Reg. No.															

Question Paper Code	14397

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

Fourth Semester

Electronics and Instrumentation Engineering

(Common to Electronic Instrumentation and Control Engineering)

24EIPC401 - ELECTRICAL MACHINES AND DRIVES

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

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

		Marks	*K – Level*	*CO*
1.	The torque produced in a DC motor is directly proportional to: a) Armature resistance b) Field flux and armature current c) Speed only d) Supply voltage only	*1*	*K2*	*CO1*
2.	Why are carbon brushes used in DC machines? a) To reduce speed b) To increase EMF c) To collect current from commutator d) To cool the machine	*1*	*K2*	*CO1*
3.	A DC series motor should not be started without load because a) It draws less current b) It may run at dangerously high speed c) It produces less torque d) It stops immediately	*1*	*K1*	*CO1*
4.	Why does a transformer not work with DC supply? a) High current is not produced b) No mutual flux is produced c) Frequency becomes zero d) Voltage decreases	*1*	*K2*	*CO2*
5.	If the number of turns in the secondary winding is greater than the primary winding, the transformer is a) Step-down transformer b) Step-up transformer c) Isolation transformer d) Auto transformer	*1*	*K3*	*CO2*
6.	A transformer rated 230/115 V is connected in reverse. The output voltage will be a) 230 V b) 115 V c) 460 V d) 57.5 V	*1*	*K3*	*CO2*
7.	The theory used to explain the operation of a single-phase induction motor is a) Fleming's rule b) Double field revolving theory c) Lenz's law d) Faraday's law	*1*	*K1*	*CO3*
8.	The centrifugal switch in a capacitor-start motor is used to a) Increase speed b) Disconnect starting winding after starting c) Reduce voltage d) Improve cooling	*1*	*K3*	*CO3*
9.	If the rotor speed of a single-phase induction motor approaches synchronous speed, the slip becomes a) Maximum b) Unity c) Zero d) Infinite	*1*	*K3*	*CO3*
10.	Stepper motors are widely used in CNC machines because: a) They operate only on AC b) They provide precise position control c) They run at constant speed only d) They require brushes	*1*	*K1*	*CO4*

11.	In electric vehicles, BLDC motors are preferred because they provide a) Low efficiency b) High maintenance c) High efficiency and reliability d) Low torque	*1*	*K1*	*CO4*
12.	Switched reluctance motors are suitable for harsh environments because: a) They use brushes b) Their rotor construction is simple and rugged c) They require slip rings d) They use commutators	*1*	*K3*	*CO4*
13.	If frequency supplied to an induction motor decreases while voltage remains constant, the motor may a) Lose magnetic flux control b) Operate normally c) Stop immediately d) Produce zero torque	*1*	*K3*	*CO5*
14.	Vector control is preferred in high-performance drives because it provides: a) Poor dynamic response b) Independent torque control c) Constant slip only d) Reduced efficiency	*1*	*K2*	*CO5*
15.	If the frequency of an induction motor is reduced without reducing voltage, the motor may a) Experience magnetic saturation b) Stop immediately c) Produce no flux d) Improve efficiency greatly	*1*	*K2*	*CO6*
16.	During transient conditions, machine dynamic equations help in analyzing: a) Steady-state flux only b) Speed and current variations with time c) Machine dimensions d) Color coding of windings	*1*	*K2*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Identify the purpose of field winding.	*3*	*K3*	*CO1*
18.	Examine why the laminations provided in transformer cores.	*3*	*K4*	*CO2*
19.	Inspect why the single-phase induction motor not self-starting.	*3*	*K4*	*CO3*
20.	Explain the principle of operation of synchronous reluctance motor.	*3*	*K4*	*CO4*
21.	Compare the braking methods in induction motor drive.	*3*	*K3*	*CO5*
22.	Determine the purpose of mathematical modeling of electrical machines.	*3*	*K4*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a) (i)	Describe the construction and working of DC Motor.	*6*	*K3*	*CO1*
	(ii)	Derive the EMF equation of a DC generator.	*5*	*K3*	*CO1*
		OR			
	b) (i)	Explain the operating characteristics and applications of DC shunt motors.	*6*	*K3*	*CO1*
	(ii)	Explain the significance of back EMF in the operation of a DC motor.	*5*	*K3*	*CO1*
24.	a)	Explain the principle of operation of a transformer with neat diagrams and construction.	*11*	*K3*	*CO2*
		OR			
	b)	Describe the procedure for conducting open-circuit and short-circuit tests on transformers.	*11*	*K3*	*CO2*
25.	a)	Derive and explain the equivalent circuit of a single-phase induction motor.	*11*	*K4*	*CO3*

OR

	b)	Explain the construction, working, and advantages of capacitor-start capacitor-run, Split Phase induction motors.	*11*	*K4*	*CO3*
26.	a)	Explain the construction and principle of operation of switched reluctance motors.	*11*	*K3*	*CO4*
		OR			
	b)	Discuss the control methods used in stepper motors and BLDC motors.	*11*	*K3*	*CO4*
27.	a)	Examine in detail about the CSI fed induction motor drives with suitable diagram.	*11*	*K4*	*CO5*
		OR			
	b)	Examine in detail about the VSI fed induction motor drives with suitable diagram.	*11*	*K4*	*CO5*
28.	a)	Discuss the implementation and control strategy of chopper fed DC drives.	*11*	*K3*	*CO6*
		OR			
	b)	Draw and explain the complete block diagram of a closed-loop V/f-controlled induction motor drive system.	*11*	*K3*	*CO6*