Course Code	18EES101J	Course Name	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	Course Category	S	*Engineering Sciences*	L	T	P	C
							3	1	2	5

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Electrical & Electronics Engineering*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Analyze given electric circuits consisting of active and passive components*			
CLR-2 :	*Identify the parts, functions and working of motors, generators and transformers that function in AC and DC*			
CLR-3 :	*Utilize the basic electronic devices and circuits*			
CLR-4 :	*Utilize transducers for measuring displacement, pressure, flow, sound, light, temperature, chemical changes etc.,*			
CLR-5 :	*Build simple logical circuits using Boolean expressions. Identify elements in a communication system*			
CLR-6 :	*Utilize the basic electrical circuits, machines, electronic devices, transducers and digital system principles and operations*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*				**Program Learning Outcomes (PLO)**														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Analyze basic theory utilized in electrical circuits and its circuits*	*3*	*75*	*70*	*H*	*M*	*L*	*L*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*
CLO-2 :	*Identify working principle of direct current and alternative current machines such as transformers, motors and generators*	*2*	*75*	*70*	*H*	*M*	*L*	*L*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*
CLO-3 :	*Operate the basic electronic devices. Identify their uses and construction features*	*3*	*75*	*70*	*H*	*-*	*L*	*L*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*
CLO-4 :	*Identify the different types of transducers used in measurement of various physical parameters*	*3*	*75*	*70*	*H*	*-*	*L*	*M*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*
CLO-5 :	*Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a communication Systems*	*3*	*75*	*70*	*H*	*M*	*M*	*M*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*
CLO-6 :	*Identify the basic electrical circuits, machines, electronic devices, transducers and digital system principles and operations*	*3*	*75*	*70*	*-*	*-*	*L*	*M*	*M*	*-*	*M*	*M*	*M*	*M*	*-*	*M*	*-*	*-*	*-*

		Electrical Circuits	*D.C Machines & A.C Machines*	*Electronic Devices*	*Transducers*	*Digital Systems*
Duration (hour)		**18**	**18**	**18**	**18**	**18**
S-1	SLO-1	*Introduction to DC and AC circuits*	*Sinusoids, Generation of AC, Average, RMS values, Form and peak factors*	*Safety measures in electrical systems*	*Transducer function and requirements*	*Number systems, binary codes*
	SLO-2	*Active and Passive two terminal elements*	*Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor*	*Types of wiring, wiring accessories*	*Classification: Active and Passive*	*Binary arithmetic*
S-2	SLO-1	*Ohms law, Voltage-Current relation, Power, Energy*	*Magnetic materials, B-H Characteristics Simple magnetic circuits*	*House wiring for staircase, fluorescent lamp, LED lamp & corridor wiring*	*Displacement: Capacitive, Inductive, Variable Inductance*	*Boolean algebra, laws and theorems*
	SLO-2	*R,L,C Circuits, Voltage and Current Sources*	*Faraday's laws, induced emfs and inductances.*	*Basic principles of earthing, Types of earthing. Grounding in DC circuits*	*Linear Variable Differential Transformer*	*Simplification of Boolean expression*
S-3	SLO-1	*Kirchoff's current law*	*1 - phase transformers: Construction, types, ideal, practical transformer*	*Basic principles and classification of instruments*	*Electromechanical: Pressure, Flow, Accelerometer, Potentiometer etc.*	*Logic Gates and Operations*
	SLO-2	*Kirchoff's voltage law*	*EMF equation, Regulation, Efficiency*	*Moving coil and moving iron instruments*	*Strain Gauge*	*Simplification of Boolean expression*
S-4	SLO-1	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*
	SLO-2					
S 5-6	SLO-1	*Lab 1: Verification of Kirchoff's Law*	*Lab 4: Transformer Operation, Efficiency*	*Lab 7: Types of wiring (fluorescent lamp wiring, staircase wiring, godown wiring)*	*Lab 10: Measurement using LVDT and Strain Gauge*	*Lab 13: Verification of Boolean expression using logic gates*
	SLO-2					
S-7	SLO-1	*Mesh Current Analysis*	*Construction, working of DC Generators*	*Overview of Semiconductors*	*Chemical: pH probes, Electro galvanic Sensor etc.,*	*SOP and POS Expressions*
	SLO-2	*Nodal Voltage Analysis*	*Types of DC generators*	*PN junction diode*	*Electroacoustic: Mic, Speaker, Piezoelectric, Sonar, Ultrasonic*	*Standard forms of Boolean expression*
S-8	SLO-1	*Thevenin's Theorem*	*Characteristics of Generators*	*Zener diode*	*Tactile, Geophones, Hydrophone*	*Simplify using Boolean Expressions*
	SLO-2	*Norton's Theorem*	*Armature reaction, Losses*	*Diode circuits: rectifiers, half and full wave*	*Electrooptical: LED, Laser, Photodiode, Photoresistor, Phototransistor*	*Minterm and Maxterm*
S-9	SLO-1	*Maximum Power Transfer Theorem*	*Power stages of DC generators*	*Bridge type rectifier, filter circuit*	*Photoconductive cell, photovoltaic cell, solar cell*	*K-Map Simple ReductionTechnique*

	SLO-2	*Star- Delta Transformation*	*Working and types of DC motors, Characteristics, Starters*	*Clippers and clampers*	*LED, infrared emitters, LCD, optocouplers*	*Two, Three and Four Variable K-Map*
S-10	SLO-1	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*
	SLO-2					
S 11-12	SLO-1	*Lab 2: Verification of all Theorems*	*Lab 5: Demo of DC Machine & Parts*	*Lab 8: Characteristics of semiconductor devices*	*Lab 11: Measurement using Electro acoustic and Electrooptical transducers*	*Lab 14: Reduction using Digital Logic Gates*
	SLO-2					
S-13	SLO-1	*Resistive Circuit Analysis*	*Construction, working of AC Generators*	*BJT construction, operation*	*Thermoelectric: Resistance Temperature Detectors*	*Principles of Communication*
	SLO-2	*Superposition, Convolution*	*Types of AC generators*	*BJT characteristics (CB, CE and CC configurations) and uses*	*Thermocouple*	*Block diagram of a Communication System*
S-14	SLO-1	*RL Circuit Transient Analysis*	*Characteristics of AC Generators, Losses*	*JFET construction, operation*	*Thermister*	*Amplitude Modulation*
	SLO-2	*RC & RLC Transient Analysis*	*Single Phase and Three Phase Machines*	*JFET characteristics (CS configuration) and uses.*	*Electrostatic: Electrometer*	*Frequency Modulation*
S-15	SLO-1	*Three Phase Systems, Connections*	*Working and types of AC motors*	*MOSFET construction, operation*	*Electromagnetic: Antenna, Hall effect, Magnetic Cartridge etc.,*	*Phase Modulation*
	SLO-2	*Relation between Line and Phase*	*Induction, Squirrel Cage, Synchronous*	*MOSFET characteristics (CS configuration) and uses*	*Radioacoustic: Geiger Muller Tubes, Radio receiver, Radio transmitter*	*Demodulation*
S-16	SLO-1	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*
	SLO-2					
S 17-18	SLO-1	*Lab 3: Time Domain Analysis (RL, RC)*	*Lab 6: Demo of AC Machine & Parts*	*Lab 9: Wave shaping circuits*	*Lab 12: Measurement using Thermoelectric and Electromagnetic*	*Lab 15: Demo of Transmission and Reception using MODEM*
	SLO-2					

Learning Resources	*1. Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013* *2. Jegatheesan .R, Analysis of Electric Circuits, Tata McGraw-Hill, 2014* *3. P. S. Bimbhra, ElectricalMachinery, 7th ed,. Khanna Publishers, 2011*	*4. R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012* *5. Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. S. Paramasivam, Danfoss, Industries Pvt Ltd., paramsathya@yahoo.com	*1. Dr. K. S. Swarup, IIT Madras, ksswarup@iitm.ac.in*	*1. Dr. K. Vijayakumar, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Rajeev Sukumaran, IIT Madras, rajeev@wmail.iitm.ac.in*	*2. Dr. S. S. Dash, SRMIST*