O.P.Code: 23EE0214	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Regular Examinations July/August-2025

INDUCTION AND SYNCHRONOUS MACHINES

(Electrical & Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What is slip in an induction motor?	CO1	L1	2M
	b	What are the two types of 3-phase induction motors?	CO1	L1	2M
	c	What is the slip at maximum torque in an induction motor?	CO2	L1	2M
	d	What is the main difference between crawling and cogging?	CO2	L3	2M
	e	List out any two applications of Shaded pole induction motor.	CO3	L4	2M
	f	Name any two application of a single-phase induction motor.	CO3	L3	2M
	g	What are the main parts of a synchronous generator?	CO4	L2	2M
	h	How is the frequency of a synchronous generator related to speed and number of poles?	CO4	L3	2M
	i	What is meant by "loss of synchronism" in a synchronous motor?	CO5	L2	2M
	j	What is the relation between rotor speed and stator frequency in a synchronous motor?	CO5	L3	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Explain the production of rotating magnetic field in 3 phase Induction motor.	CO1	L4	6M
	b	A three-phase squirrel cage induction motor connected to 50HZ line, possesses the synchronous speed of 1000 rpm. the motor absorbs 35KW and the stator copper and iron loss amount to 6KW and 2KW respectively, calculate torque developed by the motor.	CO1	L3	4M

OR

3	a	Explain the phasor diagram of 3 phase induction motor.	CO1	L3	7M
	b	List out the applications of 3 phase induction motor.	CO1	L2	3M

UNIT-II

4	a	Explain the rotor resistance speed control of 3Ø induction motor indetail.	CO2	L4	5M
	b	The power input to the rotor is of 440V,50Hz, 4 poles, 3 phase induction motor is 60KW.The electromotive force is observed to make 100 complete alterations per minute. Calculate (i) slip (ii)rotor speed (iii) rotor copper loss per phase.	CO2	L5	5M

OR

5	a	Describe the working principle of Induction generator.	CO2	L2	7M
	b	Describe Applications Induction generator.	CO2	L2	3M

UNIT-III

6	a	Explain the double field revolving theory of 1Ø induction motor.	CO3	L4	5M
	b	In a 4-pole, 50 Hz single-phase Induction motor, the power absorbed by the forward and backward field rotor equivalent resistances are 100 W and 15W respectively at a motor speed of 1420 rpm. The total mechanical loss is 30W. Compute the shaft torque at the above speed.	CO3	L4	5M

OR

7		Explain the construction and operating principle of shaded pole induction motor. List out the merits, demerits and applications.	CO3	L2	10M

UNIT-IV

8		Explain the constructional details of salient and non-salient pole alternators.	CO4	L5	10M

OR

9	a	Explain the working operation of the alternator.	CO4	L2	5M
	b	Describe the methods of synchronization of alternators.	CO4	L1	5M

UNIT-V

10	a	Explain the construction and working principle of a synchronous motor.	CO5	L1	5M
	b	A 1000 kVA, 11,000 V, 3-Phase star connected synchronous motor has an armature resistance and reactance per phase of 3.5 Ω and 40 Ω respectively. Determine the induced emf of the motor when fully loaded at 0.8 pf lagging.	CO5	L3	5M

OR

11	a	Describe the applications of synchronous motor.	CO5	L2	5M
	b	A 3-phase 11000V, the star-connected synchronous motor takes a load current of 100A. The effective synchronous reactance and resistance per phase are 30 Ω and 0.8 Ω respectively. Find the power supplied to the motor and induced EMF at 0.8 p.f leading.	CO5	L3	5M

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