Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150910 Date:04/06/2022

Subject Name:Electrical Machine- II

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)**	What is Synchronous speed ?	**03**
	(b)	State the principle of operation of a three-phase Induction motor.	**04**
	(c)	Explain the production of rotating field in 3-Phase Induction motor by Analytical Method.	**07**
Q.2	**(a)**	Draw the phasor diagram of 3-phase alternator with unity power factor load and lagging power factor load.	**03**
	(b)	Draw the per phase complete equivalent circuit of 3 -phase induction motor referred to the stator with approximate equivalent circuit.	**04**
	(c)	The power input to the rotor of 440V, 50Hz, 6 pole, 3-Phase induction motor is 80 kW. The rotor emf is observed to make 100 complete alternations per min. Calculate (a) the slip; (b) the rotor speed;(c) the mechanical power developed;(d) the rotor copper loss per phase;(e) the rotor resistance per phase if the rotor current is 65 A.	**07**
		OR	
	(c)	Derive the E.M.F. equation of an Alternator.	**07**
Q.3	**(a)**	Define different types of losses in 3-phase Alternator.	**03**
	(b)	Draw the equivalent circuit of a single-phase, single winding Induction motor based on two-revolving field theory.	**04**
	(c)	State the different methods of starting squirrel cage motors.	**07**
		OR	
Q.3	**(a)**	What is voltage regulation?	**03**
	(b)	Explain the V-curves of synchronous motor.	**04**
	(c)	Describe the construction and operating principle of synchronous motor.	**07**
Q.4	**(a)**	Explain the double field revolving theory of single-phase Induction Motor.	**03**
	(b)	Explain power stages in an Induction Motor with flow diagram.	**04**
	(c)	Explain the construction, working principle of Permanent magnet brushless DC motor.	**07**
		OR	
Q.4	**(a)**	Explain the effect of slip on rotor circuit in 3-phase Induction Motor.	**03**

	(b)	What is synchronization and load division in Parallel operation of alternators ?	**04**
	(c)	Auto Synchronous Motor: Construction, principle of operation	**07**
Q.5	**(a)**	What is Synchronous condenser?	**03**
	(b)	What is the process to make synchronous motor self-starting?	**04**
	(c)	A 3-phase, star connected alternator is rated at 1600 kVA 13500 V. The armature effective resistance and synchronous reactance are 1.5Ω and 30Ω respectively per phase. Calculate the percentage voltage regulation for a load of 1280 kW at power factors of (a)0.8 lagging;(b) unity;(c)0.8 leading	**07**

OR

Q.5	**(a)**	What is the principle of Magnetic levitation?	**03**
	(b)	Explain the principle of operation Auto Synchronous Motor.	**04**
	(c)	Explain different methods to make single-phase Induction motor self -starting.	**07**

****