Reg. No.																

Question Paper Code	14690

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

Second Semester

M.E. - Power Electronics and Drives

24PPEPC201 - SOLID STATE AC 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.	Slip in an induction motor is zero at a) Starting b) Full load c) Synchronous speed d) Standstill	*1*	*K1*	*CO1*
2.	Variable frequency control of induction motor is mainly used for a) Torque control b) Speed control c) Power factor improvement d) Braking	*1*	*K2*	*CO1*
3.	Plugging braking produces a) Positive torque b) No torque c) Reverse torque d) Constant torque	*1*	*K1*	*CO1*
4.	In VSI drives, output voltage is controlled using a) Rotor resistance b) PWM technique c) Slip rings d) Capacitor banks	*1*	*K1*	*CO2*
5.	CSI fed induction motor drives require a) Large series inductance b) Large capacitance c) Slip rings d) Rotor rheostat	*1*	*K2*	*CO2*
6.	Dynamic braking in inverter drives is achieved using a) Capacitor b) Braking resistor c) Transformer d) Slip rings	*1*	*K2*	*CO2*
7.	Rotor side control is possible only in a) Slip ring induction motor b) Synchronous motor c) Universal motor d) Stepper motor	*1*	*K1*	*CO3*
8.	Modified Kramer drive improves a) Rotor losses b) Power factor c) Starting torque d) Frequency	*1*	*K2*	*CO3*
9.	Field oriented control separates a) Voltage and current b) Torque and flux components c) Slip and frequency d) Rotor and stator voltages	*1*	*K1*	*CO3*
10.	DTC stands for a) Direct Torque Control b) Dynamic Torque Converter c) Digital Torque Controller d) Direct Time Control	*1*	*K1*	*CO4*

11.	Vector control provides performance similar to		*1*	*K2*	*CO4*
	a) AC motor	b) DC motor			
	c) Universal motor	d) Stepper motor			
12.	Torque in induction motor depends on		*1*	*K2*	*CO4*
	a) Rotor flux only	b) Stator flux only			
	c) Interaction of stator and rotor fluxes	d) Rotor resistance only			
13.	Synchronous motors operate at		*1*	*K1*	*CO5*
	a) Variable speed	b) Constant speed			
	c) Slip speed	d) Half synchronous speed			
14.	Brushless excitation is preferred because it reduces		*1*	*K2*	*CO5*
	a) Torque	b) Maintenance			
	c) Voltage	d) Slip			
15.	Load commutated inverter drive is suitable for		*1*	*K2*	*CO5*
	a) Low power drives	b) High power synchronous motor drives			
	c) DC motors	d) Servo systems			
16.	V-curves represent the relation between		*1*	*K1*	*CO5*
	a) Torque and speed	b) Voltage and current			
	c) Armature current and field current	d) Power factor and excitation current			

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

Answer ALL Questions

17.	Construct the torque production mechanism in induction motors.		*3*	*K3*	*CO1*
18.	Analyze the effect of variable frequency operation on induction motor performance.		*3*	*K4*	*CO1*
19.	Apply the operation of AC voltage controller fed induction motor drive.		*3*	*K3*	*CO2*
20.	Compare the performance of PWM inverter and six-step inverter drives.		*3*	*K4*	*CO2*
21.	Build the principle of modified Kramer drive.		*3*	*K3*	*CO3*
22.	Make use of the DC drive analogy used in field oriented control.		*3*	*K3*	*CO4*
23.	Analyze the advantages of direct torque control over vector control.		*3*	*K4*	*CO4*
24.	Conclusion the excitation methods employed in synchronous motor drives.		*3*	*K4*	*CO5*

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

Answer ALL Questions

25.	a) (i)	Develop the rotating magnetic field and torque production in induction motors.	*6*	*K3*	*CO1*
	(ii)	Develop the equivalent circuit of induction motor and its performance characteristics.	*6*	*K3*	*CO1*
		OR			
	b) (i)	Build constant Volt/Hz operation of induction motor drives.	*6*	*K3*	*CO1*
	(ii)	Construct various braking methods of induction motor drives with suitable characteristics.	*6*	*K3*	*CO1*
26.	a)	Develop the working model of six pulse VSI fed induction motor drives.	*12*	*K3*	*CO2*
		OR			
	b)	Construct and explain the slip power recovery scheme applicable for 3 slip ring induction motor.	*12*	*K3*	*CO2*

27.	a)	Apply the static rotor resistance control and rotor voltage injection methods for induction motor speed control.	*12*	*K3*	*CO3*
		OR			
	b)	Construct the static scherbius drives in super synchronous mode with neat diagram.	*12*	*K3*	*CO3*
28.	a)	Analyze the operation of vector-controlled induction motor drives based on their operating principle.	*12*	*K4*	*CO4*
		OR			
	b)	Analyze the concept of flux vector estimation in an induction motor drive.	*12*	*K4*	*CO4*
29.	a)	Analyze and explain the self-control of a synchronous motor fed from VSI.	*12*	*K4*	*CO5*
		OR			
	b)	Examine the power factor control in synchronous motor drives.	*12*	*K4*	*CO5*