Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160919 Date:24-05-2024

Subject Name:Electric Drives

Time:10:30 AM TO 01:00 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)**	Define electric drive and give the classification of electric drive.	**03**
	(b)	Why current sensing is required in electrical drives? Enlist common methods of current sensing.	**04**
	(c)	Explain the multi quadrant operation of electrical drives with suitable conventions and example.	**07**
Q.2	**(a)**	Briefly explain the steady state analysis of electrical drive.	**03**
	(b)	Explain principle of operation of chopper.	**04**
	(c)	A 5 KW,220 V shunt motor has an armature resistance of 0.5 Ω and a field resistance of 220 Ω. At no load motor runs at 1000 rpm and draws a current of 5 A. At full load and rated voltage, the current drawn is 15 A and armature reaction caused a drop of 2 % in flux. Calculate: (1) Full load speed (2) Full load torque.	**07**
		OR	
	(c)	A 200 V dc series motor resistance is 0.5 Ω. motor runs at 800 rpm when operating at its full load current of 10 A and magnetic circuit can be assumed unsaturated. what will be the speed if (1) load torque is increased by 50 % (2) Motor current is 5 A.	**07**
Q.3	**(a)**	Enlist method employed for speed control of DC series motor.	**03**
	(b)	State & explain the important features of various braking methods of dc motors.	**04**
	(c)	Explain the dynamic model of dc drive in detail.	**07**
		OR	
Q.3	**(a)**	Enlist method employed for speed control of DC shunt motor.	**03**
	(b)	Explain position control of DC motor.	**04**
	(c)	Derive the expression for average motor current, RMS motor current, torque and average motor voltage for chopper fed d.c. series motor.	**07**
Q.4	**(a)**	Write down advantages of v/f control other scalar control techniques.	**03**
	(b)	Explain different effect of harmonics on induction motor drive.	**04**
	(c)	Explain constant air gap flux control scheme for induction motor drives.	**07**
		OR	
Q.4	**(a)**	Compare VSI fed Induction motor drive with CSI fed induction motor drive.	**03**

	(b)	For Variable frequency control of induction motor explain the following point 1. For speed below base speed, why (v/f) ratio is maintained constant? For speed above base speed, why terminal voltage is maintained constant?	**04**
	(c)	Explain closed loop speed control of induction motor using slip control scheme.	**07**
Q.5	**(a)**	Write down advantages of squirrel-cage induction motor over dc motors.	**03**
	(b)	State & explain briefly different methods of speed sensing.	**04**
	(c)	Explain how static rotor resistance control is achieved during starting of induction motor.	**07**

OR

Q.5	**(a)**	Discriminate the constant torque and constant power region from torque speed characteristics of 3 phase induction motor.	**03**
	(b)	Explain space vector modulation technique.	**04**
	(c)	Explain any one slip power recovery scheme for slip ring induction motor.	**07**

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