

Branch Name:	Electrical Engineering
Program Code	ET403
Course Name:	D.C. Circuits
Course Code:	2ET4030201
Pre-requisite Course:	

COURSE OBJECTIVE:

1. Understand the concept Different types of Network Theorems.
2. Familiar with Different Circuits and able to solve the same problems with different Networks.
3. Understand the Different types of principles related to D.C.Circuits
4. Understand the Comparison of Electric & Magnetic Circuits.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				Total (Marks)
Lecture	Tutorial	Practical	Credit	Theory		Practical		
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	4	6	60	40	--	50	150

DETAILS OF COURSE CONTENTS:

Sr. No	Topic and Subtopic	Total Hours	Weightage %
1	BASIC OF ELECTRICAL ENGINEERING Charge, Current, Potential, potential difference, Voltage, EMF, Resistance, Resistivity, Conductance, Conductivity, RTC and its unit. Parameters affecting resistance, Effect of temperature on resistance, conductors, semi-conductors and insulators with energy band diagram. Definitions of Work, Power and Energy (both electrical and mechanical); Conversion from Mechanical units into Electrical units, Joules law of heat and Simple problems on ohm's law, Impact of using electrical source over the other energy sources on the environment.	10	20
2	ELECTRICAL CIRCUITS Concept of Open circuit, Closed circuit, short circuits, Series and Parallel connections of resistors and equivalent resistance, Source transformation techniques, Definitions of node, branch, loop, mesh, Kirchhoff's laws and simple numerical, Kirchhoff's Voltage and Current law (KVL and KCL), Mesh Analysis and Nodal Analysis of Networks, Principle of Duality, Series and Parallel circuits with numerical problems.	10	20
3	NETWORK THEOREMS Linear & Nonlinear circuit, Active and Passive Network, Super Position Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Star delta transformations with numerical	10	20

4	ELECTROSTATICS AND CAPACITOR Electric charge, Laws of electrostatics, Electric field, Electric flux Density, Electric field Intensity. Capacitance – Effects of Dielectrics, dielectric constant units, Types of Capacitors, Capacitors in series and parallel., Energy stored in a Capacitor, Rise and Decay of current in R-C Circuit and time constant, Capacitance of parallel plate capacitor and Spherical capacitor, Batteries, ratings, types and their comparison, Identification of weak battery in series and parallel combination, Recycling, disposal of old capacitors and batteries safely	08	10
5	MAGNETIC CIRCUIT Magnetic field, Magnetic lines of force, Flux density, Magnetic field of a current carrying conductor, Right hand rule, corkscrew rule, Magnetic field due to current flowing in the coil, Fleming's left-hand rule, Terms related to Magnetic circuit, Relations related to magnetic circuit, Laws of magnetic circuit, Composite magnetic circuit, Comparison of Electric & Magnetic circuit, Leakage flux & Hopkinson's leakage co-efficient, Fringing, B.H Curve.	10	20
6	ELECTROMAGNETIC INDUCTION Electromagnetic Induction., Faraday's law, Lenz's law, Fleming's right-hand rule for Generators, Fleming's left-hand rule for Motors., Statically and dynamically induced EMF, Inductance: Self and Mutual inductance., Energy stored in Magnetic field, Rise and decay of current in inductor, time constant	08	10

LIST OF REFERENCES:

1. Electrical Technology, Volume-1 by B.L. Thereja
2. Fundamentals of Electrical Engineering by J. B. Gupta
3. Elements of Electrical & Electronics Engineering by U. A. Patel

SOFTWARE/LEARNING WEBSITES

- a. www.nptel.iitm.ac.in
- b. www.khanacademy.org
- c. <https://phet.colorado.edu/>
- d. <https://ndl.iitkgp.ac.in>
- e. www.electrical4u.com
- f. www.vlab.co.in

LIST OF PRACTICAL:

SR NO	PRACTICALS/EXPERIMENTS	Total Hours
1	Measure voltage and current in a given linear electrical circuit.	03
2	Calculate temperature co-efficient of a given resistor.	04
3	Connect resistances in series to get required effective resistance and verify.	03
4	Connect resistances in parallel to get required effective resistance and verify	03

5	Connect resistances in parallel and series to get required effective resistance and verify	03
6	Measure current in a particular branch of the given electrical circuit using Kirchhoff's Current Law	04
7	Measure current in a particular branch of the given electrical circuit using Kirchhoff's Current Law	04
8	Measure current in a particular branch of the given electrical circuit having two input sources using Superposition theorem	04
9	Measure current in a particular branch of the given electrical circuit by Thevenin's theorem for a given circuit	04
10	Calculate the load current by Norton's theorem for a given circuit	04
11	Calculate the Maximum current in the load by Maximum power transfer theorem for a given circuit	04
12	Calculate branch current by Reciprocity Theorem.	04
13	Convert star connected resistances to its equivalent delta connected resistances.	04
14	Convert delta connected resistances to its equivalent Star connected resistances	04
15	Verify equivalent capacitance by connecting given capacitors in Series and Parallel	04

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Discuss the knowledge on fundamentals of D.C circuits	2 Understanding
CLO2	List the various experimental studies about D.C.Networks	1 Remembering
CLO3	Analyze & solve the Different D.C. Circuits with Theorems	5,3, 4 Evaluate,Applying, Analyze
CLO4	Discuss &Able to understand all the fundamentals terminology related to D.C.	2 Understanding
CLO5	ble to understand rules related to D.C.Circuits.	5,3, 4 Eval uate,Applying, Analyze
CLO6	Convert Theorems and find the Same values & relations	6 Creating

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H	L		M	M	L		L	M	L		H	H	L	L
CLO2	L				M		M		L				H	M	L
CLO3	L	L	M			L					H	H	L		M
CLO4	M		L		L		M	L							M
CLO5			M	M	L					H					
CLO6		H					H		L		L		L	L	

H:High, M:Medium, L:Low