers for exploring new fields and review reporting.
		CO2: Evaluate new directions of various cutting edge technologies.
		CO3: Create various skills by preparing detailed project report including all the findings.
		CO4: Effective communication by making an oral presentation to show the findings.
		CO5: Create facts related knowledge by preparing detailed report including outcomes.

B.Tech:4th Semester

KOE047	**Analog Electronics Circuits**	CO1: Understand the characteristics of diodes and transistors.
		CO2: Design and analyze various rectifier and amplifier circuits.
		CO3: Design sinusoidal and non-sinusoidal oscillators.
		CO4: Understand the functioning of OP-AMP and design OP-AMP based circuits.
		CO5: Design LPF, HPF, BPF, BSF.
KVE401	**Universal Human Values**	CO1: Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society and meaning of natural acceptance.
		CO2: Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
		CO3: Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society in family and society.
		CO4: Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature. harmony in nature and existence.
		CO5: Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work. harmony of professional ethics.
KEE401	**Digital Electronics**	CO1: Apply concepts of Digital Binary System and implementation of Gates.
		CO2: Analyze and design of Combinational logic circuits.
		CO3: Analyze and design of Sequential logic circuits with their applications.
		CO4: Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.
		CO5: Apply the concept of Digital Logic Families with circuit implementation.
KEE402	**Electrical Machines-I**	CO1: Analyze the various principles & concepts involved in Electromechanical Energy conversion.
		CO2: Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors.
		CO3: Evaluate the performance and characteristics of DC Machine as motor and as well as generator.
		CO4: Evaluate the performance of transformers, individually and in parallel operation.
		CO5: Demonstrate and perform various connections of three phase transformers.

Code	Subject	Course Outcomes
KEE403	**Networks Analysis & Synthesis**	CO1: Apply the knowledge of basic circuital law, nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach.
		CO2: Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems.
		CO3: Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods.
		CO4: Demonstrate the concept of complex frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters.
		CO5: Synthesize one port network and analyze different filters.
KNC 402	**Python Programming**	CO1: To read and write simple Python programs.
		CO2: To develop Python programs with conditionals and loops.
		CO3: To define Python functions and to use Python data structures –- lists, tuples, dictionaries
		CO4: To do input/output with files in Python
		CO5: To do searching, sorting and merging in Python
KEE451	**Circuit Simulation Lab**	CO1: Apply the knowledge of basic circuital law, nodal and mesh analysis for given circuit.
		CO2: Analysis of the AC and DC circuits using simulation techniques.
		CO3: Analysis of transient response of AC circuits.
		CO4: Evaluation and analysis of two-port network parameters.
		CO5: Estimation of parameters of different filters.
KEE452	**Electrical Machines-I Lab**	CO1: Analyze and conduct basic tests on DC Machines and single-phase Transformer
		CO2: Obtain the performance indices using standard analytical aswell as graphical methods.
		CO3: Determine the magnetization, Load and speed-torque characteristics of DC
		CO4: Machines.
		CO5: Demonstrate procedures and analysis techniques to perform electromagnetic and electromechanical tests on electrical machines.
KEE453	**Digital Electronics Lab**	CO1: Understand Digital Binary System and apply it in implementation of Gates.
		CO2: Design the Sequential circuits with the help of Combinational circuits and feedback element.
		CO3: Design data selector circuits with the help of universal Gates.
		CO4: Design the counters with the help of sequential circuit and basic Gates.
		CO5: Demonstrate the projects using the digital ICs and electronics components.

B.Tech:5th Semester

Code	Subject	Course Outcomes
KNC-501	**Constitution of India, Law and Engineering**	CO1: Identify and explore the basic features and modalities about Indian constitution
		CO2: Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
		CO3: Demonstrate different aspects of Indian Legal System and its related bodies.
		CO4: Discover and apply different laws and regulations related to engineering practices.
		CO5: Interpret and evaluate the role of engineers with different organizations and governance models

KEE-052	Sesnsors& Transducers	CO1: Complete understanding of sensors used in industry for measurement of displacement, force and pressure.
		CO2: Understanding of sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.
		CO3: Understand image processing and analysis, training the vision system in a pick and place robot.
		CO4: Complete understanding of concepts related to signal conditioning and data acquisition methods
		CO5: Understand the usage of smart sensors and their applications in automation systems
KEE-503	Electrical Machines - II	CO1: Demonstrate the constructional details and principle of operation of three phase Induction and Synchronous Machines.
		CO2: Analyze the performance of the three phase Induction and Synchronous Machines using the phasor diagrams and equivalent circuits.
		CO3: Select appropriate three phase AC machine for any application and appraise its significance.
		CO4: Start and observe the various characteristics of three phase Induction & Synchronous Machines
		CO5: Explain the principle of operation and performance of Single-Phase Induction Motor & Universal Motor.
KEE-501	Power System I	CO1: Describe the working principle and basic components of conventional and nonconventional power plants as well as the other aspects of power generation.
		CO2: Analyze the role and functioning of different types of supply systems, conductors and performance of transmission lines.
		CO3: Calculate the sag and tension in overhead lines with wind & ice loading, potential distribution over a string of insulators, string efficiency and its improvement.
		CO4: Calculate the inductance and capacitance of single phase, three phase lines with symmetrical and unsymmetrical spacing including effect of earth on capacitance of transmission lines.
		CO5: Calculate the resistance and capacitance parameters of different types of cables including grading of cables.
KEE-502	Control System	CO1: Obtain transfer functions to predict the correct operation of open loop and closed loop control systems and identify the basic elements, structures and the characteristics of feedback control systems.
		CO2: Measure and evaluate the performance of basic control systems in time domain. Design specification for different control action.
		CO3: Analyze the stability of linear time-invariant systems in time domain using Routh Hurwitz criterion and root locus technique
		CO4: Determine the stability of linear time-invariant systems in frequency domain using Nyquist criterion and Bode plot.
		CO5: Design different type of compensators to achieve the desired performance of control System by root locus and Bode plot method. Develop and analyze the intermediate states of the system using state space analysis.
KEE-058	Analog & Digital Communication	CO1: Remember the concept of Amplitude Modulation in communication system.
		CO2: Understand the concept of Frequency & Phase modulation.
		CO3: Apply the concept of Pulse Modulation Techniques.
		CO4: Analyze the concept of Digital Modulation Techniques and their use in communication system.
		CO5: Analyze the concept of Information Theory in Communication Engineering.

KEE-551	Power System-I lab	CO1: Formulate a program/simulation model for calculation of various parameters of transmission line
		CO2: Formulate a program to determine the ABCD constant of transmission line
		CO3: Formulate a program /simulation model to determine the Ferranti effect in transmission line
		CO4: Formulate a program /simulation model to determine the sag & tension and string efficiency of insulator of transmission line
		CO5: Formulate a program /simulation model to determine the skin effect, and ground clearance of transmission line
KEE-552	Control System Lab	CO1: Determine the characteristics of control system components like ac servo motor, synchro, potentiometer, servo voltage stabilizer and use them in error detector mode.
		CO2: Compare the performance of control systems by applying different controllers / compensators.
		CO3: Analyze the behavior of dc motor in open loop and closed loop conditions at various loads & determine the response of 1st& 2nd order systems for various values of constant K.
		CO4: Apply different stability methods of time & frequency domain in control systems using software & examine their stability
		CO5: Convert the transfer functions into state space & vice versa &obtain the time domain response of a second order system for step input and their performance parameters using software.
KEE-553	Electrical Machines - II Lab	CO1: Perform various tests and demonstrate the various characteristics of three phase induction motor.
		CO2: Demonstrate the working of three phase synchronous machine under different operating conditions.
		CO3: Evaluate the performance of single-phase induction motor under different operating conditions
		CO4: Develop simulation models for Electrical Machines.
KEN-554	Mini Project	CO1: Understand research papers for exploring new fields and review reporting.
		CO2: Evaluate new directions of various cutting-edge technologies.
		CO3:Create various skills by preparing detailed project report including all the findings.
		CO4: Effective communication by making an oral presentation to show the findings.
		CO5: Create facts related knowledge by preparing detailed report including outcomes.

B.Tech:6th Semester

KEE601	Power System - II	CO1: Analyze the role of components and one line diagram in power system studies including network under both balanced and unbalanced fault condition.
		CO2: Perform load flow analysis of an electrical power network.
		CO3: Apply the concept of travelling wave theory in transmission lines operations.
		CO4: Analyze the steady state and transient state stability of the power system under various conditions.
		CO5: Understand the operating principle and applications of various types of relays and circuit breakers in power systems.
KEE602	Microprocessor and Microcontroller	CO1:Demonstrate the basic architecture of 8085 & 8086 microprocessors K2
		CO2: Illustrate the programming model of microprocessors & write program using 8085 microprocessor
		CO3:Interface different external peripheral devices with 8085 microprocessor
		CO4:Comprehend the architecture of 8051 microcontroller
		CO5: Compare advance level microprocessor & microcontroller

		for differentapplications
KEE603	**Power Electronics**	CO1: Demonstrate the characteristics as well as the operation of BJT, MOSFET, IGBT,
		CO2: SCR, TRIAC and GTO and identify their use in the power switching applications.
		CO3: Comprehend the non-isolated DC-DC converters and apply their use in different
		CO4: Power electronics applications.
		CO5: Analyze the phase controlled rectifiers and evaluate their performance parameters.
KEE061	**Special Electrical Machines**	CO1: Describe the working principle, Constructional Features of different types of electrical machines including the fractional kilowatt machines.
		CO2: Analyse torque- speed characteristics of different electrical machines and interpret
		CO3: their performance and identify the suitable machine for an operation.
		CO4: Study different types of control techniques for a machine and identify the best control strategy based upon different constraints.
		CO5: Illustrate the use of stepper, BLDCs, SRM, and other special machines in the area
KOE060	**Idea to Business Model**	CO1: Enhance creative knowledge of students regarding selection of a business idea and it'simplementation process.
		CO2: Acquire knowledge on entrepreneurship development, its Pro's and con's.
		CO3: Acquire basic knowledge on how to become an Entrepreneur.
		CO4: Develop knowledge on Production systems and it's sustainability through production, planning and control (PPC)
		CO5: Develop appropriate business model and apply in a better way.
KNC602	**Indian Tradition, culture and Society**	CO1: To identify and understand the roots and details of Society State and Polity in India.
		CO2: To understand the importance of Indian Literature, Culture, Tradition, Practices and to apply in present system
		CO3: To analyze the Indian Religion, Philosophy, Practices and in shadow of Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy and to apply in
		CO4: To analyze the Science, Management and Indian Knowledge System and to apply in present system.
		CO5: To evaluate the Indian Architect, Engineering and Architecture in Ancient India, Indian's Cultural Contribution to the World and to create environment in Arts.
KEE651	**Power System-II Lab**	CO1: Test various relays for different characteristics and compare with the performance characteristics provided by manufacturers.
		CO2: 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
		CO3: Analyze various types of short circuit faults
		CO4: Demonstrate different numerical integration methods and factors Influencing transient stability
		CO5: Determine the effect of load in long transmission line

KEE652	Microprocessor and Microcontroller Lab	CO1:Study of microprocessor system
		CO2:Development of flow chart for understanding the data flow
		CO3: Learning assembly language to program microprocessor based system
		CO4:Interfacing different peripheral devices with the microprocessor
		CO5:Building logic for microprocessor based system
KEE653	Power Electronics Lab	CO1: Demonstrate the characteristics and triggering of IGBT, MOSFET, Power
		CO2: transistor and SCR.
		CO3: Analyze the performance of single phase fully controlled bridge rectifiers under
		CO4: different loading conditions.
		CO5: Develop simulation models of power electronic circuits.

B.Tech:7th Semester

KEE-072	HVDC & AC Transmission	CO1: Describe the comparison of EHVAC and HVDC transmission while understanding various issues related to transmission.
		CO2: Calculate and study the corona loss and its impacts. Cite examples of the causes of switching overvoltage, Ferro-resonance.
		CO3: Explain the generation and measurement circuits for impulse, high DC & AC voltages. While considering the design parameters evaluate the effect on the performance of the EHV lines.
		CO4: Classify the DC links and choice of converter configuration to investigate the impact of inductance on operation of converters and identify different control schemes as well as starting and stopping methods of DC links.
		CO5: Describe the converter faults, protections including MTDC types and applications.
KEE-077	Power System Protection	CO1: Describe the relays and different protective schemes.
		CO2: Explain Relay types and its application.
		CO3: Describe types of faults and protection scheme for major components of power system.
		CO4: Describe the circuit breaker operation, testing and types.
		CO5: Explain the electronic relay, microprocessor and computer based protection schemes.
KOE-074	Renewable Energy Resources	CO1: Understand of renewable and non-renewable sources of energy
		CO2: Gain knowledge about working principle of various solar energy systems
		CO3: Understand the application of wind energy and wind energy conversion system.
		CO4: Develop capability to do basic design of bio gas plant.
		CO5: Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc.
KHU-701	Rural Development	CO1: Students can understand the definitions, concepts and components of Rural Development
		CO2: Students will know the importance, structure, significance, resources of Indian rural economy.
		CO3: Students will have a clear idea about the area development programmes and its impact.
		CO4: Students will be able to acquire knowledge about rural entrepreneurship.
		CO5: Students will be able to understand about the using of different methods for human resource planning.

KEN-751	Industrial Automation & PLC lab	CO1: Understand the basics of PLC programming.
		CO2: Understand the different parameters of PLC.
		CO3: Design different process control applications through ladder logic.
		CO4: Analyze & explain different functions of PLC.
		CO5: Build and experiment with PLC based SCADA systems for various industrial applications.
KEN-752	Mini Project or Internship Assessment	CO1: To learn the application of knowledge in real world problems..
		CO2: To get exposure to team-work and leadership quality
		CO3: To deal with industry-professionals and ethical issues in the work environment.
		CO4: Student is able to determine the challenges and future potential for his / her internship organization in particular and the sector in general.
		CO5: Student is able to apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization.
KEN-753	Project I	CO1: In a specialization domain of his / her choice, student will be able to choose an appropriate topic for study
		CO2: Student will form group and will be able to clearly formulate & state a research problem
		CO3: For a selected research topic, student will be able to compile the relevant literature and frame hypotheses for research as applicable
		CO4: For a selected research topic, student will be able to plan a research design including the sampling, observational, statistical and operational designs if any
		CO5: For a selected research topic, student will be able to compile relevant data, interpret & analyze it and test the hypotheses wherever applicable

B.Tech:8th Semester

KOE-090	Electric Vehicles	CO1: Understand the Concepts and basics of Electric Vehicles.
		CO2: Understand Different types of Electric Motor Drives for EV applications.
		CO3: Manage EV Batteries and Battery Management System.
		CO4: Design Charging system technology for EV applications.
		CO5: Plan EV Charging Facility.
KHU-802	Project Management &Entrepreneurship	CO1: Learners will pick up about Foundation of Entrepreneurship Development and its theories
		CO2: Learners will explore entrepreneurial skills and management function of a company with special reference to SME sector
		CO3: Learners will identify the type of entrepreneur and the steps involved in an entrepreneurial venture.
		CO4: Learners will understand various steps involved in starting a venture and to explore marketing methods & new trends in entrepreneurship.
		CO5: Learners will pick up about Foundation of Entrepreneurship Development and its theories
KOE-085	Quality Management	CO1: Realize the importance of significance of quality.
		CO2: Manage quality improvement teams.
		CO3: Identify requirements of quality improvement programs.
		CO4: Identify improvement areas based on cost of poor quality.
		CO5: Organize for quality and development of quality culture through small group activities.

KEN-851	Project II	CO1: Based on the analysis and interpretation of the data collected, student manager will be able to arrive at logical conclusions and propose suitable recommendations on the research problem
		CO2: Demonstrate a sound technical knowledge of their selected project topic.Undertake problem identification, formulation and solution.
		CO3: Design engineering solutions to complex problems utilising a systems approach.Conduct an engineering project.
		CO4: Student manager will be able to create a logically coherent project report and will be able to defend his / her work in front of a panel of examiners
		CO5: Communicate with engineers and the community at large in written an oral forms.Demonstrate the knowledge, skills and attitudes of a professional engineer.