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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

Course Code: 23EE6PCAPD **Max Marks: 100**

Course: Advanced Power Electronics and Electric Drives

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Name the major parts of an electrical drive and briefly describe their function.	*CO1*	*PO2*	**05**
	b)	State and explain the fundamental torque equation of an electrical drive.	*CO1*	*PO2*	**05**
	c)	Discuss the nature and classification of load torques. How do they affect the drive selection and performance?	*CO1*	*PO2*	**10**
		OR			
2	a)	List the advantages and disadvantages of using electrical drives over mechanical drives.	*CO1*	*PO2*	**05**
	b)	Differentiate between steady-state stability and transient stability in drives with neat sketch.	*CO1*	*PO2*	**05**
	c)	Describe multi-quadrant operation with suitable examples and diagrams	*CO1*	*PO2*	**10**
		UNIT - II			
3	a)	Compare and contrast the methods of starting and braking in DC motor drives.	*CO2*	*PO1, PO2*	**05**
	b)	Explain the need for controlled rectifiers in DC drive systems and mention its applications.	*CO2*	*PO1, PO2*	**05**
	c)	Explain the operation of a single-phase fully controlled rectifier-fed DC motor drive with a neat circuit diagram and relevant waveforms.	*CO2*	*PO1, PO2*	**10**
		OR			

	4	a)	What are the advantages of using a dual converter for DC motor control? Explain briefly.	*CO2*	*PO1, PO2*	**05**
		b)	Discuss the torque-speed characteristics of a separately excited DC motor with neat sketch.	*CO2*	*PO1, PO2*	**05**
		c)	Describe in detail the chopper control of a separately excited DC motor. Mention types of choppers and their applications.	*CO2*	*PO1, PO2*	**10**
			UNIT - III			
	5	a)	Define slip regulation and state its importance in induction motor control.	*CO3*	*PO3*	**05**
		b)	Write a short note on Kramers drive used in speed control of induction motors.	*CO3*	*PO3*	**05**
		c)	Explain the basic concept of SRM motor control with neat sketch	*CO3*	*PO3*	**10**
			OR			
	6	a)	Explain the basic concept of BLDC motor control with neat sketch	*CO3*	*PO3*	**05**
		b)	Compare VSI-fed and CSI-fed induction motor drives. Include their working principles and applications.	*CO3*	*PO3*	**05**
		c)	Explain self-control and separate control modes of synchronous motor drives with neat sketch. How do they differ?	*CO3*	*PO3*	**10**
			UNIT - IV			
	7	a)	Write a short note on voltage control of a three-phase inverter.	*CO4*	*PO1*	**05**
		b)	What is the purpose of harmonic reduction in PWM techniques? Explain the concept of Selective Harmonic Elimination (SHE) in PWM	*CO4*	*PO1*	**05**
		c)	Describe the principle and implementation of Space Vector PWM and discuss its advantages over traditional SPWM.	*CO4*	*PO1*	**10**
			OR			
	8	a)	Illustrate the concept of pulse placement in multiple-pulse modulation.	*CO4*	*PO1*	**05**
		b)	What is modified SPWM? List its benefits over conventional SPWM.	*CO4*	*PO1*	**05**
		c)	Explain in detail the selective harmonic elimination (SHE) technique with the help of suitable equations and switching angles.	*CO4*	*PO1*	**10**
			UNIT - V			
	9	a)	Define EMI and EMC. How are they related in power electronic systems?	*CO5*	*PO2*	**05**

		b)	Describe the concept of conducted and radiated EMI with examples.	*CO5*	*PO2*	**05**
		c)	Describe the various EMI reduction techniques, including filtering, shielding, grounding, and layout strategies.	*CO5*	*PO2*	**10**
			OR			
	10	a)	Differentiate between common mode and differential mode noise.	*CO5*	*PO2*	**05**
		b)	Explain briefly EMI-induced failure mechanisms in power electronic equipment. How can system design be improved to enhance EMC performance?	*CO5*	*PO2*	**05**
		c)	Discuss the standards applicable to EMI/EMC testing for power electronic systems. How are these tests conducted?	*CO5*	*PO2*	**10**

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