

## BASIC ELECTRICAL ENGINEERING

<b>I Semester : CSE / CSE (AI &amp; ML) / CSE (DS) / CSE (CS) / CSIT / IT</b>								
<b>II Semester : AE / ME / CE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
AEEC01	Foundation	3	-	-	3	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>		<b>Total Classes: 45</b>		
<b>Prerequisites: Linear Algebra and Calculus</b>								
<b>I. COURSE OVERVIEW:</b>								
<p>The Basic Electrical Engineering enables knowledge on electrical quantities such as current, voltage, power, energy to know the impact of technology in global and societal context, provides knowledge on basic DC and AC circuits used in electrical and electronic devices, highlights the importance of transformers, electrical machines in generation, transmission and distribution of electric power, identify the types of electrical machines suitable for particular applications.</p>								
<b>II. COURSE OBJECTIVES:</b>								
<b>The students will try to learn:</b>								
<p>I. Understand the basic electrical circuits and circuit laws to study the behavior AC and DC circuits.            II. Analyze electrical circuits with the help of network theorems.            III. Outline the concepts of network topology to reduce complexity of network and study its behavior.            IV. Demonstrate the working principle of AC and DC machines.            V. Analyse single phase transformers circuits.</p>								
<b>III. COURSE SYLLABUS:</b>								
<b>MODULE – I: INTRODUCTION TO ELECTRICAL CIRCUITS (09)</b>								
Circuit concept: Ohm’s law, Kirchhoff’s laws, equivalent resistance of networks, Source transformation, Star to delta transformation, mesh and nodal analysis; Single phase AC circuits: Representation of alternating quantities, RMS, average, form and peak factor, concept of impedance and admittance.								
<b>MODULE – II: NETWORK THEOREMS AND NETWORK TOPOLOGY (09)</b>								
Network Theorems: Superposition, Reciprocity, Thevenin’s, Norton’s, Maximum power transfer for DC excitations circuits. Network Topology: Definitions, Graph, Tree, Incidence matrix, Basic Cut Set and Basic Tie Set Matrices for planar networks.								
<b>MODULE – III: DC MACHINES (09)</b>								
DC generators: Principle of operation, construction, EMF equation, types of DC generators. Losses and efficiency. Critical field resistance, speed control.								
DC motors: Principle of operation, back EMF, torque equation, types of DC motors, Losses and efficiency, condition for maximum efficiency, numerical problems.								
<b>MODULE –IV: SINGLE PHASE TRANSFORMERS (08)</b>								
Single Phase Transformers: Principle of operation, construction, types of transformers, EMF equation, operation of transformer under no load and on load, Phasor diagrams, equivalent circuit, efficiency, regulation and numerical problems.								
<b>MODULE – V: AC MACHINES (09)</b>								
Three Phase Induction motor: Principle of operation, slip, slip -torque characteristics, efficiency and applications; Alternators: Introduction, principle of operation, constructional features, calculation of regulation by synchronous impedance method and numerical problems.								
<b>IV. TEXT BOOKS:</b>								
<ol style="list-style-type: none"> <li>1. A Chakrabarthy, “Electric Circuits”, Dhanipat Rai &amp; Sons, 6<sup>th</sup> Edition, 2010.</li> <li>2. A Sudhakar, Shyam Mohan S Palli, “Circuits and Networks”, Tata McGraw-Hill, 4<sup>th</sup> Edition, 2010.</li> <li>3. A E Fitzgerald and C Kingsley, "Electric Machinery", McGraw Hill Education, 2013.</li> </ol>								

4. I JNagrath, DP Kothari, "Electrical Machines", Tata McGraw-Hill publication, 3<sup>rd</sup> Edition, 2010.

#### **V. REFERENCE BOOKS:**

1. John Bird, "Electrical Circuit Theory and Technology", Newnes, 2<sup>nd</sup> Edition, 2003.
2. C L Wadhwa, "Electrical Circuit Analysis including Passive Network Synthesis", International, 2<sup>nd</sup> Edition, 2009.
3. David A Bell, "Electric circuits", Oxford University Press, 7<sup>th</sup> Edition, 2009.
4. PS Bimbra, "Electrical Machines", Khanna Publishers, 2<sup>nd</sup> Edition, 2008.

#### **VI. WEB REFERENCES:**

1. <https://www.igniteengineers.com>
2. <https://www.ocw.nthu.edu.tw>
3. <https://www.uotechnology.edu.iq>
4. <https://www.iare.ac.in>

#### **VII. E-TEXT BOOKS**

1. <https://www.bookboon.com/en/concepts-in-electric-circuits-ebook>
2. <https://www.jntubook.com>
3. <https://www.allaboutcircuits.com>
4. <https://www.freeengineeringbooks.com>