Reg. No.															

Question Paper Code	13629

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Electrical and Electronics Engineering

20EEPC601 - SOLID STATE DRIVES AND CONTROL

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Rolling mills exhibit what type of load torque characteristics? (a) Constant torque characteristics (b) Linearly rising torque characteristics (c) Non-Linearly rising torque characteristics (d) Non-Linearly decreasing torque characteristics	1	K1	CO1
2.	What is the condition for the steady-state operation of the motor? (a) Load torque > Motor torque (b) Load torque <= Motor torque (c) Load torque = Motor torque (d) Load torque < Motor torque	1	K1	CO1
3.	When armature current becomes discontinuous? (a) Small firing angles (b) Large firing angles (c) Infinite firing angles (d) Does not depend on firing angle	1	K1	CO2
4.	Full-converter can be used in DC motor for regenerative braking in (a) Constant operation (b) Variable operation (c)Inversion operation (d) Opposite operation	1	K1	CO2
5.	The disadvantage of Scherbius system used for speed controlling in 3 phase induction motor is (a) It cannot be used for slip ring induction motors (b) It cannot be used for squirrel cage induction motors (c) It can be used for large induction motors (d) None of the mentioned	1	K1	CO3
6.	In pulse width modulation (a) the input voltage is modulated (b) the output voltage is modulated (c) the gating pulses are modulated (d) higher order harmonics are minimized	1	K1	CO3
7.	Margin angle control takes place in ___ mode (a) Transition mode (b) accelerating mode (c) interrupt mode (d) All of mentioned	1	K1	CO4
8.	In permanent magnet synchronous motor, the emf equation is similar to (a) DC machine (b) Synchronous machine (c) Transformer (d) Induction machine	1	K1	CO4
9.	The armature voltage control of DC motor give out (a) Constant voltage drive (b) constant torque drive (c) constant current drive (d) None of the mentioned	1	K1	CO5
10.	The PWM control of DC motor varies (a) linearly with speed (b) inversely with speed (c) parabolically with speed (d) exponentially with speed	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	What is meant by regenerative braking?	2	K1	CO1
12.	Summarize the various types of load in a drive system.	2	K2	CO1
13.	Draw the basic block diagram of electric drive.	2	K1	CO1

14.	Mention the importance of freewheeling diode in converter circuits.	*2*	*K1*	*CO2*
15.	Illustrate current limit control.	*2*	*K2*	*CO2*
16.	Show the advantages of operating choppers at high frequency.	*2*	*K2*	*CO2*
17.	Show the three regions in the speed-torque characteristics in the IM.	*2*	*K2*	*CO3*
18.	What is meant by super-synchronous operation?	*2*	*K1*	*CO3*
19.	Explain in short indirect flux control.	*2*	*K2*	*CO4*
20.	Define torque angle.	*2*	*K1*	*CO4*
21.	What is Commutator Less Motor (CLM)?	*2*	*K1*	*CO5*
22.	Outline the advantages of load commutation over forced commutation.	*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Illustrate and explain the block diagram of electric drive with its advantages and applications.	*11*	*K2*	*CO1*
		OR			
	b)	With neat sketches explain the different characteristics of various loads of electric drive.	*11*	*K2*	*CO1*
24.	a)	Draw the power circuit diagram of three phase full converter fed dc drive and explain it in continuous conduction mode with relevant waveforms and equations.	*11*	*K2*	*CO2*
		OR			
	b)	Explain the operation of motoring control in chopper fed separately excited dc motor with its speed torque curves.	*11*	*K2*	*CO2*
25.	a)	Draw and explain the slip power recovery scheme applicable for three phase slip ring induction motor.	*11*	*K2*	*CO3*
		OR			
	b)	Discuss in detail with suitable diagrams and waveforms of the V/F control technique of speed control method of Induction motor.	*11*	*K2*	*CO3*
26.	a)	Explain the operation of a ‘margin angle control’ based self-controlled synchronous motor drive.	*11*	*K2*	*CO4*
		OR			
	b)	Explain open loop V/F speed control of synchronous motor.	*11*	*K2*	*CO4*
27.	a)	Describe the closed loop speed control of separately excited DC motor by proportional Controller.	*11*	*K3*	*CO5*
		OR			
	b)	Solve the armature voltage control of the DC motor with constant field and field weakening modes.	*11*	*K3*	*CO5*
28.	a) (i)	Discuss on self control technique in synchronous motor.	*6*	*K2*	*CO4*
	(ii)	Explain how the converter power output and the controller characteristics are related.	*5*	*K2*	*CO5*
		OR			
	b) (i)	Explain the construction of permanent magnet synchronous motor drive.	*6*	*K2*	*CO4*
	(ii)	Explain Converter selection and characteristics.	*5*	*K2*	*CO5*