BASIC ELECTRICAL ENGINEERING

Course Code	: 18EEE15/25	Credits	: 3
L: T: P: S	: 3:0:0:0	CIE Marks	: 50
Exam Hours	: 03	SEE Marks	: 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the definitions, derivations, principles involved in electric and magnetic circuits.
CO2	Apply ohm's law, KCL, KVL & laws in electromagnetism to find unknowns in electric & magnetic circuits
CO3	Evaluate problems in single and three phase star-delta connected system, 1 phase transformers, 3 phase induction motor and dc machines
CO4	Analyze construction, basic principle of operation and performance characteristics of electrical machines and measuring instruments
CO5	Analyze protective devices, precautions against shock, Earthing and wiring techniques

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EEE25.1	3	3	-	-	-	-	-	-	-	-	-	-
EEE25.2	3	3	2	1	1	1	-	3	-	-	-	2
EEE25.3	3	3	2	1	1	-	1	3	-	-	-	2
EEE25.4	3	3	2	1	1	-	-	3	-	-	-	2
EEE25.5	3	3	2	1	1	1	1	3	-	-	-	2

SYLLABUS			
Module	**Contents of the Module**	**Hours**	**COs**
1	**Electric Elements & Circuits Laws:** Charge and electric forces, voltage, current. Ohm's law – Resistance, Specific Resistance, Conductivity, Temperature coefficient of resistance and resistor color coding, Kirchhoff's voltage law and current law. Characteristics of series and parallel circuits. Current divider and voltage divider rules. Equivalent resistance of series and parallel circuits, definitions of work, power, energy and heating effects of electrical current **Circuit Theorems:** Superposition, Thevenin's and Norton's theorems, Maximum power transfer theorem (Only Statement and Proof- Problems Excluded) **List of Related Experiments:** 1. Verification of Kirchhoff's Voltage and Current law. 2. Verification of Superposition Theorem 3. Verification of Thevenin's and Norton's Theorem 4. Verification of Maximum Power Transfer Theorem	**10**	**EEE25.1, EEE25.2**
2	**Magnetic Fields:** Faradays law, Induced EMF- Dynamically Induced EMF and Statically Induced EMF, Self-induced EMF and Mutually Induced EMF, Self-inductance of a Coil, Mutual Inductance (all the laws associated), Energy Stored in Inductor. **Introduction to D.C Machines:** Principle and construction of D.C machines, EMF equation, classification of D.C. machines based on method of excitation, load characteristics of D.C generators, critical resistance, voltage regulations, speed and torque characteristics of D.C motors. Applications. **List of Related Experiments:** 5. Speed Control of DC Shunt Motor 6. Load Test on DC Shunt Motor	**10**	**EEE25.1, EEE25.2, EEE25.3, EEE25.4**
3	**AC Circuits:** Sinusoidal source, maximum, average and RMS values, form factor, analysis of R, L & C circuits. Complex algebra and phasor diagrams. Reactance, susceptance, impedance and admittance. Problems involving series, parallel and series – parallel circuits, Power triangle - Real power, reactive power, apparent power and Power factor. **Transformers:** Single-phase transformers, construction and principle of operation, classification of transformers, E.M.F equation, turns ratio, ideal - equivalent circuit, phasor diagram, losses, efficiency, regulation and applications. **List of Related Experiments:** 7. Measurements of Electrical Quantities- Voltage, Current, Power and Power Factor in RLC Circuit. 8. Load Test on Single Phase Transformer.	**10**	**EEE25.1, EEE25.2, EEE25.3**

4	**Three-Phase Circuits:** Introduction to single phase and poly phase, Advantages of poly-phase systems over single-phase systems. Generation of various phase voltages (2 and 3). Relationship between line and phase quantities in Star and Delta for balanced systems, Measurement of power and power factor by using Two Watt Meter method. **Domestic wiring:** Brief discussion on concealed conduit wiring. Two-way and three-way control of lamps, Electric shock: precautions against shock, Protective devices – fuses, MCB's, Earthing – importance, pipe earthing, plate earthing. **List of Related Experiments:** 9. Measurement of 3ϕ Power using two Wattmeter method. 10. Residential House Wiring using Switches, Fuse, Indicator and Lamp. 11. Types of Wiring (Staircase and Fluorescent Wiring) 12. Study of Earthing and Measurement of Earthing Resistance using Megger. 13. Study of Circuit Protective Devices (MCB, Earth Leakage Relay and Fuse)	**7**	**EEE25.1, EEE25.2, EEE25.3, EEE25.4, EEE25.5**
5	**Induction Machines:** Three- phase induction motor, production of rotating magnetic field, construction and principles of operation, types of Rotor, slip and its significance, necessity of starter, applications. **Measuring Instruments:** Construction and Principle of operation of dynamometer type wattmeter and single phase induction type energy meter. **List of Related Experiments:** 14. Study and troubleshooting of Electrical Equipment (Fan, Iron Box and Mixer) 15. Speed control of 1 ϕ Induction motor using VFD and to measure F, V & I using DSO.	**7**	**EEE25.1, EEE25.3, EEE25.4**

TEXT BOOK:

1. "Basic Electrical Engineering", DC Kulshreshtha, TMH, Revised 1st edition, 2017. ISBN-13: 978-0071328968
2. "Basic Electrical and Electronics Engineering", S.K. Bhattacharya, Pearson Publications, 2016 . ISBN-13: 978-8131505564

REFERENCE BOOKS:

1. E. Hughes, "Electrical Technology", Pearson publishers. Latest edition, 2016, ISBN-13: 978-0582226968
2. "Basic Electrical, Electronics and Computer Engineering", Muthusubramanian R, Salivahanan S and Muraleedharan K A, Tata McGraw Hill, Latest Edition, 2016. ISBN-13: 978-0074622766
3. "Basics of Electrical and Electronics Engineering", Nagsarkar T K and Sukhija M S, Oxford press University Press. 2016. ISBN-13: 978-0198081807S.Parker Smith & N N Parker Smith, "Problems in Electrical Engineering".

4. S. Parker Smith & N N Parker Smith, "Problems in Electrical Engineering". 9th edition, 2016. ISBN: 9788123908588
5. Electrical Technology B.L Theraja, S. Chand publication, Vol 1, 2015, ISBN-13: 978-8121924412

Assessment Pattern

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quiz	Co-curricular Participation
Marks (out of 50)	25	10	5	10
Remember	5			
Understand	10			
Apply	5	5	5	5
Analyze	5	5		5
Evaluate				
Create				

SEE- Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember	10
Understand	10
Apply	15
Analyze	**15**
Evaluate	
Create	