SCHEME OF COURSE WORK

Course Title	**ELECTRICAL MACHINES LAB-II**		
Course Code	**13EE1115**	L T P C	0 0 3 2
Program	B.Tech		
Branch	Electrical and Electronics Engineering		
Semester	V		
Prerequisites	The students should have undergone a basic course on construction and operation transformers and AC machines		

Course Outcomes (COs):

At the end of the Course, the Student will be able to:

CO-1	Test the parallel operation of 1-phase transformers.
CO-2	Identify the polarity and perform the heat run test on 3 Nos. of phase transformers
CO-3	Determine the performance characteristics of 3 phase induction machine by conducting direct and indirect methods.
CO-4	Determine Xd, Xq and the Regulation of 3 phase alternator by conducting EMF and MMF methods.
CO-5	Determine the performance of single phase induction motor by conducting indirect test.

Program Outcomes (POs):

The student of Electrical and Electronics Engineering at the end of the program will be able to:

PO-1	Apply the knowledge of basic sciences and electrical and electronics engineering fundamentals to solve the problems of power systems and drives.
PO-2	Analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present Information and Communications Technology.
PO-3	Design and develop electrical machines and associated controls with due considerations to societal and environmental issues.
PO-4	Design and conduct experiments, analyze and interpret experimental data for performance analysis.
PO-5	Apply appropriate simulation tools for modeling and evaluation of electrical systems.
PO-6	Apply the electrical engineering knowledge to assess the health and safety issues and their consequences.
PO-7	Demonstrate electrical engineering principles for creating solutions for sustainable development.
PO-8	Develop a techno ethical personality that help to serve the people in general and Electrical and Electronics Engineering in particular.
PO-9	Develop leadership skills and work effectively in a team to achieve project objectives.
PO-10	Communicate effectively in both verbal and written form.
PO-11	Understand the principles of management and finance to manage project in multi disciplinary environments.
PO-12	Pursue life-long learning as a means of enhancing the knowledge and skills.

Course Outcome versus Program Outcomes:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	S	M	S	S	S							M
CO-2	S	M	S	S	S							M
CO-3	S	S	S	S	S							M
CO-4	S	S	S	S	S							M
CO-5	S	S	S	S	S							M

S - Strongly correlated, M - Moderately correlated, Blank - No correlation

Assessment Methods	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	**TOPIC / CONTENTS**	**Course Outcomes**	**Sample questions**	**Teaching-learning strategy**	**Assessment Method**
1.	Manual Write up & Demonstration	CO-1, CO-2, CO-3 & CO-4	How to perform Data Acquisition with NI LabVIEW & DAQ device.	Demonstration & Power point Presentation	Day to Day Analysis & Lab Internals
2.	Parallel-operation of single-phase transformers.	CO-1	Conduct an experiment to observe load sharing between two parallelly operating transformers	Demo and Experimentation	Day to Day Analysis & Lab Internal-I
3.	Polarity test, poly phase connection of transformers using 3 single-phase transformers	CO-2	Conduct Polarity test, Polyphase connection of transformers using 3 single-phase transformers	Demo and Experimentation	Day to Day Analysis & Lab Internal-I
4.	No-load & blocked rotor tests on three-phase induction motor and circle diagram.	CO-3	Perform experimentation to obtain circle diagram of a 3-phase induction motor and calculate its efficiency at full load.	Demo and Experimentation	Day to Day Analysis & Lab Internal-I
5.	Regulation of a three-phase alternator by synchronous impedance, M.M.F. and ZPF methods.	CO-4	Regulation of a three-phase alternator by synchronous impedance, M.M.F. and ZPF methods.	Demo and Experimentation	Day to Day Analysis & Lab Internal-I
6.	Determination of Xd and X q of a salient pole synchronous generator	CO-4	Perform an experiment to obtain direct and quadrature axes reactances of a synchronous machine.	Demo and Experimentation	Day to Day Analysis & Lab Internal-I
7.	Revision and Doubts clarification of first cycle experiments	CO-1, CO-2, CO-3 & CO-4	On first cycle Experiments	Demo and Experimentation	

8.	**LAB INTERNAL-I**	CO-1, CO-2, CO-3 & CO-4	Perform experimentation to obtain circle diagram of a 3-phase induction motor and calculate its efficiency at full load.		
9.	Manual Write up & Demonstration	CO-2, CO-3, CO-4 & CO-5	How to plot the OCC characteristics of DC shunt Generator using NI LabVIEW & DAQ device.	Demonstration & Experimentation	Day to Day Analysis & Lab Internal
10	Determination of equivalent circuit parameters of a single phase induction motor.	CO-5	Conduct an experiment to obtain the equivalent circuit parameters of a 1-phase Induction Motor	Demo and Experimentation	Day to Day Analysis & Lab Internal-II
11.	Open loop v/f control for an inverter fed induction motor	CO-3	Obtain speed control of an Induction Motor using V/f control.	Demo and Experimentation	Day to Day Analysis & Lab Internal-II
12.	V and inverted-V curves of a three-phase synchronous motor at finite load.	CO-4	Perform synchronisation of a 3-phase alternator with AC mains and obtain V & inv-V curves of the synchronous machine (motor).	Demo and Experimentation	Day to Day Analysis & Lab Internal-II
13.	Load test on three-phase induction motor	CO-3	Obtain the efficiency of a 3-phase induction motor by loading it electrically. Assume efficiency of DC machine as 74%.	Demo and Experimentation	Day to Day Analysis & Lab Internal-II
14	Heat run test on a bank of 3 Nos. of single-phase delta connected transformers.	CO-2	Conduct heat run test on a bank of 3 Nos. of single-phase delta connected transformers.	Demo and Experimentation	Day to Day Analysis & Lab Internal-II
15.	Revision and Doubts clarification of Experiments.	CO-2, CO-3, CO-4 & CO-5	On second cycle Experiments	Demo and Experimentation	
16.	**LAB INTERNAL-II**	CO-2, CO-3, CO-4 & CO-5	Conduct a suitable experiment to obtain speed control of an Induction Motor using V/f control.		
.	**SEMESTER END EXAM**				