SCHEME OF COURSE WORK

Course Details:

Course Title	**: ELECTRICAL MACHINES-I**		
Course Code	**: 13EE1102**	**L T P C**	**: 4 0 0 3**
Program:	**: B. Tech.**		
Specialization:	**: ELECTRICAL AND ELECTRONICS ENGINEERING**		
Semester	**: III SEM**		
Prerequisites	**: BASIC NETWORKS, NETWORK ANALYSIS AND SYNTHESIS.**		
Courses to which it is a prerequisite	**: ALL ADVANCED MACHINE DESIGN COURSES**		

Course Outcomes (COs): At the end of the course students will be able to:

1	Outline different types of electromechanical energy conversion and determine dynamic equation of rotating machines.
2	Identify and Define different types of dc generators, interpret their performance under different load conditions.
3	Describe the construction and working principle of various types of DC motors.
4	Distinguish between different types of transformers and compute their equivalent circuit parameters.
5	Determine the performance of DC machine and Transformers by conducting different tests.

Program Outcomes (POs):

1	Be on part with those from any advanced institution.
2	Take up any job either in the core industry (or) in allied disciplines.
3	Fit to write any competitive examinations for getting selected either for M.S. program (or) to undertake relevant career at a high end.
4	Develop a techno ethical personality that makes him serve the people in general & Electrical & Electronics Engineering in particular.
5	Enable the students adopt themselves in any socio-technological situation.
6	Develop communication and leadership skills so that the candidates in their future become leaders in the industry & academia.
7	Make students do projects either of fundamental nature (or) of the ones useful to industry such that in either case they enter the frontiers of research.
8	Have a basic capability to analyze and /or design an electrical &electronics system and be useful to the community in general.
9	Function effectively as an individual and also as a member and leader in diverse teams.
10	Communicate effectively problems of his discipline to the experts of other disciplines.
11	Have sufficient working knowledge in IT tools for him to correctly model the system and predict the solution.
12	Prepare for a life-long learning in the broadest context of technological changes.

Course Outcome Versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S	S	S	M	M	M	M	M	M	-	M
CO-2	S	S	S	S	S	S	M	M	M	M	-	M
CO-3	S	S	S	S	S	M	M	M	M	M	-	M
CO-4	S	S	S	S	S	M	M	M	M	M	-	M
CO-5	S	S	S	S	S	S	M	M	M	M	-	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 & Schedule
1	**UNIT-I: TRANSFORMERS** Constructional details of core and shell type transformers - Types of windings – Principle of operation - emf equation.	CO1	Explain principle of transformer with neat diagrams? Derive the emf equation of transformer and write the differences between core type and shell type transformers?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 1)
2	Transformation ratio - Transformer on no-load - Parameters referred to HV / LV windings.	CO1	Explain why tappings are provided on hv winding ? Explain on load tap changing of transformers with neat diagrams?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test 1 (Week 8) Seminar (Week 2)
3	Equivalent circuit – Transformer on load – Efficiency and Regulation.	CO1	Draw the equivalent circuit of a transformer and explain each parameter? Derive the voltage regulation and efficiency of a transformer with suitable?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test 1 (Week 8) Seminar (Week 3)
4	**UNIT-II: PARALLEL OPERATION & TESTING OF TRANSFORMERS** Parallel operation of single phase transformers – Three phase transformers.	CO2	Write advantages of parallel operation of transformers and write and explain the all conditions of parallel operation? Write types three phase transformers with neat diagrams ?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 4)
5	Vector group-Auto transformer Testing of transformers	CO2	Draw the vector diagram of transformer for leading ,lagging and unity power factor loads? Write a short notes on auto transformers and write comparisons of two winding and auto transformers?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 5)
6	Polarity test, load test, open circuit and short circuit tests – All day efficiency.	CO2	Write short notes on oc and sc test of transformers? Write differences between all day efficiency and power efficiency and derive the formulas?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week 6)
7	**UNIT-III: BASIC CONCEPTS OF ROTATING MACHINES** EMF induced in dc machine-wave shape of induced e.m.f- flux distribution curve and fringing-average value of induced EMF-direction of induced EMF-force on conductor carrying current-power developed by armature torque developed by armature	CO3	Derive the dynamical Induced emf equation of rotating machine? Write a short notes on armature torque and shaft torque?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test 1 (Week 8) Seminar (Week-7)
8	**Mid-Test 1**		**UNIT I, II AND HALF PART IN IIIrd.**		
9	the laws of the magnetic circuit-units relative permeability-magnetization curves for iron-magnetic circuit of dc machine-flux distribution curve or filed form-reluctance of air gap-active iron length-	CO3	Write a short notes on construction of dc machine? Write a short notes on air gap energy and co energy?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test (Week 17) Seminar (Week-9)

	armature teeth-tapered teeth				
10	real and apparent flux density armature core-form of pole section-magnetic leakage-effect of load upon leakage coefficient-the yoke-magnetization curve of dc machine-effect of saturation upon filed form-filed form and voltage between commutator segments-flux plotting.	CO3	Write a short notes on magnetic yock of dc machine? Draw and explain the armature reaction of dc machine?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-10)
11	**UNIT-IV: DC GENERATORS** Constructional details– Methods of excitation – Self and separately excited generators – shunt generator- effect of speed upon self excitation- failure of excite-reversed polarity-series generator-compound.	CO4	Write and explain the different types of dc generators? Explain if filed winding of dc shunt machine opens under running condition?	▫ Lecture ▫ Discussion Problem Solving	Mid-Test (Week 17) Seminar (Week-11)
12	Wound generator field windings-calculation of shunt coils- calculation of series coils-external characteristics of separately excited and shunt generator-series generator characteristics.	CO4	Write types of characteristics of dc generator and explain detailed? Write applications of dc series generator?	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test (Week 17) Seminar (Week-17)
13	compound generator characteristics-generator in parallel equalizing connection.	CO4	What are the conditions for parallel operation of dc generators? Write a short notes on equalizing rings in parallel operation of dc generators?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-13)
14	**UNIT-V: DC MOTORS &TESTING OF DC MACHINES** Back EMF induced in DC motor armature-load characteristics of shunt, series, and compound motors-speed-voltage characteristics of motors parallel operation	CO5	What is the function of back emf in dc motor? Why drooping characteristics will occur in dc shunt motor? What is the types speed control of dc motor?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-14)
15	series operation-speed control of dc motors-Ward Leonard control Brake test, Swinburne's test, Retardation test.	CO5	How to determine efficiency of dc motor with retardation test explain with neat diagram? Write a short notes on swinburn's test?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-15)
16	Hopkinson's test separation of iron and friction loss- separation of hysteresis and eddy current losses.	CO5	Write short notes on Hopkinson's test? Draw the power flow diagram and explain each block clearly?	▫ Lecture ▫ Discussion ▫ Problem Solving	Mid-Test (Week 17) Seminar (Week-16)
17.	**Mid-Test 2**		**UNIT IV, V AND HALF PAT IN IIIrd**		
18.	**Preparation and Practical Examination**		**----------**		
19,20	**END EXAM**		**UNIT-I,II,III,IV,V**		Assessment will be on all topics at END EXAM