

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
Programme		B.Tech. (Electrical Engineering)			
Class, Semester		Third Year B. Tech., Sem V			
Course Code		6OE343			
Course Name		Open Elective I : Electrical Machine Technology			
Desired Requisites:		Basic Electrical Engineering			
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Credits: 3					
Course Objectives					
1	To make students understand operation and performance of ac and dc machines.				
2	To make students learn characteristics of ac and dc machines.				
3	To develop skills to choose ratings of ac and dc machines for various applications.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Explain the construction and working principle of A.C. and D.C. Machines.			II	Understand
CO2	Examine the various characteristics of A.C. and D.C. machines.			III	Apply
CO3	Analyze the performance of A.C. and D.C. machines for various applications.			IV	Analyze
Module	Module Contents				Hours
I	Module 1: DC Motors Review of Construction, Working and Types, Back emf, Speed equation, Armature Reaction, Torque equation, Speed torque characteristics, Applications, Power losses in d.c. motors. Need of starter speed control of D.C. shunt and series motor, Reversal of rotation, Electric braking of shunt and series motor.				7
II	Module 2: Single Phase Transformer Construction and type, EMF equation phasor diagram, equivalent circuit, efficiency, losses, regulation, Experimental determination of equivalent circuit parameters and calculation of efficiency and regulation, Introduction to three Phase Transformer, Connection of three Phase Transformer, Applications of Transformers.				7
III	Module 3: Single-Phase Induction Motor Double revolving field theory and principle of operation. Construction and operation of split-phase, capacitor start, capacitor run, and shaded pole motors. Comparison of single-phase motors and applications.				6
IV	Module 4: Three Phase Induction Motor Construction, Types, Working, Speed equation, Torque equation, Starting torque, Concept of full load torque, torque speed characteristics, Power stages in motor, Induction Generator.				6

V	Module 5: Synchronous Machines Alternator, Construction of Alternator, Synchronous Motor, Equivalent Circuit, Motor on load, Pull-Out Torque, Motor Phasor Diagram, Mechanical Power Developed by Motor, Power Factor of Synchronous Motor, Application of Synchronous Motor, Comparison of Synchronous Motor with Induction Motor.	6
VI	Module 6: Special-Purpose Electric Machines Stepper motor-Variable-Reluctance Motor, Permanent Magnet Motor, Hybrid Stepper Motor, Servomechanism, D.C. Servomotors, A.C. Servomotors, Switched Reluctance Motor, Permanent Magnet D.C. Motor, Brushless D.C.Motor. Selection and Sizing of Motors based on applications.	4

Textbooks

1	S. J. Chapman, "Electric Machinery Fundamentals", Tata Mc Graw Hill publication, 4th Edition, 2011, ISBN: 9780071070522
2	M. G. Say. "Performance Design of AC Machines", CBS Publishers, 3rd Edition, 2017, ISBN: 9788123910277

References

1	SK Bhattacharya, "Electrical Machines", Tata Mc Graw Hill, 3rd Edition, 2010, ISBN: 9789332902855
2	J. B. Gupta, "Electrical Machines", SK Kataria and Sons, 2013, ISBN: 9789350140550

Useful Links

1	https://nptel.ac.in/courses/108/102/108102146/
2	https://nptel.ac.in/courses/108/105/108105155/
3	https://nptel.ac.in/courses/108/105/108105131/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2		2												
CO3		2												

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)