



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Electrical Branch)
With effect from: Academic Year 2020-21

Subject Code: EE802-N	Subject Title: Electrical Machine Design-II
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Course Objective:

- To present a problem oriented introductory knowledge of Economics and planning of Electrical Design and costing Engineering systems.
- To understand basic concepts of Electrical Design and costing of Electrical Engineering.

A. Teaching / Examination Scheme

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				
3	0	2	5	4	3	70	30	20	30	150

B. Outline of the Course

1. Design Of DC Machines

a. DC Machine Design

Introduction, output equation, Choice of B_{av} and a_c , mmf calculation, Selection of Number of poles, core length, armature diameter, Number of ventilating Ducts, Examples, length of air gap, Examples on above topics.

b. Armature Design

Effect of Armature Reaction & Brush Shift, Choice of armature winding, Number of armature conductor & Coils, number of armature slots, slot dimensions, slot loading, Armature voltage Drop, Design of armature core, Examples on above topics.

c. Design of Field System

Pole design, Tentative design of field winding, Design of Shunt Field Winding, Design of Series Field, Examples on above topics, Commutation Phenomenon, Design of interpoles, Design of commutator and brushes, Losses & Efficiency.

2. Design Of Synchronous Machines

Introduction, output equation, Main dimension, SCR, effect of SCR on machine performance, Length of air gap and shape of pole face, Armature design, Armature winding (Single layer and double layer), number of armature slots, slots dimension, length of mean turns, calculation of armature resistance and reactance Design of rotor, Design of magnetic circuit, Open circuit characteristic, Determination of full load field



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MMF, Design of field winding Determination of direct and Quadrature axis synchronous reactance Short circuit characteristics, Performance evaluation Design of Turbo alternators, Main dimension, Length of air gap, Stator & Rotor design Algorithms and Flow chart Design consideration for low speed alternators and vertically operated alternator

C. Lesson Planning

SR No.	Lectures (Hours)	Weight-age in % in Exam	Topic
1	8	50	DC Machine Design Introduction, output equation, Choice of B_{av} and a_c , mmf calculation, Selection of Number of poles, core length, armature diameter, Number of ventilating Ducts, Examples, length of air gap, Examples on above topics.
2	8		Armature Design Effect of Armature Reaction & Brush Shift, Choice of armature winding, Number of armature conductor & Coils, number of armature slots, slot dimensions, slot loading, Armature voltage Drop, Design of armature core, Examples on above topics.
3	8		Design of Field System Pole design, Tentative design of field winding, Design of Shunt Field Winding, Design of Series Field, Examples on above topics, Commutation Phenomenon, Design of interpoles, Design of commutator and brushes, Losses & Efficiency.
4	7	50	Design Of Synchronous Machines Introduction, output equation, Main dimension, SCR, effect of SCR on machine performance, Length of air gap and shape of pole face, Armature design, Armature winding (Single layer and double layer), number of armature slots, slots dimension, length of mean turns, calculation of armature resistance and reactance
5	7		Design of rotor, Design of magnetic circuit, Open circuit characteristic, Determination of full load field MMF, Design of field winding Determination of direct and Quadrature axis synchronous reactance Short circuit characteristics,
6	7		Main dimension, Length of air gap, Stator & Rotor design Algorithms and Flow chart Design consideration for low speed alternators and vertically operated alternator.
	45	100	



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D. Term work:

1. Design of DC Machine
2. Drawing sheet of DC Machine
3. Drawing and description of syn. M/c components
4. Design of synchronous Machine
5. Tutorials of single phase I.M and Submersible pumps

E. Instructional Method & Pedagogy

- 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, 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.

F. Students Learning Outcomes

On successful completion of the course

- The student can be acquired the basic knowledge of Economics and planning of Electrical Design.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use by design Implementation.

Reference books:

1. Electrical Machine Design **by A. K. Sawhney, Dhanpat Rai & Co. Pub.**
2. Electrical Machine Design **by R. K. Aggrawal, S.K.Kataria Pub.**
3. Electrical Machine Design **by V. N. Mittle, TMH publications.**
4. Electrical Machine Design **by S. K. Sen, Oxford Publications.**