Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:2140906 Date:19-01-2024

Subject Name: AC Machines

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)**	Derive emf equation of an alternator.	**03**
	(b)	Compare squirrel cage and slip ring Induction Motor.	**04**
	(c)	Explain the parallel operation of two alternators.	**07**
Q.2	**(a)**	Discuss the methods of starting of synchronous motor.	**03**
	(b)	Describe the effect of armature reaction with zero lagging power factor in case of a synchronous generator	**04**
	(c)	Explain the torque slip characteristics of a three-phase induction motor and describe the significance of stable and unstable region	**07**
		OR	
	(c)	List the methods of determination of voltage regulation of an alternator. Describe any one of them in detail.	**07**
Q.3	**(a)**	A three phase 400/200V, Y-Y connected wound rotor has 0.06 Ω rotor resistance and 0.3 Ω standstill reactance per phase. Find the additional resistance required in the rotor circuit to make the starting torque equal to the maximum torque of the rotor.	**03**
	(b)	Discuss the procedure to perform no load and blocked rotor tests on a three-phase induction motor.	**04**
	(c)	Draw the phasor diagram (vector diagram) for a three-phase induction motor and justify the statement „Power factor of the motor improves from no load to full load“.	**07**
		OR	
Q.3	**(a)**	Define and explain pitch factor and distribution factor with respect to an alternator.	**03**
	(b)	Explain any one method to find the voltage regulation of an alternator	**04**
	(c)	What is synchronization? Explain two bright one dark lamp method of synchronization.	**07**
Q.4	**(a)**	Explain with reason why synchronous motor is not self-starting.	**03**
	(b)	Discuss the methods of starting of synchronous motor.	**04**
	(c)	A 3-phase, 16-pole alternator has the following data: Number of slots = 192; Conductors / slot = 8 (conductors of each phase are connected in series) coil span = 160 electrical degrees, speed of the alternator = 375 rpm; flux/pole = 55m Wb. Calculate the phase and line voltages. speed of the alternator = 375 rpm.; flux/pole = 55m Wb. Calculate the phase and line voltages.	**07**
		OR	
Q.4	**(a)**	What is hunting? How to minimize it?	**03**
	(b)	Explain working principle of Induction Generator.	**04**
	(c)	List the different methods for speed control of an Induction motor and explain any two in detail with necessary diagram.	**07**

Q.5	**(a)**	Briefly explain the double field revolving theory in relation to single phase AC motors.	**03**
	(b)	Explain the construction and working of universal motor.	**04**
	(c)	Explain V-curves and its importance for synchronous motor.	**07**

OR

Q.5	**(a)**	Briefly explain the role of capacitor in the ceiling fan.	**03**
	(b)	Explain slip test for measurement of direct and quadrature axis reactances for salient pole machine	**04**
	(c)	Draw the schematic diagram and explain the construction and working of shaded pole single phase motor.	**07**

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