Gyanmanjari
Innovative University

Subject: Electric Circuits-BETEE12303

Type of course: Minor

Prerequisite: Basic Understanding of Electricity

Rationale:

This course has been designed to impart in depth knowledge of Electrical. The students learn basic concepts of electrical circuits and apply the electrical theorems to analyze complex circuits. The students need to learn Principles of Circuit Analysis, Network Theorems, Sinusoidal steady-state analysis, Transient Analysis of DC & AC networks along with Two Port Network

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				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.

Course Content:

Unit No	Course content	Hrs	% Weight age
1	**Principles of Circuit Analysis** Basic Electrical concepts: Charge, Current, Voltage, Power, Circuit Elements, Voltage and Current sources., controlled sources, Series and Parallel connected sources,Voltage and Current laws, Ohm's law, Kirchhoff's voltage law, Kirchhoff's current law, Resistor in series and parallel, current and Voltage Division rule,Nodal analysis, Supernode concept, Mesh analysis and Supermesh. Power: Real, Reactive and Apparent, Power Triangle	12	20%
2	**Network Theorems** Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Analysis with independent and dependent current & voltage sources. Numericals based on Theorems	9	15%
3	**Sinusoidal steady-state Analysis** Analysis of Sinusoidal waveform, concept of Impedance and Admittance, Phasor Voltage/Current Relationships in Time Domain and Frequency Domain in Resistor, Inductor and Capacitor, Sinusoidal Response of series RL,RC and RLC circuit. Sinusoidal Response of parallel RL, RC and RLC circuit. Series and parallel AC Circuit. Application of Network theorem in AC Circuit	15	25%
4	**Transient Analysis of DC & AC networks** Transient response of Series R-L, R-C, R-L-C circuits for D.C. excitations, Transient response of Series R-L, R-C, R-L-C circuits for Sinusoidal Excitation (first order and Second Order.)	12	20%
5.	**Two port networks** Two port network parameters – Z, Y, ABCD and hybrid. Condition for reciprocity and symmetry-Conversion of one parameter to other- Interconnection of Two port networks in series, parallel and cascaded configuration. Numericals based on above.	12	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Electric Appliance study** Study of hardware components of Electric Appliance assigned by Faculty (Group of 2 or 3).Make a comparison between different Brands available for that Appliance and upload it on GMIU Web Portal.	10
2	**Poster Making** Make a poster of Safety Precautions while dealing with Electricity(in a group of 3) and upload the Poster on GMIU Web Portal	10
3	**Solve & Simulate** A puzzle (Problem) will be assigned by faculty. Student need to solve and simulate on any application and upload the file on GMIU Web portal	10
	Total	30

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)
Weight age	30%	40%	20%	10%	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	Familiarize with the concept of electrical Circuit
CO2	Apply the Network Theorem on a Circuit.
CO3	Use systematic methods to analyze the behavior of circuits through Steady State & Transient Analysis.
CO4	Perform Two Port Network Analysis.

List of Practicals:

Sr. No	Descriptions	Unit No	Hrs
1	To perform Nodal analysis on a given circuit	1	2
2	To perform Mesh analysis on a given circuit	1	2
3	Prove Thevenin's theorem	2	2
4	Prove Superposition theorem	2	2
5	Prove Max Power Transfer theorem	2	2
6	To do analysis of sinusoidal Waveform	3	2
7	To study and Simulate RL, RC and RLC series circuit	3	2
8	To study and Simulate RL, RC and RLC Parallel circuit	3	2
9	To study transient response of RL and RC circuit	4	2
10	To study transient response of RLC circuit	4	2
11	Analyze the given circuit for Z Parameter	5	2
12	Analyze the given circuit for Y Parameter	5	2
13	Calculate Y Parameter for cascade two port network	5	2
14	Analyze the given circuit for h Parameter	5	2
15	Analyze the given circuit for Transmission Parameter	5	2
	TOTAL		30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any 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 the 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] Charles K. Alexander & Matthew N. O.Sadiku ,"Fundamentals of Electric Circuits "

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

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

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