

Course Code EEE1001	Electric Circuits and Systems	Course Type	LTP
		Credits	4

Prerequisites: None

Course Objectives:

- To analyze the voltages and currents in Electric Circuits.
- To understand the operating principles and working of electrical machines and transformers.
- To gain knowledge on basic semiconductor devices.
- To understand the logic of combinational and sequential circuits.
- To understand the construction and working principle of electronic devices and circuits.

Course Outcomes:

Students who complete this course will gain knowledge in the underlying principles of electric circuits, tronic devices and electrical machines.

Student Outcomes (SO): a, b, c, e, i, k

Module No.	Module Description	Hrs.	SO
1	Electric Circuits: DC Circuit Analysis: Laws: Ohm's law, voltage and current divisions rule - Kirchhoff's Current and Voltage laws, Series & parallel circuits - Star-Delta conversion, Mesh and Nodal Analysis – Network Theorems: Super position theorem, Thevenin's theorem, Norton's Theorem, duality theorem and maximum power transfer theorem - Voltage and Current sources.	9	a,b,c,e
2.	AC Circuits Analysis Fundamentals of AC waveforms (average, rms, peak), AC Circuit Analysis & Phasors: RL, RC, RLC - Series and parallel, Resonance. Natural and forced responses in First order and Second order systems.	8	a,c,e
3.	Magnetic Circuits Magnetic Coupled Circuits: Analogy between electric and magnetic circuits, Series and parallel magnetic circuits, Electromagnetic Self and mutual induction - Applications of Electro-Magnetism- DC- motor & generator, single phase and 3 phase induction motor and transformer.	9	a,b,c,e
4.	Semiconductor Devices: Introduction to semiconductors PN Junction Diode: Construction and operation with characteristics - Rectifiers: Half-wave and Full-wave. Zener Diode: Construction and operation with characteristics - Zener Regulator. BJT – CE Amplifier- Configuration – Characteristics - MOSFET.	9	a,b,c,e
5.	Digital and Logical Systems: Number system and conversion, Boolean Algebra, Logic gates & Universal Gates. Arithmetic circuits, MUX/DEMUX, Decoder/ Encoder, Flip-flops	8	a,b,c,i
6.	Guest Lecture on Contemporary Topics	2	k
Total			45

Mode of Teaching and Learning:

Flipped Class Room, Activity Based Teaching/Learning, Digital/Computer based models, wherever possible to augment lecture for practice/tutorial and minimum 2 hours lectures by industry experts on contemporary topics

Mode of Evaluation:

The assessment and evaluation components may consist of unannounced open book examinations, quizzes, student's portfolio generation and assessment, and any other innovative assessment practices followed by faculty, in addition to the Continuous Assessment Tests and Term End Examination.

Text Book(s):

1. S.K. Bhattacharya, 'Basic Electrical and Electronics Engineering', Pearson Publications, 1st Edition, 2011.

Reference Book(s):

1. Allan R. Hambley, ‘Electrical Engineering-Principles & Applications’ Pearson Education, First Impression, 6th Edition, 2013.
2. P.S.Bimbhra,” Electrical Machinery”, Khanna Publishers, 2003.
3. Charles K Alexander, Mathew N.O Sadiku, ‘Fundamentals of Electric Circuits’, McGraw Hill, 5th Edition, 2012.
4. Thomas L. Floyd, ‘Digital Fundamentals’, Pearson Education, 10th Edition, 2010.
5. William H. Hayt Jr. Jack E. Kemmerly, Jamie D. Phillips, Steven M. Durbin, Electric Circuit Analysis, McGraw Hill, 9th Edition, 2020
6. Adel S Sedra, Kenneth C Smith, Chandorkar, Microelectronic Circuits, Theory and Applications, oxford press, 7th Edition, 2017.

15 Hrs

Indicative List of Experiments:**SO – a, b, c, e, i**

1. Analysis of circuit parameters using the following: Mesh, nodal and networks theorems.
2. Analysis of Magnetic Circuits resonance.
3. IV Characteristics of PN Junction diode.
4. IV Characteristics of Zenor Diode.
5. Rectifier circuits half wave, full wave and bridge rectifier.
6. Input and output characteristics of BJT.
7. Combinational Circuits: Adder and subtractor.
8. Encodes and Decoders.
9. Mini Project: Regulated power supply.

<i>Recommendation by the Board of Studies on</i>	11.12.2023
<i>Approval by Academic council on</i>	
<i>Compiled by</i>	Dr Om Prakash Pahari