Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2140906 Date:29-06-2022

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)**	Explain torque-slip characteristic of three-phase induction motor.	**03**
	(b)	Derive EMF equation of alternator. Define coil span factor and distribution factor.	**04**
	(c)	Why single-phase motor is not self-starting? explain the double field revolving theory in relation to single phase AC motors.	**07**
Q.2	**(a)**	Explain production of rotating magnetic field in poly-phase induction motor.	**03**
	(b)	Explain the phenomena of crawling in case of three-phase induction motor with its remedies.	**04**
	(c)	State and explain any two method of speed control of Induction motor.	**07**
		OR	
	(c)	Explain the procedure to construct the circle diagram of induction motor. Also describe the method to determine losses, efficiency and slip at full load condition using circle diagram.	**07**
Q.3	**(a)**	How does a synchronous motor differ from a three-phase induction motor?	**03**
	(b)	Derive the relation between torque and voltage in case of three-phase induction motor.	**04**
	(c)	Mention different starters for three phase induction motor and explain Star-Delta starter in details.	**07**
		OR	
Q.3	**(a)**	What conditions should be met while connecting an alternator in parallel with running paralleled alternators?	**03**
	(b)	Describe the effect of armature reaction in case of an alternator.	**04**
	(c)	Draw power stage diagram of three-phase induction motor. Show that in an induction motor the rotor input: power developed: rotor copper losses = 1: (1 - S): S, where S = fractional slip.	**07**
Q.4	**(a)**	Draw the schematic diagram and explain the principle of induction generator.	**03**
	(b)	How direct axis and quadrature axis reactance can be measured for salient pole machine?	**04**
	(c)	List the methods of determination of voltage regulation of an alternator. Describe any one of them in detail.	**07**
		OR	
Q.4	**(a)**	What could be the reasons if a 3-phase synchronous motor fails to start?	**03**
	(b)	Briefly explain V-curves of synchronous motor.	**04**

	(c)	Briefly explain that in case of double cage induction motor, torque and efficiency are higher as compared to normal squirrel cage induction motor during starting and running period respectively.	**07**
Q.5	**(a)**	What is Hunting of Synchronous machine and how it prevents?	**03**
	(b)	What is short circuit ratio of synchronous machine and how it's effect to machine performance.	**04**
	(c)	Draw the schematic diagram and explain the construction and working of shaded pole single phase motor.	**07**

OR

Q.5	**(a)**	What do you mean by Synchronous Condenser and how it's different than Synchronous motor?	**03**
	(b)	What is synchronization? Explain two bright one dark lamp method of Synchronization.	**04**
	(c)	Explain the construction and working principle of Schrage motor.	**07**

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