Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2024

Subject Code:3150910 Date:28-11-2024

Subject Name:Electrical Machine- II

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 an equation of generated EMF in an AC generator.	**03**
	(b)	Explain the effect of distributed and short pitched winding on generated emf.	**04**
	(c)	State the functions and material used for the following parts of a 3-phase induction motor. (1)Stator core (2) stator winding (3) rotor winding (4) slip ring (5) shaft (6) stator frame and (7) rotor core	**07**
Q.2	**(a)**	What is slip in induction motor? State the methods to measure it.	**03**
	(b)	Explain revolving magnetic field in 3-phase induction motor.	**04**
	(c)	Explain torque/slip characteristics of induction motor.	**07**
		OR	
	(c)	Compare salient pole type and cylindrical type synchronous machine.	**07**
Q.3	**(a)**	Explain the methods to get more starting torque in 3-phase slip ring induction motor.	**03**
	(b)	Explain construction and working principle of a universal motor.	**04**
	(c)	The power input to a 500V, 50Hz, 6-pole, 3-phase induction motor running at 975 RPM is 40KW. The total stator losses (iron and stator cu loss) are 1KW, the friction and windage losses are 2 KW. Determine (1) slip, (2) Rotor cu losses, (3) shaft power and (4) the efficiency.	**07**
		OR	
Q.3	**(a)**	State the losses occurred in 3-phase induction motor and state the ways to reduce these losses.	**03**
	(b)	Draw the circuit diagram for No load and blocked rotor tests on 3-phase induction motor. Which measurements are taken during the tests? Also explain the purpose of these tests.	**04**
	(c)	In a No load test, a 3-phase, star connected induction motor took 10A and total input power is 450 watt at a line voltage of 110V. If the stator resistance per phase is 0.05 ohm and friction and windage losses amount to 135 watt, determine (1) the working component of no load current, (2) the magnetizing component of no load current, (3) No load power factor,(3)Ro ,and (5) Xo	**07**
Q.4	**(a)**	Explain the 1-phase induction motor used in ceiling fan.	**03**
	(b)	Explain the working principle of a shaded pole induction motor.	**04**
	(c)	Explain how the power factor and armature current varies with change in field current for a particular load condition in a 3-phase synchronous motor.	**07**
		OR	

Q.4	**(a)**	Explain hunting phenomena in synchronous machine.	**03**
	(b)	Explain any two stating methods for 3-phase synchronous motor.	**04**
	(c)	A 1-MVA, 11-KV, 3-phase, star connected synchronous motor has an armature resistance and reactance per phase are 3.5 ohm and 40 ohm respectively. Determine the induced emf and retardation angle fully loaded and operated at unity power factor.	**07**
Q.5	**(a)**	What is voltage regulation? State the methods to determine it.	**03**
	(b)	Draw and explain O.C.C and S.C.C of a typical 3-phase alternator and explain how the synchronous impedance can be determined?	**04**
	(c)	A 3-phase, 12-pole, star connected alternator has 180 slots with 10 conductors per slot and conductors of each phase are connected in series. The coil span is 144^0(electrical). Determine the phase values of emf if machine runs at 600RPM and the flux per pole is 0.06wb distributed sinusoidal over the pole.	**07**

OR

Q.5	**(a)**	Explain the purpose of damper winding in synchronous machine.	**03**
	(b)	Explain the effect of change in steam input and change in exciting current on the output power of a 3-phase synchronized alternator with grid.	**04**
	(c)	What is synchronizing? State the conditions for synchronizing and explain how we can synchronize the incoming alternator with grid.	**07**

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