Department of Electrical and Electronics

Number of programmes where syllabus revision was carried out

SL. NO.	COURSE CODE	COURSE OFFERED
1	SEEA1202	DC Machines and Transformer

SEEA1202	DC MACHINES AND TRANSFORMERS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To analyze the electromechanical system.
- To impart knowledge in construction details, principle operation and performance characteristics of DC machines and transformer.
- To evaluate the different losses and performance of DC machines and transformer using different testing methods.
- To analyze the performance characteristics of DC machines.
- To impart knowledge in three phase transformer connection.

UNIT 1 MAGNETIC CIRCUITS 9 Hrs.

Definition of MMF, Flux and Reluctance - Leakage Factor - Reluctances in Series and Parallel (Series and Parallel Magnetic Circuits)- Electromagnetic Induction - Fleming's Rule - Lenz's Law - Faraday's laws -statically and dynamically induced EMF- Self and mutual inductance – Analogy of Electric and Magnetic Circuits.

UNIT 2 D.C.GENERATORS 9 Hrs.

Constructional Details - Principle of Operation - E.M.F Equation - Methods of Excitation - Types – losses and efficiency- No load and Load characteristics of Series, Shunt and Compound generators - Armature Reaction, Effects, Methods of Compensation – Commutation - Methods of Improving Commutation – Applications.

UNIT 3 D.C MOTORS 9 Hrs.

Principle of Operation - Back E.M.F and Torque Equation - Characteristics of Series, Shunt & Compound Motors -Starters - Speed Control of DC Series & Shunt Motors - Testing of DC Machines - Brake Test, Swinburne's Test & Hopkinson's Test.

UNIT 4 SINGLE PHASE TRANSFORMER 9 Hrs.

Principle of Operation - Constructional Details - E.M.F. Equation - Transformation Ratio - losses and efficiency – Transformer on No Load - Parameters Referred to HV / LV Windings - Equivalent Circuit - Transformer On Load - Phasor diagram - Regulation - Testing of Transformer - Open Circuit and Short Circuit Test - All day Efficiency - Sumpner's Test..

UNIT 5 THREE PHASE AND SPECIAL TRANSFORMERS 9 Hrs.

Auto Transformer - Saving of copper in comparison with Two winding Transformer - Parallel Operation of Single Phase Transformers - Construction of Three Phase Transformer - Transformer Connections – Scott connection - Three Phase to Single Phase Transformer conversion - Elementary Ideas on Instrument Transformers and Toroidal Transformer.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concept of magnetic circuits.
CO2 - Explain the principle, types, effect of armature reaction and commutation of DC generator.
CO3 - Analyze the performance characteristics of DC motor using various testing methods.
CO4 - Understand the principle, equivalent circuit and performance of a single phase transformer.
CO5 - Compare the saving of copper of auto transformer with a two winding transformer.
CO6 - Analyze the various transformer connection for specific application.

TEXT / REFERENCE BOOKS

1. A K Theraja & B L Thereja, "A Text book of Electrical Technology (Vol II)", S Chand & Co- 23rd Edition 2008.
2. I J Nagrath and D P Kothari, "Electrical Machines", Tata McGraw Hill Publishing Company Limited New Delhi, 3rd Edition, 2007.
3. R.K.Rajput, "Electrical Machine", Laxmi Publications, 5th Edition 2008.
4. S K Sen, "Electrical Machinery", Khanna Publishers, New Delhi, Reprint 2002.
5. John Hindmarsh, U.M.I.S.T England, "Electrical Machines & their applications", Pergamon, 4th edition 2014.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 10 Question of 2 marks each – No choice **20 Marks**
PART B: 2 Questions from each unit of internal choice; each carrying 16 marks **80 Marks**