SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engg.

Semester/Year		III/II	Program		B.Tech
Subject Category	OC	Subject Code:	OE- 305 (A)	Subject Name:	Electrical Machine & Transformer

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assig	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Basics of Physics, Mathematics, Basics of electrical circuits

Course Objective:

1. Familiarize with the basic concept of Power in AC circuits.
2. Impart the knowledge of Transformer.
3. Impart the knowledge of AC and DC Motors, Generators and Alternators.

Course Outcomes:

Course Outcomes - On the successful completion of this course student should be able to:

CO1: Acquire knowledge and be able to demonstrate AC circuits, and understand the behavior of 3-phase AC circuits.

CO2: Able to understand the working of transformer, construction and performance.

CO3: Understand the concept of magnetic circuits, and able to understand the working principle of DC machine, types, application and performance.

CO4: Able to understand the working principle of Induction machine, revolving field theory concept, type of single phase and three phase induction application and performance.

CO5: Able to understand the working principle of synchronous machine with its working, types and application

UNITs	Descriptions	Hrs.	CO's
I	**AC Circuits-** Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series). Three phase balanced circuits, voltage and current relations in star and delta connections.	8	CO1
II	**Transformers-** Review of laws of electromagnetism, MMF, flux, and their relation. Single-phase transformer basic concepts and construction features, transformer induced emf equation, losses in transformers, three phase transformer and its configuration.	8	CO2

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III	**DC machines (Motor and Generator)-** Constructional details of DC machine, working principle of DC machines, classification of DC machine, EMF equation, characteristic of separately excited and self excited generators. Working principle of DC motor, Importance of back EMF, Starting of DC motor	8	CO3
IV	**AC machines (Induction Motor)-** 3-phase induction motor: General principle, construction, squirrel cage and phase wound rotor, slip, frequency of rotor current. 1-phase induction motor: Difference between three phase and single phase induction motor, types of single phase induction motor with construction and working principle	8	CO4
V	**Synchronous Machine (Motor and Alternators)-** Motor: stationery armature, details of construction salient and non-salient type motor, function of damper winding, speed and frequency. Alternator: various types of alternator, construction working principle, generated EMF equation.	8	CO5
Expert Lecture			
Total Hours		40	

Suggestive list of experiments:

Text Book:-

1. Electrical Machine by Ashfaq Husain and Haroon Ashfaq, Dhanpat Rai & Co., third Edition.
2. Basic Electrical Engineering by V N Mittle and Arvind Mittal, Mc Graw Hill, II Edition.

Reference Books-

1. Engineering Circuit Analysis by William H hayt and Kimberly
2. Electrical machinery by Dr P S Bhimbra
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition

Modes of Evaluation and Rubric

Theory (60)	Attendance (10)	Midsem (10 + 10)	Performance (10)	Total (100)

List/Links of e-learning resource

- https://nptel.ac.in/courses/108/108/108108076/
- IISC banglore
- https://nptel.ac.in/courses/108/105/108105132/
- IIT kharagpur

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Prof. C S Sharma/ Dr. Jitendra K. Tandekar
Subject handled by department	Electrical Engg.

Signature of BoS members:

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Department of Electrical Engineering

Semester/Year		II /II	Program		B.Tech.
Subject Category	OC	Subject Code:	OE- 305 (B)	Subject Name:	Network Analysis

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				**Practical**			Total Marks				
ES	MS	Quiz	Assig	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	-	3

Prerequisites:

The main Pre-requisites are physics, calculus and fundamental of electrical Engg.

Course Objective:

1. To solve different complex circuits using various network reduction techniques such as Source transformation, Network theorems etc.
2. To understand basic concepts of DC and AC circuit behaviour.
3. To analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.
4. To analyze two port circuit behaviours.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

CO1. Acquire and demonstrate the knowledge of circuit elements, different laws and Analysis of magnetically coupled circuits

CO2. Apply the knowledge of basic circuit law to simplify the networks using network theorems.

CO3. Analyze the RL, RC and RLC circuits using Laplace transform.

CO4. Analyze the transient, steady state of RL, RC and RLC circuits for AC and DC excitations.

CO5: Analysis of various two port networks with their connection, interrelationships and interconnection of two port networks (with respect to impedance, admittance).

UNITs	Descriptions	Hrs.	CO's
I	**Introduction to circuit elements** R, L, C and their characteristics in terms of linearity, KCL and KVL analysis, Nodal & mesh analysis with dependent source, Analysis of magnetically coupled circuits, Mutual and self Inductance, Dot convention, Energy in a Coupled Circuit.	8	CO1
II	**Network Theorems for AC & DC circuits-** Thevenin's & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.	8	CO2
III	**Laplace transforms and properties:** Initial conditions in networks and network solution with Laplace transformation, step, ramp and impulse functions, initial and final value theorem	8	CO3

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IV	**Transient behaviour and initial conditions:** Behaviour of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.	8	CO4
V	**Network function & Two port networks** –Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD.	8	CO5
Expert Lecture			
Total Hours		40	

Suggestive list of experiments:

TEXT BOOKS:

1. M.E. Van Valkenburg, Network Analysis, Phi Learning, 3rd Edition, 2010
2. Abhijit Chakrabarti, Circuit theory: Dhanpat Rai & co. 7th Edition, 2017

REFERENCE BOOKS:

1. William D Stanley : Network Analysis with Applications, Pearson Education, 4th Edition,2013
2. G.K. Mitha; Network Analysis; Khanna Publisher, 14 Edition,1988
3. Roy Choudhary D; Network and systems; New Age Pub,2nd Edition, 2013
4. Russell Mersereau and Joel Jackson , "Circuit Analysis: A Systems Approach; Pearson Pub..2005

Modes of Evaluation and Rubric

Theory (60)	Attendance (10)	Midsem (10 + 10)	Performance (10)	Total (100)

List/Links of e-learning resource

- https://archive.nptel.ac.in/courses/108/105/108105159/

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Jeetendra Prasad
Subject handled by department	Electrical Engg.

Signature of BoS members: