



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Second Year Bachelor of EC Engineering

Subject Code: EC306-N	Subject Title: ELECTRICAL MACHINES
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Course Objective:

- To present a problem oriented introductory knowledge of Electrical Machines.
- To focus on the study of electro mechanical energy conversion & different parts of electrical machine.
- To address the underlying concepts & methods behind Electrical Engineering machines.
- To identify & formulate solutions to problems relevant to Electrical Machines and find the efficiency of machine.

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
02	00	02	04	03	03	70	30	20	30	150

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	DC generators:	6
2	DC Motors	6
3	3-Phase induction motor	8
4	Transformer	8
5	Special Machines	4

Total hours (Theory): 32

Total hours (Practical): 32

Total hours: 64



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Detailed Syllabus:

Sr. N	Topic	Lecture Hours	Weight age(%)
1	DC generators Working principle, Construction, Types, Open circuit characteristic, External and Internal characteristic, Losses & Efficiency	6	20
2	DC Motors Principle of operation, Types, Torque equation, Speed-Torque characteristics of shunt, series and compound motor, Need of Starter and Types, Methods of speed control, Losses and Efficiency.	6	20
3	3-Phase induction motor Construction, , Principle of operation, Production of Rotating magnetic field ,Speed and Slip, Rotor current , Power Flow diagram, Relations between rotor input, copper losses and Output, Torque Equation, Torque-Slip Characteristics, Losses and Efficiency, Need of Starters and Types, Methods of Speed control.	8	25
4	Transformers Construction of Three phase and single phase transformers, Working principle, Types of transformers based on construction EMF equation, no load and on load vector diagram, SC and OC test, and Basic Introduction of Three phase Tranformer, Auto transformer.	8	25
5.	Special Machines Stepper motor: General construction, working and applications, Synchronous Motor, Universal Motors, AC & DC Servo motors.	4	10
	Total	32	100



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Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Learning Outcomes:

At the end of this course, the student would be able

- The student can be acquired the basic knowledge of energy conversion principle and electrical machine thus being Prepared to pursue any area of engineering spectrum in depth as desired.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and Techniques for their use.

TEXT BOOKS & REFERENCE BOOKS :

1. Electrical Machines. by Nagarath & Kothari,MHE Publications
2. Electrical Technology Vol II. B. L. Theraja,S .Chand Publications
3. Performance and Design of A.C. machines by M. G. Say
4. Electrical Machines by P S Bhimbra
5. Electrical Machines by J. B. Gupta, Kataria Pub.



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LIST OF EXPERIMENTS

Sr. No.	Name of experiment
1	Constructional study of D.C. Machine Parts
2	To obtain the magnetization characteristic of a separately excited D.C Generator
3	To Obtain Internal and External characteristic of D.C Shunt Generator.
4	To obtain Internal and External characteristics of a D.C. Series generator.
5	To obtain External and Internal characteristics of a D.C. compound generator
6	Study construction and working principle of the d.c. motor Starter.
7	To perform the speed control of D.C shunt Motor by (i) Field Control Method (ii) Armature Control Method
8	Constructional study of 1-Phase Transformer.
9	Constructional study of 3-Phase Induction Motor.
10	To perform load Test on a 3- Φ Induction Motor & Obtain the performance characteristics.