Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-1

Subject: DC Circuits - DETEE11201

Type of course: Major

Prerequisite: Basic knowledge of Physics

Rationale:
The course is designed to prepare students to understand fundamental concept and principle of DC circuits. Students acquire the skill to solve and analyze electrical circuits using various network and theorems as well as analyze magnetic circuit and apply laws of electromagnetic induction for advance course like electrical machine.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

(For each activity maximum-minimum range is 5 to 10 marks)

Sr. No	Active Learning Activities	Marks
1	**Quiz** Students will be assigned a quiz of 10 MCQs per unit.	10
2	**Assignment** Students will be assigned one assignment / Tutorial per unit. Students need to solve and upload to Moodle.	10
3	**Web Surfing** Students need to collect specifications, picture of electrical equipment from internet and to prepare a report and upload to Moodle	10
Total		30

Course Content:

Unit. No	Course content	Hrs	% Weightage
1	**CHAPTER -1: Basics of Electrical Engineering – 8 Hours** Electric Charge, Current, Potential, Potential Difference, Voltage, Power, Energy, EMF, electrical resistance and its unit, Conductors, insulators, semiconductors, capacitors and inductors Ohm's law, Applications, Limitations, specific resistance and its unit, Parameters affecting the resistance, effect of temperature on resistance and temperature co-efficient Joule's law of heating, applications Power and energy, unit conversion from mechanical to electrical and vice-versa	14	25%
2	**CHAPTER -2: Electric Circuit – 6 Hours** Introduction, Network Terminology, Open Circuit, Closed Circuit, Short Circuit, Node, Branch, Mesh, Loop, Kirchhoff's Voltage & Current Laws, Analysis of Series & Parallel Circuit, Solution of network by KCL & KVL, Numerical	16	30%

	CHAPTER -3: Network Theorem – 8 Hours Linear, Non-liner, Active and passive network, Mesh analysis and nodal analysis of network, Maxwell's mesh / loop current methods, D.C. network theorems, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Star – Delta & Delta - Star Transformation, Simple Numerical		
3	**CHAPTER -4: Magnetic Circuit – 6 Hours** Important Terminology, Analysis of magnetic circuit, Comparison between magnetic and electric circuit, Composite magnetic circuits, Parallel magnetic circuit, MMF, Air gap, Flux, Leakage flux, Fringing, Ampere turns calculation, Series and parallel magnetic circuit, Analysis of series-parallel magnetic circuits, Magnetization curve, Hysteresis Loss **CHAPTER -5: Electromagnetic Induction – 6 Hours** Electromagnetic induction, Faraday's Laws, Lenz's Law, Fleming's Rules, Induced emf, statically and dynamically induced EMF, self inductance, mutual inductance, coefficient of coupling, inductance of coupled coils, Expression for self and mutual inductance, Inductance in series and parallel, energy stored in magnetic field, Charging and discharging of inductor	14	25%
4	**CHAPTER -6: Electrostatics & Capacitors – 8 Hours** Introduction, Electric charge, laws of electrostatics, electric field, electrostatic induction, electric flux, flux density, electric field Intensity, Permittivity. Capacitor and Capacitance, Capacitance of parallel plate for uniform dielectric medium and different dielectric medium, Factors affecting the Capacitor, Types of Capacitors, Capacitor in Series, Capacitor in Parallel, Capacitors in Series & parallel, Energy stored in a capacitor, Charging & Discharging of Capacitor	12	20%

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30	50	20	0	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Interpret significance of basic electrical components
CO2	Solve simple electrical circuits using network theorems
CO3	Understand Electromagnetic Induction Laws and inductor phenomena
CO4	Understand types and working of Capacitor and Electrostatic Principle

List of Practical

(Minimum-10practical):

Sr. No	Descriptions	Unit No	Hrs
1	To compute resistance based on color code and verify by measurement	1	2
2	To measure various electrical quantities like Voltage, Current and Power	1	4
3	To study conductors, Semiconductors & Insulators	1	2
4	To verify Ohm's Law	1	2
5	To compute and verify through experimental check effective equivalent resistance of series and parallel connected combination	2	4

6	To perform an experimental check of Kirchhoff's Current Law and Kirchhoff's Voltage Law	2	4
7	To perform star to delta and delta to star conversion	2	2
8	To verify Thevenin's theorem and determine the voltage and current in the given branch of the circuit	2	2
9	To verify Norton's Theorem and determine the voltage and current in the given branch of the circuit	2	2
10	To study B-H curve (Magnetization Curve) and Hysteresis	3	2
11	To study charging & discharging of Capacitor	4	2
12	To study safe disposal of old capacitors & batteries	4	2
	TOTAL		**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] B. L. Theraja, *"A Text Book of Electrical Technology Vol-I"*, S. Chand & Co. Ltd.

[2] Tarlok Singh, "*Fundamental of Electrical Engineering*", S. K. Kataria & Sons

[3] J. B. Gupta, "*A Course of Electrical Technology Vol-I*", Kataria & Sons,

[4] S.K. Sahdev, "*Fundamentals of Electrical Engineering & Electronics*", Dhanpat Rai & Co.

[5] U. A. Bakshi & V. U. Bakshi, "*Basic Electrical Engineering*", Technical Publication Pune,

[6] U. A. Patel, "*Elements of Electrical Engineering*", Atul Prakashan,

[7] K Uma. Rao, *"Basic Electrical Engineering"*, Pearson Education, India