Reg. No.																

Question Paper Code	14256

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fourth Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

20EIPC401 - ELECTRICAL MACHINES

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The torque developed by a DC motor is directly proportional to ---------- (a) Flux per pole * armature current (b) Armature resistance * armature current (c) Armature resistance * applied voltage (d) None of the above	1	K1	CO1
2.	In lap winding, the number of brushes is always (a) double the number of poles (b) same as the number of poles (c) half the number of poles (d) two	1	K1	CO1
3.	The primary winding of a transformer has a 220V AC supply. What is the value of secondary voltage if the turn ratio is 10? (a) 220 V (b) 22 V (c) 22000 V (d) 2200 V	1	K2	CO2
4.	The open circuit test in a transformer is used to measure___ (a) Copper loss (b) Winding loss (c) Total loss (d) Core loss	1	K1	CO2
5.	A machine without commutator, providing an AC emf to the external circuit is called as (a) D.C. generator (b) Alternator (c) Synchronous motor (d) Transformer	1	K1	CO3
6.	The generalized expression for emf equation of an alternator is (a) Eph = 4.44f φ Tph (b) Eph = 4.44 Kc Kd f φ E (c) Eph = 4.44 Kc Kd fφTph (d) Eph =4 Kc Kd f φ Tph	1	K1	CO3
7.	A 3-phase 440 V, 50 Hz induction motor has 4% slip. The frequency of rotor current will be (a) 50 Hz (b) 25 Hz (c) 5 Hz (d) 2 Hz	1	K2	CO4
8.	In cumulatively cascade method for speed controlling, if PA is the number of poles of main motor and PB is the number of poles of auxiliary method. Then the speed of the rotor B is given by (a) 120f / PA + PB (b) 120f / PA - PB (c) 120f / PA (d) 120f / PB	1	K2	CO4
9.	Single phase induction motors are (a) Self starting (b) Not self starting	1	K1	CO5
10.	With a stator having 8 teeth and a rotor having 6 teeth, what step angle will an application be able to achieve? (a)15° (b) 51° (c) 20° (d) 105°	1	K2	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Distinguish between self-excited and separately excited DC generator.	2	K1	CO1
12.	Derive the condition for maximum power in a DC motor.	2	K2	CO1
13.	Draw the equivalent circuit of a transformer referred to primary.	2	K2	CO2
14.	Draw the phasor diagram of transformer with no load.	2	K2	CO2
15.	Mention the principal advantages of rotating field system type of construction of synchronous machines.	2	K1	CO3
16.	Why is the synchronous motor not self-starting?	2	K2	CO3
17.	Differentiate squirrel cage induction motor from slip ring induction motor.	2	K2	CO4
18.	Why is the rotor slots of a 3-phase induction motor skewed?	2	K2	CO4

19.	Discuss the relation between torque and slip.		*2*	*K1*	*CO4*
20.	Discuss the type of single-phase motor used in ceiling fans.		*2*	*K2*	*CO5*
21.	Compare the applications of Hysterisis motor and Universal Motor.		*2*	*K2*	*CO5*
22.	Compare SRM and Stepper motor.		*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Apply your understanding to sketch a DC machine and briefly explain its construction.	*11*	*K3*	*CO1*
		OR			
	b)	Apply the concepts of DC motor operation to describe the speed control techniques of a shunt motor and evaluate their advantages and disadvantages.	*11*	*K3*	*CO1*
24.	a)	Construct a Single Phase Transformer with neat sketches and describe its operation and features.	*11*	*K3*	*CO2*
		OR			
	b)	A 40 kVA, single phase transformer has core loss 450 W and full load copper loss 850 Watts. If the power factor of the load is 0.8,Calculate: (i) Full load efficiency. (ii) Maximum efficiency at UPF. (iii) Load for maximum efficiency.	*11*	*K3*	*CO2*
25.	a)	Explain the constructional features and types of Synchronous machines with neat diagrams.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the different starting methods of a Synchronous motor.	*11*	*K2*	*CO3*
26.	a)	Explain the constructional details of an Induction motor with neat sketches.	*11*	*K2*	*CO4*
		OR			
	b)	Explain any 2 starting methods of three-phase induction motor.	*11*	*K2*	*CO4*
27.	a)	Why is the single-phase induction motor not self-starting? Describe any one method of starting a Single- phase induction motor.	*11*	*K2*	*CO5*
		OR			
	b)	With a neat diagram explain in detail about repulsion type motor and universal motor.	*11*	*K2*	*CO5*
28.	a)	Derive the condition for maximum torque in an induction motor.	*11*	*K2*	*CO4*
		OR			
	b)	Explain the speed control of the induction motor from the rotor side.	*11*	*K2*	*CO4*