

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021****Subject Code:3160919****Date:04/12/2021****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) Write emf balance equation and derive torque equation of DC motor.	03
	(b) Discuss armature control method for speed control of DC motor.	04
	(c) Derive basic equations for DC motors. Draw performance characteristics for DC shunt, DC separately excited and DC series motor.	07
Q.2	(a) Discuss operation of chopper controlled separately excited DC motor drive in motoring mode.	03
	(b) Discuss various losses taken place in DC motor drive.	04
	(c) Derive basic modeling of DC motor with necessary assumptions. Draw block diagram from the derived functions.	07
OR		
	(c) Describe four quadrant chopper controlled operation of DC motor drive with necessary diagram and wave forms.	07
Q.3	(a) How smooth starting is obtained for DC motor using chopper control?	03
	(b) Discuss regenerative braking control of DC separately excited motor using chopper.	04
	(c) Discuss closed loop control of DC motor drive.	07
OR		
Q.3	(a) Discuss need of various PWM techniques over conventional 180° conduction mode for induction motor drive.	03
	(b) Derive speed controller and current controller design for DC motor drive.	04
	(c) Discuss power electronics based rotor side control of slip ring induction motor.	07
Q.4	(a) Draw equivalent circuit of three phase induction motor with necessary nomenclature.	03
	(b) Discuss stator voltage control method for speed control of induction motor.	04
	(c) Explain SPWM technique for voltage source inverter.	07
OR		
Q.4	(a) Develop the speed-torque characteristics of induction motor in four quadrants.	03
	(b) Discuss operation of induction motor for fan and pump type load.	04
	(c) Explain Space Vector PWM technique for voltage source inverter.	07

- Q.5** (a) What is above base speed and below base speed operation of the motor? **03**
(b) Discuss effect of variation in rotor resistance on induction motor performance. **04**
(c) Discuss principle of V/f control of induction motor in detail with necessary equation and diagram. **07**

OR

- Q.5** (a) Draw and discuss motor characteristics for constant torque and flux weakening region. **03**
(b) What is slip power recovery? How it can be used for speed control of induction motor? **04**
(c) Explain closed loop Volt/Hz control of induction motor. **07**
