Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – SUMMER • 2015

Subject code: 180904 **Date:07/05/2015**

Subject Name: Electrical Machine Design-II

Time: 10.30AM-01.00PM **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)**	Discuss the Methods to reduce the harmonic torque in induction motor	**07**
	(b)	Discuss the factors that govern the choice of average gap density for a synchronous machine.	**07**
Q.2	**(a)**	Determine the main dimensions, Number of radial ventilating ducts and the turns per phase of a 3.7 KW, 400V, 3-Phase, 4-pole, 50Hz squirrel cage induction motor which is to be started using a star-delta starter. Assume:- Average flux density in the gap=0.45wb/m^2, Ampere conductors per meter=23000, efficiency=0.85, Power factor=0.84. Choose the main dimension to give an overall good design.	**07**
	(b)	Explain the factors which are to be considered while selecting the armature slots of a synchronous machine.	**07**
		OR	
	(b)	Explain briefly the methods for improving e.m.f. wave form of an alternator.	**07**
Q.3	**(a)**	Discuss the effect of air gap length on the performance of a 3-phase induction motor.	**07**
	(b)	A 15KW, 400V, 3-phase, 50Hz, 6-pole induction motor as a diameter of 0.3m and the length of core 0.12m. The number of stator slots is 72 with 20 conductors per slots. The stator is delta connected. Calculate the value of magnetizing current per phase if the length of air gap is 0.55mm. The gap contraction factor is 1.2. Assume the mmf require for the iron parts to be 35% of the air gap mmf. Coil span =11 slots.	**07**
		OR	
Q.3	**(a)**	What is dispersion coefficient? What is its effect on (i) power factor (ii) over load capacity of induction motor?	**07**
	(b)	Derive the equation of rotor resistance referred to stator side, for a squirrel cage induction motor.	**07**
Q.4	**(a)**	Explain is the role of damper winding in (i) synchronous generator (ii) synchronous motor.	**07**
	(b)	The following is design data available for a 1250 KVA, 3-phase, 50Hz, 3300V, star connected, 300 rpm alternator of salient pole type : Stator bore D=1.9m, stator core length L=0.335m, ratio of pole arc to pole pitch=0.66, turns per phase=150, single layer concentric winding with 5 conductors per slot, short circuit ratio=1.2. Assume that distribution of gap flux is rectangular under the pole arc with zero values in the interpolar region. Calculate (i) specific magnetic loading (ii) air gap length. Mmf required for air gap is 0.88 of no load field mmf and gap contraction factor is 1.15.	**07**

OR

Q.4	**(a)**	Discuss in steps the design of field winding of a salient pole synchronous machine.	**07**
Q.4	**(b)**	Discuss the design differences of a salient pole and non salient pole synchronous machines.	**07**
Q.5	**(a)**	Write the design steps for a starting winding of split phase induction motor.	**07**
	(b)	Show that the output for single phase induction motor is 2/3 of the output of the 3-phase induction motor for the same diameter and length.	**07**

OR

Q.5	**(a)**	Explain the procedure to calculate the value of the capacitor to obtain the maximum starting torque of a capacitor start single phase induction motor.	**07**
	(b)	Discuss the design consideration of high voltage 3-phase induction motor.	**07**

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