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Reg. No.												

Question Paper Code	11648

B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Fourth Semester

Electrical and Electronics Engineering

20EEPC401 - SYNCHRONOUS AND INDUCTION MACHINES

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level,CO
1.	Distinguish between "synchronous reactance" and "Potier reactance" of a synchronous generator.	2,K1,CO1
2.	Why the concept of Two reaction theory is applied only to salient pole machine?	2,K1,CO1
3.	How synchronous motor can be used as synchronous condenser?	2,K1,CO2
4.	State the uses of damper winding in synchronous machine.	2,K1,CO2
5.	What are the advantages of skewing of cage rotor conductors?	2,K1,CO3
6.	A 3 phase Induction motor is wound for 4 poles and is supplied from 50Hz system. Calculate the speed at which the magnetic field of the rotor is rotating.	2,K1,CO3
7.	List the advantages of rotor resistance starter.	2,K1,CO4
8.	What is meant by plugging?	2,K1,CO4
9.	Why single phase Induction Motor is not self-starting?	2,K1,CO5
10.	State the applications of single-phase Induction Motor.	2,K1,CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	A 3-Phase, star-connected, 1000KVA, 11,000V alternator has rated current of 52.5A. The ac resistance of the winding per phase is 0.45Ω.The test results are given below: OC Test: field current = 12.5 A, voltage between lines = 422V. SC Test: field current = 12.5 A, line current = 52.5A Determine the full load voltage regulation of the alternator (i) 0.8 pf lagging and (ii) 0.8 pf leading.	13,K2,CO1
		OR	
	b)	(i) Illustrate a method of determining the direct and quadrate axis reactances of a salient pole synchronous generator.	7,K2,CO1
		(ii) Derive the emf equation of alternator.	6,K2,CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

12. a) Explain effect of changing field current excitation at constant load. *13,K2,CO2*
(i) Under excitation (ii) Normal excitation (iii) Over excitation.

OR

b) (i) Illustrate the phenomenon of Hunting. *5,K2,CO2*
(ii) Explain the various starting methods of a synchronous motor. *8,K2,CO2*

13. a) (i) Explain torque slip characteristics of induction motor. *5,K3,CO3*

(ii) A 6 pole, 50Hz, 3 phase, induction motor running on full load develops a useful torque of 160Nm. When the rotor emf makes 120 complete cycle per minute. Calculate the shaft power input. If the mechanical torque lost in friction and that for core loss is 10 Nm, compute. The copper loss in the rotor windings. The input of motor. The efficiency. The total stator loss is given to be 800W. *8,K3,CO3*

OR

b) (i) Develop an equivalent circuit for three phase induction motor. *7,K3,CO3*

(ii) Write brief notes on: (a) Squirrel cage Induction Motor (b) Induction Generator. *6,K3,CO3*

14. a) (i) Discuss any two types of starting methods of induction motors. *7,K2,CO4*
(ii) Explain in detail the slip power recovery scheme. *6,K2,CO4*

OR

b) Explain briefly the various speed control schemes of induction motors refer to stator side. *13,K2,CO4*

15. a) Give the classification of single-phase motors. Explain any two types of single-phase induction motors. *13,K2,CO5*

OR

b) Explain the working of single phase Induction motor using double field revolving theory. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A 1500 kW, 3 phase, star connected, 3.3 kV synchronous motor has reactance of Xd = 4.01 ohm and Xq = 2.88 ohm per phase. All losses may be neglected. Calculated the excitation emf when the motor is supplying rated load at unity PF. Also calculate the maximum mechanical power that the motor can supply with excitation held fixed at this value. *15,K2,CO2*

OR

b) A 9 kW, 400 V, 3 phase star connected synchronous motor has synchronous impedance per phase of (0.4 + j3) ohm. Find the angle of retard and the voltage to which the motor must be excited to give a full load output at 0.8 leading pf. Assume in efficiency of 90%. *15,K2,CO2*