Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150910 Date:18-05-2024

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)**	Explain necessity of starter in 3-phase induction motor.	**03**
	(b)	State different types of starters used and explain any one of them in 3- ø induction motor.	**04**
	(c)	Explain how a rotating magnetic field is produced when a three phase supply is given to three phase winding.	**07**
Q.2	**(a)**	Define slip. how it relates with rotor speed?	**03**
	(b)	State the difference between slip ring induction motor and squirrel cage induction motor.	**04**
	(c)	State different methods of speed control of three phase induction motor. Explain any two of them.	**07**
		OR	
	(c)	Derive the equation of starting torque for 3-ø induction motor and obtain condition of maximum starting torque from it.	**07**
Q.3	**(a)**	Write the applications of 1-ø induction motors.	**03**
	(b)	Explain working of split phase induction motor.	**04**
	(c)	Explain two field rotating theory of 1-ø induction motor with diagram.	**07**
		OR	
Q.3	**(a)**	Explain why 1-ø induction motor is not self starting.	**03**
	(b)	Explain working of capacitor start induction motor.	**04**
	(c)	List the methods of starting of 1-ø induction motor. Draw and explain construction and working of shaded pole induction motor.	**07**
Q.4	**(a)**	State the conditions for synchronization of 3 phase alternator with infinite bus bar.	**03**
	(b)	Explain Pitch factor and Distribution factor with reference to alternator winding.	**04**
	(c)	A 3-phase, 50 Hz alternator is running at 600 rpm has a 2-layer winding, 12 turns/coil, 4 slots/pole/phase, and coil-pitch of 10 slots. Find the induced EMF per phase if the flux/pole is 0.035 Weber.	**07**
		OR	
Q.4	**(a)**	Write the difference between stationary armature type and rotating armature type alternator.	**03**
	(b)	Explain concept of synchronous reactance in synchronous machine.	**04**
	(c)	A 3-phase star connected alternator is rated at 1600 KVA; 13500 V. The armature effective resistance and synchronous reactance are 1.5 ohms and 30 ohms respectively per phase. Calculate the percentage voltage regulation at full load, 0.8 lagging power factor.	**07**

Q.5	**(a)**	Explain methods of starting of synchronous motor.	**03**
	(b)	Explain working principle of stepper motor.	**04**
	(c)	A 6 pole three phase 440 V, 50 Hz. Induction motor develops 8 H.P. at 955 rpm, stator losses amount to 400 watts and the friction losses 0.5 H.P., Calculate (i) rotor copper loss (ii) efficiency of motor.	**07**

OR

Q.5	**(a)**	Explain synchronous condenser.	**03**
	(b)	Explain magnetic levitation principle.	**04**
	(c)	Draw and explain different vector diagrams of synchronous motor on load.	**07**

****