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INTEGRAL UNIVERSITY, LUCKNOW
DEPARTMENT OF ELECTRICAL ENGINEERING

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COURSE: Electric machines
COURSE CODE: EE223
COURSE CREDIT: 4

PREREQUISITES:

Subject	Description	Level of study
Basic Electrical Engineering	Basic current and voltage laws, Circuit theorems, Phasors	Basic

COURSE OBJECTIVES:

- Knowledge of principle of electromechanical energy conversion in rotating machines and the laws governing it.
- To understand the basic concept of different types of electrical DC and AC machines.
- To learn the practical application of Electrical Machines.
- To evaluate the performance of dc machines
- To identify different types of transformers and evaluate their performance

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Knowledge of electromechanical energy conversion in rotating machines
CO2	To study performance and characteristics of DC machines and principle and operation of Transformer.
CO3	Testing and application of Transformer and Operation of AC motor.
CO4	Operation of 3 phase of motor and their application.
CO5	Construction and operation of synchronous machines and their application

CO-PO MAPPING:

CO		PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design/development of solutions	PO4 Conduct investigations into complex problems	PO5 Modern tool usage	PO6 Engineer and Society	PO7 Environment and Sustainability	PO8 Ethics	PO9 Individual and Team work	PO10 Communication	PO11 Project Management and Finance	PO12 Lifelong learning
CO1	Knowledge of electromechanical energy conversion in rotating machines	2	1		2								1
CO2	To study performance and characteristics of DC machines and principle and operation of Transformer.	3	2		1								
CO3	Testing and application of Transformer and Operation of AC motor.	3	1			1							1
CO4	Operation of 3 phase of motor and their application.	3	1			2							1
CO5	Construction and operation of synchronous machines and their application	3	1	2		1							2
3: Strong contribution, 2: average contribution, 1: Low contribution													

SYLLABUS WITH CO:

UNIT	CONTENT	CO
I	Principle of Electromechanical Energy Conversion, Construction types of D.C. Machines. Principle of Electromechanical Energy Conversion, EMF equation, Performance characteristics of DC generator and motor, Starting, Speed control and braking of DC motor, Introduction to solid state speed Control of DC motor.	1
II	Performance of DC machine, Efficiency of DC machines, Application of DC motor, Numerical on efficiency, Principle of operation of transformer, Types of transformers, Losses in the transformer, Voltage Regulation of single phase transformer.	2
III	Testing of single phase transformers, Auto transformer, Three phase transformers, Three winding transformer, Welding transformer, Principle of operation of three phase induction motor, Types of three phase induction motor, Industrial application of three phase induction motor and numerical.	3
IV	Characteristics of three phase induction motor, Three phase induction motor starters, Three phase induction motor speed controls, Three phase induction motor braking, Principle of operation of single phase induction motor, Types of single phase induction motors, Shaded pole type single phase induction motor, Industrial application of single phase induction motor and numerical.	4
V	Construction and types of synchronous machine, Types of synchronous generators, Principle of operation of synchronous motor, Methods of starting of synchronous motor, Hunting in synchronous motor, Method of synchronization of alternator, Application of synchronous motor.	5

RECOMMENDED BOOKS:

Text Books:

1. Electric Machinery and transformers, I.L.Kosow, PHI
2. Electrical Machine, I J Nagrath and D P Kothari (TMH)
3. Fundamental of Electrical Machines, B.R. Gupta & V. Singhal (New Age International Pub.)

Reference Books:

1. Electrical Machinery, Fitzgerald, Kingsley (McGraw Hill)
2. Electrical Machines and their applications, J Hind Marsh