Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (OLD) EXAMINATION – WINTER 2018

Subject Code: 180904 **Date: 03/12/2018**

Subject Name: Electrical Machine Design -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.**

Q.1	**(a)**	Explain the factors affecting the selection of Air gap of three phase Induction Motor.	**07**
	(b)	Explain factors affecting specific electric loading and specific magnetic loading of3 phase IM.	**07**
Q.2	**(a)**	Explain the effect of skewing the rotor slots in a squirrel cage induction motor.	**07**
	(b)	Estimate the stator core dimensions, number of stator slots and number of stator conductors per slot for a 100KW, 3300V, 50 Hz, 12 pole star connected slip ring induction motor. Assume Bav=0.4wb/m^2, ac=25000 A/m, Efficiency=0.9, power factor=0.9 and winding factor =0.96. Choose main dimensions to give best power factor. The slot loading should not exceed 500 ampere conductors.	**07**
		OR	
	(b)	Draw and explain briefly the current distribution wave form spreaded over one pole pitch in bars and end rings squirrel cage induction motor.	**07**
Q.3	**(a)**	What is dispersion coefficient? Show its effect on maximum power factor and overload capacity of three phases Induction Motor.	**07**
	(b)	Find the current in the bars and end rings of a 11KW, 6 pole, 50 Hz , 3 phase star connected induction motor having 54 stator slots with 9 conductors in each slot. The number of rotor bars is 64. The machine has an efficiency of 0.86 and a power factor of 0.85. The rotor mmf may be assumed as 85 % of stator mmf. Also find the suitable size of the cage bars and end rings if the current density is 5 A/mm^2.	**07**
		OR	
Q.3	**(a)**	Explain methods of Improving starting torque of Induction Motor.	**07**
	(b)	Draw flow chart and write algorithm steps for design of submersible motors.	**07**
Q.4	**(a)**	Explain steps of design of field winding of alternator.	**07**
	(b)	The field coil of a salient pole alternator are wound with a single layer winding of bare copper strip 30 mm deep with separating insulation 0f 0.15mm thick. Determine a suitable winding length, number of turns and thickness of conductor to develop mmf of 12000 A with a potential difference of 5 V per coil and with a loss of 1200W/m2 of total coil surface. The mean length of turn is 1.2 m. The resistivity of copper is 0.021ohm/m and mm^2	**07**
		OR	
Q.4	**(a)**	Define SCR of a synchronous machine. Discuss the importance of SCR in the design of synchronous machine.	**07**
	(b)	For the same h.p. output compare the relative sizes of a 3-phase induction motor to 1-phase induction motor (split phase capacitor start). Assume same loadings, same number of poles, same power factor and efficiency.	**07**
Q.5	**(a)**	What is the role of damper winding in (i) synchronous generator and (ii) synchronous motor? Derive the equation of MMF of damper winding.	**07**

	(b)	Explain the designing of capacitance value for maximum starting torque in case of capacitor start single phase induction motor.	**07**

OR

Q.5	**(a)**	Explain evaluation of Direct and Quadrature axis reactance of Alternator	**07**
	(b)	Explain the terms "critical speed" and "run away speed" with reference to synchronous machine.	**07**

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