

ELECTRICAL ENGINEERING DEPARTMENT
B. TECH. FIRST YEAR (4 YDC)
EE10015: FUNDAMENTALS OF ELECTRICAL ENGINEERING (Modified)

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	S	END SEM	
2	-	1	2	-	1	30	70	-	-	100

PRE- REQUISITE: Basic knowledge of science and mathematics at XII level.

COURSE OBJECTIVES:

1. To acquaint students with the basic concepts, elements and properties of electrical circuits and networks.
2. To introduce the concept of phasor and power factor improvement in sinusoidal steady-state analysis.
3. To impart the knowledge of a three-phase system- its generation and analysis.
4. To explain basics of magnetic circuit and its practical aspects applied in transformer. To teach students the basic principles of operation, construction, and application of rotating electrical machines.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE10015(T)1: Formulate various circuit describing mathematical models.

EE10015(T)2: Utilize ac excited steady state circuit analysis concepts in real life problems such as need of power factor correction, power factor improvement methods and home energy distribution system.

EE10015(T)3: Analyse three phase power generation system and perform basic analysis of three phase star/delta circuits.

EE10015(T)4: Carry out practical magnetic circuit calculations and performance analysis of single phase transformer.

EE10015(T)5: Do performance analysis of various type of motors and develop ability to identify suitable motor for particular application.

COURSE CONTENTS:

THEORY:

<p><u>UNIT: 1</u></p> <p>Voltage and current sources & transformation, resistors, effect of temperature on resistance, capacitors and inductors, their v-i relationships. Kirchoff's laws, Mesh and Nodal analysis, Star Delta transformations, Superposition theorem, Thevenin's and Norton's theorem, Maximum power transfer theorem.</p>
<p><u>UNIT: 2</u></p> <p>Circuit analysis in sinusoidal steady state, various signals & waveform analysis, Concept of phasor, impedance, admittance, phasor diagrams, Complex, real and reactive power in ac circuits, Power factor and power factor corrections, capacitor bank, electricity distribution system in houses.</p>
<p><u>UNIT: 3</u></p> <p>Generation of three phase voltages, star and delta connection, Line and Phase quantities, Three phase power, Three phase Power measurement techniques, diesel generator set overview.</p>
<p><u>UNIT: 4</u></p> <p>Magnetic circuits, definitions, B-H curves, Magnetic circuit calculations, laws of electro-magnetic induction. Hysteresis and eddy current losses, single phase transformer construction & principle, EMF equation, equivalent circuit, regulation and efficiency.</p>
<p><u>UNIT: 5</u></p> <p>Basic construction of three phase induction motor, production of rotating magnetic field, principle of working of three phase induction motor, losses, name plate rating, efficiency, type of motor used and rating for domestic and industrial applications.</p>

ASSESMENT:

- A. Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. It includes class attendance as well as assignments on the course topics.
- B. The end-term theory examination weightage is 70%.

TEXT BOOKS RECOMMENDED:

1. Vincent Del Toro, "Electrical Engineering Fundamentals", Prentice-Hall of India.
2. John Hiley, Keith Brown & Ian Mckenzie Smith, (HUGES), "Electrical and Electronic Technology", Pearson Education Ltd.
3. Charles K. Alexander, & Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill Higher Education.

REFERENCES BOOKS:

1. Fitzgerald Higginbotham & Grabel, "Basic Electrical Engineering", Tata McGraw Hill Publication.
2. Joseph Edminister, Mahmood Nahvi "Electric Circuits", Schaum's outlines series.
3. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson India Education Services Pvt. Ltd.
4. I. J. Nagarath, "Basic Electrical Engineering", Tata McGraw Hill Publication.