

15EE210	Electrical Machines II			L	T	P	C
				3	0	0	3
<i>Co-requisite:</i>	NIL						
<i>Prerequisite:</i>	NIL						
<i>Data Book / Codes/Standards</i>	NIL						
<i>Course Category</i>	P	PROFESSIONAL CORE	ELECTRICAL MACHINES				
<i>Course designed by</i>	Dept. of Electrical and Electronics Engineering						
<i>Approval</i>	32 nd Academic Council Meeting , 2016						

PURPOSE	To acquire knowledge about different types of AC machines						
INSTRUCTIONAL OBJECTIVES				STUDENT OUTCOMES			
At the end of the course, the student will be able to							
1.	Comprehend the construction, principle of operation, characteristics of three phase and single phase induction motor and their application.	a	e				
2.	Know the construction and performance of synchronous machines	a	e				
3.	Understand the construction and characteristics of special motors and their applications	a	h				

Session	Description of Topic	Contact hours	C-D-I-O	IOs	References
	UNIT I: THREE PHASE INDUCTION MOTOR	9			
1	Construction details of three-phase induction motor, Rotating magnetic field, principle of operation	2	C	1	1,2
2	Slip, Effect of slip on rotor parameters	1	C	1	1,2
3	Torque equation, Torque-slip characteristics	1	C	1	1,2
4	Power Stages	2	C	1	1,2
5	Induction motor as generalized transformer-Equivalent circuit	2	C	1	1,2
6	No load and blocked rotor tests, Equivalent circuit	1	C	1	1,2
	UNIT II: STARTING, SPEED CONTROL AND PERFORMANCE CALCULATION FROM CIRCLE DIAGRAM	9			
7	Performance calculation from circle diagram	2	C,D	1	1,2
8	Need for starters–Starting methods of three-phase induction motor	1	C	1	1,2
9	Speed control of three-phase induction motor: Stator side, Rotor side	2	C	1	1,2
10	Slip power recovery schemes	1	C	1	1,2
11	Double cage rotor, Induction generator, Cogging, Crawling,	2	C	1	1,2
12	Electric Braking	1	C	1	1,2
	UNIT III: SINGLE-PHASE INDUCTION MOTOR AND SPECIAL MOTORS	8			
13	Single-phase induction motor: Construction detail, Double revolving field theory, Torque equation, Torque-speed characteristics	1	C	1	1,2
14	Equivalent circuit, No load and Blocked rotor tests, Performance analysis	2	C	1	1,2
15	Methods of Self-starting-shaded pole induction motor	1	C	1	1,2
16	Construction, Principle of operation and applications of Linear Induction motor, Universal motor, stepper motor	2	C	3	2,3

Session	Description of Topic	Contact hours	C-D-I-O	IOs	References
17	Construction, Principle of operation and applications of reluctance motor, repulsion motor, AC series Motor	2	C	3	2,3
	UNIT IV - SYNCHRONOUS GENERATORS	10			
18	Alternators: Construction features and types	1	C	2	1,2
19	EMF equation of alternators, armature reaction in alternators	1	C	2	1,2,6
20	Alternator on load, Synchronous reactance, Synchronous Impedance	1	C	2	1,2
21	Voltage regulation, Pre-determination of voltage regulation using EMF and MMF methods	2	C	2	1,2
22	Pre-determination of voltage regulation using ZPF and ASA methods	2	C	2	1,2
23	Synchronizing and parallel operation of alternators	1	C	2	1,2,5
24	Salient pole synchronous machine, two-reaction theory, slip test	2	C	2	1,2,5
	UNIT V - SYNCHRONOUS MOTOR	9			
25	Principle of operation, Methods of starting	1	C	2	1,2
26	Torque and power equations	1	C	2	1,2
27	Synchronous motor on load, Synchronous motor on constant excitation variable load.	1	C	2	1,2,4
28	Synchronous motor on constant load variable excitation, 'V' and inverted 'V' curves, Synchronous condenser	1	C	2	1,2,3
29	Hunting and its suppression	1	C	2	1,2,4
30	Behavior of synchronous machine on short circuit, capability curves	2	C	2	1,2
31	Brushless DC motor, PMSM	2	C	3	1,2
	Total contact hours			45	

LEARNING RESOURCES

Sl. No.	TEXT BOOKS
1	Nagarath.I.J. and Kothari.D.P., " <i>Electric Machines</i> ", T.M.H. Publishing CoLtd., New Delhi, 4 th edition 2010.
2	Gupta., " <i>Theory and Performance of Electrical Machines</i> ", . Kataria and Sons, 14 th edition 2009.
3	Mulukutla.S.Sarma and MukeshK.Pathak, " <i>Electric Machines</i> ", Cengage Learning.,New Delhi, 2012
REFERENCE BOOKS / OTHER READING MATERIAL	
4	Fitzgerald Kingsley and Umans, " <i>Electric Machinery</i> " McGraw HillBooks co., New Delhi, 7 th Edition, 2013.
5	R.K.Srivastava, " <i>Electric Machines</i> ", Cengage Learning.,New Delhi,2 nd edition, 2013
6	Bhag S.Guru and Huseyin R.Hiziroglu " <i>Electric Machinery and Transformers</i> " Oxford University Press,3 rd edition, 2012.

Course nature		Theory					
Assessment Method (Weightage 100%)							
In-semester	Assessment tool	Cycle test I	Cycle test II	Cycle Test III	Surprise Test	Quiz	Total
	Weightage	10%	15%	15%	5%	5%	50%
End semester examination Weightage :							50%