

## EE101R: BASICS OF ELECTRICAL ENGINEERING

Teaching Scheme : 03 L + 00 T; Total: 03 hours/week

Credits : 03

Evaluation Scheme : 10 ISA + 30 MSE + 60 ESE

Total Marks : 100

ESE Duration : 3 Hrs.

### COURSE DESCRIPTION

This is the basic course in Electrical Engineering which introduces the basic concepts, different theorem and laws, Electrical circuits to students

### DESIRABLE AWARENESS / SKILLS

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### COURSE OUTCOMES

On the successful completion of this course, the students shall be able to -

1. Apply various basic laws and theorems to electric circuits
2. Apply the basic magnetic laws to magnetic circuits
3. Differentiate single and three phase AC system and the relationship of various AC circuits parameters
4. Explain the principle, working and applications of various electrical machines like transformer, DC motor, generator and induction motor
5. Identify the electrical wiring installations aspects and accessories

### RELEVANCE OF COURSE OUTCOMES (COs) WITH POs AND PSOs (WITH STRENGTH OF CO-RELATION)

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1				2	1	1	2	2		2			
CO2	2	2				2	1	1	2	2		2			
CO3	3	1				1	2	1	1	1		1			
CO4	2	2				2	1	2	2	1		2			
CO5	2	2				2	2	2	2	2		2			

1-Weakly correlated

2 – Moderately correlated

3 – Strongly correlated

## **COURSE CONTENT**

### **D.C. Circuit:**

Kirchhoff current and voltage laws, Source conversion, series and parallel circuit, current and voltage division rule, Delta-Star and Star-Delta conversion, Node Analysis and Mesh Analysis methods Network Theorem: Superposition theorem, Thevenin's and Norton's theorems Maximum power transfer theorem (Numerical limited to two sources)

Capacitor: Charging and discharging of capacitor, Time constant for RC circuit Introduction of circuit active and passive parameter of electrical circuit,

### **Electromagnetic Induction:**

Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, inductance in series and parallel, Magnetic Circuits: Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Series and parallel circuits, magnetic hysteresis, and eddy current loss, Rise and decay of current in inductive circuit, Time constant for RL circuit

### **Single phase and Three phase AC Circuits:**

Concept of single phase supply, terms related with A.C. quantities, pure resistive, inductive and capacitive circuits, complex and phasor representation of AC quantities, R-L-C series and parallel circuits, resonance in series and parallel circuits, Q-factor of coil

Three phase AC Circuits: Concept of Three phase supply, star and delta connections, line and phase values, phasor diagram, three phase balance star and delta loads and their phasor diagrams.

### **Introduction to Electrical Machines:**

Principle of operation, construction, working and applications of- DC generator, DC motor, single phase and three phase transformers: EMF equation and transformation ratio, single phase and three phase Induction motors (Numerical treatment not expected)

### **Electrical Wiring and Accessories:**

Electrical Wiring Installations: Accessories used for electrical wiring, types of insulated wires & wiring systems, detail study of concealed conduit electrical wiring systems, concept of fuses, MCBs, ELCBs in wiring installations, concept of earthing, power rating of different domestic appliances, kWh (Unit) / Energy consumption calculations, study and comparison of Light Emitting Diode (LED) lamps and Compact Fluorescent Lamps (CFL), Solar lamps.

### **Text Books**

1. D.P.Kothari, I.J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hall
2. M.S.Naidu, S.Kamakshaia, "Introduction to Electrical Engineering", Tata McGraw Hall
3. J.P.Tiwari, "Basic Electrical Engineering", New Age Publication
4. D. P. Kothari, I. J. Nagrath, "Electrical Machines", Fifth Edition, McGraw Hill, 2017.
5. Ashfaq Husain, Haroon Ashfaq, "Electric Machines" Third Edition, Dhanpat Rai & Co., 2015

### **Reference Books**

1. Leonord Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press
2. Vincent Del Toro, “Principles of Electrical Engineering”, Prentice Hall
3. Joseph Administer, “Schaum’s outline of Electric circuits”, Tata McGraw Hill
4. A. E. Fitzgerald, C. Kingsley and S. D. Umans, “Electric Machinery”, 6th Edition, McGraw Hill, 2003
5. M. G. Say, “Alternating Current Machines”, Pitman Publications, 5th Edition, 1984
6. J.B.Gupta, “Theory and performance of Elctrical Machines”, S.K.Kataria and Sons, 14th Edition, 2014

### **Evaluation Methodology**

- **ISA** – ISA will be based on any one or two of the following component-
  - Declared test
  - Surprise test
  - MCQ Test
  - Assignments
  - PPT presentation
  - Quiz
  - Fabrication of working model

Apart from the above components, the course coordinator may suggest any other component of evaluation, if any. However, the course coordinator shall declare the same at the beginning of the course.

- **MSE**- Mid Semester Exam will be based on 50% of the syllabus
- ESE**- End Semester Exam will be based on 100% of the syllabus