Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2021

Subject Code:3170916 Date:15/12/2021

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 in brief, how torque is estimated in closed loop control of electric drives.	**03**
	(b)	Explain in brief, the control of Current Source Inverter with necessary diagram.	**04**
	(c)	Explain PWM converter as line side rectifier with necessary figure.	**07**
Q.2	**(a)**	Describe Selected Harmonic Elimination with necessary figure.	**03**
	(b)	Draw the block diagram of Electric drive and explain each block in brief.	**04**
	(c)	Explain operation of H bridge as a 4-Q drive.	**07**
		OR	
	(c)	Draw and explain the equivalent circuit of a single –phase induction machine.	**07**
Q.3	**(a)**	State advantages of vector control over scalar control.	**03**
	(b)	Compare VSI and CSI fed drives.	**04**
	(c)	Write a note on Reference-frame theory, and state commonly used reference frames.	**07**
		OR	
Q.3	**(a)**	Compare DTC and FOC	**03**
	(b)	Discuss what will happen if V/f ratio is not kept constant in IM drive.	**04**
	(c)	Draw and explain operation of open loop V/f control of Induction motor with PWM voltage fed converter.	**07**
Q.4	**(a)**	List different permanent magnet motors.	**03**
	(b)	Draw block diagram of synchronous motor drive.	**04**
	(c)	Explain direct torque control of synchronous motor.	**07**
		OR	
Q.4	**(a)**	Draw block diagram for closed loop speed control of SRM.	**03**
	(b)	List different control techniques of PMSM.	**04**
	(c)	Explain CSI fed synchronous motor drives.	**07**
Q.5	**(a)**	List various topologies of SRM drives.	**03**
	(b)	Discuss PWM module in DSP.	**04**
	(c)	State the eight different possible switching vectors in SVM with diagram. Describe sectors in the same.	**07**
		OR	
Q.5	**(a)**	Draw figure showing construction of any one type of BLDC motor.	**03**
	(b)	Write a short note on TMSLF2407 with reference to motion control.	**04**
	(c)	State names of some DSPs used in motion control and discuss the use of same.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3170916 Date:08/06/2022

Subject Name:Advanced 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)**	Explain PWM control of inverter in brief.	**03**
	(b)	Draw the block diagram of Electric drive.	**04**
	(c)	Draw and explain PWM converter as line side rectifier.	**07**
Q.2	**(a)**	Describe Selected Harmonic Elimination with necessary figure.	**03**
	(b)	Discuss the importance of V/f ratio in IM drive.	**04**
	(c)	Describe the operation of H bridge as a 4-Q drive.	**07**
		OR	
	(c)	Write a note on reference frame theory.	**07**
Q.3	**(a)**	State advantages of SHE technique.	**03**
	(b)	Compare vector control and scalar control.	**04**
	(c)	Discuss speed control in BLDC motors.	**07**
		OR	
Q.3	**(a)**	Describe use of DSP to generate PWM.	**03**
	(b)	Compare Direct Torque Control and Field Oriented Control.	**04**
	(c)	Draw and explain operation of open loop V/f control of Induction motor with PWM voltage fed converter.	**07**
Q.4	**(a)**	List different permanent magnet motors.	**03**
	(b)	Draw block diagram of synchronous motor drive.	**04**
	(c)	Explain direct torque control of synchronous motor.	**07**
		OR	
Q.4	**(a)**	Draw block diagram for closed loop speed control of SRM.	**03**
	(b)	List different control techniques of PMSM.	**04**
	(c)	List and explain various topologies for SRM drives.	**07**
Q.5	**(a)**	Compare open loop and close loop control of an electric drive.	**03**
	(b)	Draw equivalent circuit model of Induction motor.	**04**
	(c)	Explain switching vectors in space vector modulation with a neat labelled diagram.	**07**
		OR	
Q.5	**(a)**	State advantages and drawbacks of PM motors.	**03**
	(b)	Draw figure showing construction of outer rotor design type BLDC motor.	**04**
	(c)	Draw block diagram for DSP based Brushless Direct Current Motor Drive System.	**07**