Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160919 Date: 30-05-2025

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.**

Q.1	**(a)**	Derive torque equation of DC motor.	**03**
	(b)	Explain the principal of motoring and regenerative braking mode of DC motor.	**04**
	(c)	Discuss the block diagram of close loop DC drive with current limit control.	**07**
Q.2	**(a)**	Draw and explain different types of load torque speed characteristics.	**03**
	(b)	Draw torque speed characteristic of DC shunt motor and explain how change in armature voltage will change in speed of motor	**04**
	(c)	Derive the output voltage equation of step-down chopper fed DC drive and explain the operation with necessary diagram and waveforms.	**07**
		OR	
	(c)	Discuss the operation of Class E chopper fed DC drive with necessary diagram and waveforms.	**07**
Q.3	**(a)**	Explain current controller specification for chopper-based speed control of separately excited DC motor.	**03**
	(b)	Based on the block diagram of close loop control of DC drives, derive the transfer function.	**04**
	(c)	Explain the feature of PWM inverter fed Induction motor drive.	**07**
		OR	
Q.3	**(a)**	Draw only block diagram of close loop armature control with field flux weaking.	**03**
	(b)	Give of comparison between converter fed dc drives and chopper fed dc drives.	**04**
	(c)	Explain the types of output voltage control methods with the help of chopper.	**07**
Q.4	**(a)**	How torque speed characteristic of induction motor will be modified with change in rotor resistance.	**03**
	(b)	What is slip speed control of induction motor drives?	**04**
	(c)	Derive the torque equation from equivalent circuit of three phase induction motor.	**07**
		OR	
Q.4	**(a)**	What is above base speed and below base speed operation of the motor?	**03**
	(b)	What is slip power? What are the different methods used for control the slip power?	**04**
	(c)	Discuss principle of constant flux operation of induction motor in detail with necessary equation and diagram.	**07**
Q.5	**(a)**	Compare all the PWM technique for voltage source inverter.	**03**
	(b)	Draw and discuss motor characteristics for constant torque and flux weakening region.	**04**
	(c)	Draw the neat circuit diagram and explain the speed control of 3 phase induction motor by static scherbius system.	**07**
		OR	

Q.5	**(a)**	Explain three regions of torque speed characteristic of induction motor based on slip.	**03**
	(b)	How torque speed characteristic of induction motor will be modified with (i) change in applied voltage (ii) change in applied frequency	**04**
	(c)	Discuss the operation of 3 phase AC voltage controller driven induction motor drive with necessary diagram and waveforms.	**07**

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