Reg. No.																

Question Paper Code	14456

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fourth Semester

Electrical and Electronics Engineering

20EEPC401 - SYNCHRONOUS AND INDUCTION MACHINES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Synchronous speed depends on a) Voltage b) Frequency c) Power d) Torque	1	K1	CO1
2.	Slip of synchronous motor is a) 1 b) 0 c) -1 d) 0.5	1	K1	CO1
3.	Rotor of alternator is usually a) Salient b) Cylindrical c) Both d) None	1	K1	CO1
4.	A synchronous condenser is used for improving _____. a) Speed b) Efficiency c) Power factor d) Torque	1	K2	CO2
5.	Which method is commonly used to start a synchronous motor? a) Damper winding method b) Capacitor start c) Resistance start d) Direct loading	1	K2	CO2
6.	Hunting in a synchronous motor causes _____. a) Smooth operation b) Speed oscillations c) Increase in voltage d) Decrease in flux	1	K2	CO2
7.	Slip in induction motor is a) Ns/Nr b) (Ns-Nr)/Ns c) Nr/Ns d) Ns × Nr	1	K3	CO3
8.	Torque is maximum when a) Slip = 1 b) Slip = 0 c) Slip = R^2/X^2 d) Slip = 0.5	1	K3	CO3
9.	Rotor frequency equals a) sf b) f c) (1-s)f d) 0	1	K3	CO3
10.	Pole changing method is used to control _____. a) Voltage b) Current c) Speed d) Flux	1	K1	CO4
11.	A star-delta starter reduces starting _____. a) Torque b) Current c) Speed d) Flux	1	K2	CO4

12.	Regenerative braking returns power to the		1	K2	CO4
	a) Rotor	b) Load			
	c) Supply	d) Starter			
13.	Blocked rotor test is used to determine _____ parameters.		1	K1	CO5
	a) Rotor	b) Equivalent circuit			
	c) Speed	d) Torque only			
14.	Capacitor-run motor improves _____.		1	K1	CO5
	a) Noise	b) Power factor			
	c) Heating	d) Slip			
15.	In a shaded pole motor, starting torque is produced by _____.		1	K1	CO5
	a) Capacitor	b) Shading coil			
	c) Slip rings	d) Commutator			
16.	Capacitor-start capacitor-run motor is mainly used for _____.		1	K2	CO5
	a) Low starting torque applications	b) High starting torque applications			
	c) DC supply applications	d) Low-efficiency applications			

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Utilize the EMF equation to determine the induced EMF in an alternator.	3	K3	CO1
18.	Examine the operation of a synchronous machine.	3	K4	CO1
19.	Categorize the applications of synchronous motors.	3	K4	CO2
20.	Justify the uses of damper windings in synchronous motors.	3	K3	CO2
21.	Construct the slip equation of an induction motor.	3	K3	CO3
22.	Demonstrate the concept of plugging used in the braking of an induction motor.	3	K3	CO4
23.	Differentiate the types of starters used for three-phase induction motors.	3	K4	CO4
24.	Infer why a single-phase induction motor is not self-starting.	3	K4	CO5

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Develop the EMF equation of an alternator.	12	K3	CO1
		OR			
	b)	Demonstrate the construction and working principle of an alternator.	12	K3	CO1
26.	a)	Model the expression for power developed in a synchronous motor and demonstrate its operation as a synchronous condenser.	12	K3	CO2
		OR			
	b)	Utilize the concept of variable excitation to interpret the behavior of a synchronous motor under constant load conditions.	12	K3	CO2
27.	a)	Derive the torque equation of an induction motor and interpret its torque-slip characteristics.	12	K3	CO3
		OR			
	b)	Apply the equivalent circuit of an induction motor to determine its performance characteristics.	12	K3	CO3

28.	a)	Analyze the starting methods of three-phase induction motors.	*12*	*K4*	*CO4*
		OR			
	b)	Contrast the braking methods used in three-phase induction motors.	*12*	*K4*	*CO4*
29.	a)	Examine why a single-phase induction motor is not self-starting using double-field revolving theory.	*12*	*K4*	*CO5*
		OR			
	b)	Compare the construction, working, and slip-torque characteristics of the following single-phase induction motors with neat diagrams: (i) Shaded pole induction motor. (ii) Capacitor start induction run motor.	*12*	*K4*	*CO5*