Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170916 Date: 26/06/2023

Subject Name: Advanced 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)**	State advantages and drawbacks of multi-level Inverter	**03**
	(b)	Explain the drawbacks of diode rectifier with filter load	**04**
	(c)	Discuss operation of diode clamped multilevel inverter with neat circuit diagram and waveforms.	**07**
Q.2	**(a)**	Explain the effect of switching frequency on harmonics spectrum in inverter.	**03**
	(b)	Derive the Fourier transform of square wave output of full-wave bridge Inverter.	**04**
	(c)	Draw the space vector diagram for three level SVPWM techniques and calculate the magnitude of large, medium and small vectors.	**07**
		OR	
	(c)	Explain Power Factor Correction technique using PWM converter connected as line side rectifier.	**07**
Q.3	**(a)**	What is the difference between scalar and vector control of induction motor.	**03**
	(b)	Explain Park and Clarke Transformation Matrix.	**04**
	(c)	Draw and explain block diagram of CSI variable frequency drive with current control.	**07**
		OR	
Q.3	**(a)**	Draw equivalent d-q circuit model of Induction motor	**03**
	(b)	Explain the method to maintain constant air gap flux in induction motor drives and state its importance.	**04**
	(c)	Discuss Direct Torque Control (DTC) method of Induction motor drive.	**07**
Q.4	**(a)**	Classify BLDC motor based on construction	**03**
	(b)	State advantages and drawbacks of close loop control drives in comparison with open loop drives.	**04**
	(c)	Explain open loop v/f control of synchronous machines	**07**
		OR	
Q.4	**(a)**	State application of synchronous motor drive.	**03**
	(b)	Explain basic working principle of BLDC motor	**04**
	(c)	Explain CSI fed synchronous motor drives	**07**
Q.5	**(a)**	State advantages and drawbacks of PM motors.	**03**
	(b)	Explain speed estimation using DSP block	**04**

	(c)	Discuss speed control in BLDC motors.	**07**
		OR	
Q.5	**(a)**	Draw block diagram for closed loop speed control of SRM.	**03**
	(b)	Discuss PWM module in DSP.	**04**
	(c)	Explain closed-loop switch reluctance motor drive.	**07**

****