Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160919 Date:10/06/2022

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)**	Draw speed torque characteristic of DC separately excited, shunt and series motor with proper labeling.	**03**
	(b)	Enlist methods for speed control of DC motor. Explain any one in brief.	**04**
	(c)	Describe four quadrant operation of a dc motor.	**07**
Q.2	**(a)**	Give of comparison between converter fed dc drives and chopper fed dc drives.	**03**
	(b)	Explain dynamic model of DC motor drive.	**04**
	(c)	Explain chopper controlled DC shunt motor drive operation for motoring mode and regenerative mode.	**07**
		OR	
	(c)	A dc chopper is used for regenerative braking of a separately excited dc motor. The dc supply voltage is 400 V. The motor has r_a=0.2 Ω, k_m=1.2V-s/rad. The average armature current during regenerative braking is kept constant at 300 A with negligible ripple. For a duty cycle of 60% for a chopper, determine: (a) power returned to the dc supply (b) equivalent load resistance of motor acting as a generator (c) minimum and maximum permissible breaking speeds and (d) speed during regenerative braking.	**07**
Q.3	**(a)**	Draw the circuit and waveform of 1-ϕ dual converter drive for the speed control of separately excited dc motor.	**03**
	(b)	Explain the closed loop speed control technique for DC motor.	**04**
	(c)	Discuss chopper controlled Separately excited DC motor drive operation for motoring mode.	**07**
		OR	
Q.3	**(a)**	Define the principle of vector control.	**03**
	(b)	Compare DC Drive with AC Drive.	**04**
	(c)	Explain closed loop speed control of induction motor using slip control scheme.	**07**
Q.4	**(a)**	Discuss the points to be considered while selecting carrier frequency for inverter.	**03**
	(b)	Compare VSI with CSI fed induction motor drives.	**04**
	(c)	Draw and explain block diagram of CSI variable frequency drive with current control.	**07**

OR

Q.4	**(a)**	List advantages of V/f control over scalar control.	**03**
	(b)	Discuss effect of various harmonic torques of VSI based induction motor drive.	**04**
	(c)	Explain the feature of PWM inverter fed Induction motror drive.	**07**
Q.5	**(a)**	Explain the effect of non-sinusoidal supply on VSI.	**03**
	(b)	Explain stator voltage control of induction motor.	**04**
	(c)	Explain constant air gap flux control scheme for induction motor drives.	**07**

OR

Q.5	**(a)**	Explain operation of doubly fed induction machine in sub synchronous mode.	**03**
	(b)	Compare scalar control and vector control.	**04**
	(c)	Apply the slip recovery scheme for speed controlling of induction motor drive.	**07**

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