Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code:3160919 Date:25-11-2025

Subject Name:Electric Drives

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

		.	Marks
Q.1	**(a)**	Write advantages of Elecrical Drive.	**03**
	(b)	Draw the following characteristics for DC separately excited, shunt and series motor. (1) Speed-Torque char. (2) Torque-Current char.	**04**
	(c)	Draw the block diagram of electrical drive and explain the each block of drive.	**07**
Q.2	**(a)**	Draw the circuits diagram of class E chopper for four quadrant operation of separately excited dc motor.	**03**
	(b)	Draw the circuit diagram of fully controlled converter drive and derive the equations of voltage and current.	**04**
	(c)	Explain the four-quadrant operation of electrical motor with suitable example and show proper direction of load torque, machine torque and rotations.	**07**
		OR	
	(c)	A 220V, 1500rpm, 50A separately excited motor with armature resistances of 0.5 ohm, is fed from a 3 phase fully controlled rectifier. Available ac sources have a line voltage of 440 V, 50 Hz. A star delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when converter firing angle is zero. Determine the value of value of firing angle motor is running at 1200 rpm and rated torque.	**07**
Q.3	**(a)**	Show the effects of variation in applied voltage on torque speed characteristics of induction motor.	**03**
	(b)	Discuss the dynamics model of dc motor.	**04**
	(c)	How to control separately excited dc motor drive by chopper in motoring mode and regenerative braking mode?	**07**
		OR	
Q.3	**(a)**	How to apply dynamic braking in single phase ac motor?	**03**
	(b)	Explain rotor resistance control method of speed control for the Induction motor.	**04**

	(c)	Explain the closed speed loop control of DC motor for below the rated speed and above the rated speed.	**07**
Q.4	**(a)**	What are the electrical quantities essential to sense for operation of V by F electrical drive?	**03**
	(b)	Explain the modulation index in Sine PWM scheme for induction motor drive.	**04**
	(c)	Discuss the reverse voltage braking in ac motor.	**07**

OR

Q.4	**(a)**	Draw the equivalent circuits of induction motor and write equation for torques and slip.	**03**
	(b)	Explain the advantages pulse width modulation (PWM) techniques in electrical drive system.	**04**
	(c)	Write short note on V by F control of induction motor.	**07**
Q.5	**(a)**	Gives any three advantages of vector control over scalar control.	**03**
	(b)	Write advantages of voltage source inverter (VSI) over the current source inverter (CSI).	**04**
	(c)	Draw and explain the circuits of static scherbius drive for induction motor.	**07**

OR

Q.5	**(a)**	Role of slip recovery scheme in speed control of induction motor.	**03**
	(b)	Explain the operation of current regulated voltage source inverter control.	**04**
	(c)	Write short note on space vector modulation techniques.	**07**

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