

Electrical Engineering

Semester VI

Teaching Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
EE 3007	Energy Management	3	0	0	4
EE 3008	Electrical Infrastructure	3	0	1	4
EE 3006	Microprocessor and Microcontroller	3	3	0	5
	Department Elective- I	3	0	1	4
HS 3001	HSS-4: Introduction to Philosophy	3	0	0	4
	Total	15	2	3	21

Department Elective- I

Course Code	Course Name
EE 3009	Communication Systems
EE 3010	Design of Electrical Machines

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I	Course Code	EE 3007			
II	Course Title	Energy Management			
III	Credit Structure	L	P	T	C
		3	0	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	<p>Introduction: Energy mix in India, Sector wise energy consumption, demand supply gap, potential of renewable energy, energy conservation and its benefits Energy management and conservation in electrical devices and systems, Economic evaluation of energy conservation measures, Electric motors and transformers, Inverters and UPS, Voltages stabilizers, Energy audit and Instrumentation.</p> <p>Energy conservation strategies in electric lighting and in domestic and industrial sectors Energy management in electric furnaces, ovens and boilers, Harmonic suppression and power factor correction Energy auditing and methodology, energy monitoring and statistical analysis of energy data Energy efficiency measures and efforts of BEE, India towards energy efficiency and energy conservation</p>			

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I	Course Code	EE 3008			
II	Course Title	Electrical Infrastructure			
III	Credit Structure	L	P	T	C
		3	1	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	<p>Illumination: Nature of light, Definitions, Laws of illumination, Different types of lamps, Tungsten lamp, discharge lamp, Sodium vapor lamp, Fluorescent lamp, Design of lighting scheme, methods of lighting, Calculations, examples., Flood lighting, Factory lighting and street lighting, Examples., Conservation approach to be considered.</p> <p>Electric Traction: Electric Traction, Principles and History, Mechanics of train movement, Adhesion, Traction motor, traction motor drives, Protection of electric locomotive and circuits, Traction sub systems, Railway signaling, traction substation, maglev</p> <p>Hybrid Electric Vehicles: Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.</p> <p>Electrolytic Process: Principle, Faradays laws of electrolysis, Current efficiency, Energy efficiency etc., Rating of metals, Production of chemicals, Electro-deposition, Electroplating, Power supply for electrolytic processes.</p>			

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I	Course Code	EE 3006			
II	Course Title	Microprocessor and Microcontroller			
III	Credit Structure	L	P	T	C
		3	0	3	5
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	<p>A block diagram view of a general purpose processor; elements of hardware and software architectures; introductory data and control paths concepts, registers and memory organization. Instruction set basics and assembly language programming: Instruction structure and addressing modes, instruction encoding, detailed study of 8085A instruction set and interfacing basics: memory interfacing, principles of I/O interfacing, polled and interrupts I/O handshaking principles. Examples of I/O devices: parallel port, serial port, keypad, display, etc. Introductory micro controllers: architectures, instruction set, programming, input-output interfacing, interrupts.</p> <p>Laboratory: Supplements the theory 8085-microprocessor kit based experiments: Software experiments demonstrate the use of the instruction set and assembly language programming. Hardware experiments for memory interfacing, parallel port, serial ports, interrupt driven I/O Simple micro controllers based experiments.</p>			

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I	Course Code	EE 3009			
II	Course Title	Department Elective- I: Communication systems			
III	Credit Structure	L	P	T	C
		3	1	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	Review of signals and spectra, band-limited signals, analysis of signals, distortion in transmission; linear CW modulation, methods of generation, bandwidth efficiency, synchronous and asynchronous detection, frequency division multiplexing; exponential modulation, narrowband PM and FM, transmission bandwidth, generation and detection, de-emphasis and pre-emphasis filtering; pulse modulation, sampling theorem, aliasing, PAM, PWM, PPM, time division multiplexing; pulse code modulation, delta modulation, DPCM; review of random processes and power spectral density, signal space; Noise analysis; Digital communications basic, line codes and their spectra, pulse shaping, inter-symbol interference, Nyquist criterion for distortionless transmission, equalization; Basics of digital bandpass modulation, ASK, PSK, FSK.			

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I	Course Code	EE 3010			
II	Course Title	Department Elective- I : Design of Electrical Machines			
III	Credit Structure	L	P	T	C
		3	1	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	<p>Introduction: Major Considerations in Electrical Machine Design Materials for Electrical Machine Design Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow Temperature rise - Rating of machines National and International Standards.</p> <p>DC Machines: Design of DC Machines-Design of Commutator and Brushes-Magnetic Circuit of A D.C. Machine-Design of field windings. Transformers: Specifications - KVA output for single and three phase transformers Window space factor Overall dimensions Operating characteristics Regulation No load current Temperature rise in Transformers Design of Tank - Methods of cooling of Transformers.</p> <p>Induction Machines: Specifications Length of air gap- Rules for selecting rotor slots of squirrel cage machines Design of rotor bars & slots Design of end rings Design of wound rotor - Magnetic leakage calculations Leakage reactance of poly phase machines- Magnetizing current - Short circuit current Operating characteristics.</p> <p>Synchronous Machines: Specifications choice of loadings Design of salient pole machines Short circuit ratio shape of pole face Armature design Armature parameters Estimation of air gap length Design of rotor Design of damper winding Determination of full load field mmf Design of field winding Design of turbo alternators Rotor design.</p>			

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I	Course Code	HS 3001			
II	Course Title	HSS 4: Introduction to Philosophy			
III	Credit Structure	L	P	T	C
		3	0	0	4
IV	Prerequisite(If any for the student)	Nil			
V	Course Content	What is it to philosophize, Different aspects of philosophy: Metaphysics, Epistemology, Ethics, Logic; Philosophy in ancient Greece: Heraclitus, Parmenides, Socrates, Plato, and Aristotle; Philosophy in ancient India: Orthodox and heterodox schools; Modern Western philosophy: Rationalism and empiricism; Metaphysics: Problem of universals; Epistemology: Knowledge as justified true belief, Gettier counter-examples; Ethics: Meta-ethics and normative ethics, Different ethical theories; Analytic philosophy: Frege, Russell, Wittgenstein, Austin, Quine, and Kripke.			