Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – WINTER 2013

Subject Code: 131901 **Date: 03-12-2013**

Subject Name: Electrical Machines and Electronics

Time: 02.30 pm - 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 constructional details of D.C. generator. Also give the classification with neat diagrams.	**07**
	(b)	An ideal 25 KVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz supply. Calculate (1) primary and secondary currents on full load (2) secondary e.m.f. (3) maximum core flux	**07**
Q.2	**(a)**	Explain voltage build up process of D.C. Generator. Also derive E.M.F. equation of D.C. Generator.	**07**
	(b)	A 4-pole, D.C. shunt generator with a shunt field resistance of 100 ohm and armature resistance of 1 ohm has 378 wave connected conductors in its armature. The flux per pole is 0.02 Wb. If a load resistance of 10 ohm is connected across the armature terminals and the generator is driven at 1000 r.p.m. , calculate the power absorbed by the load.	**07**
		OR	
	(b)	Determine Armature torque and Shaft torque of 220 V , 4-pole,series motor with 800 conductors,wave connected supplying a load of 8.2KW by taking 45 A from the mains. The flux per pole is 25 mwb and its armature circuit resistance is 0.6 ohm.	**07**
Q.3	**(a)**	Derive condition for maximum torque for induction motor and explain Torque-Slip and Torque- speed characteristics.	**07**
	(b)	A 400 V, 4 pole, 3 phase, 50Hz star connected induction motor has a rotor resistance and reactance per phase equal to 0.01 ohm and 0.1 ohm respectively. Determine Starting torque, slip at which maximum torque will occur, speed at which maximum torque will occur, maximum torque, full load torque if full load slip is 4%.assume ratio of stator to rotor turns as 4.	**07**
		OR	
Q.3	**(a)**	Describe working principle of shaded pole type single phase induction motor with neat diagram.	**07**
	(b)	Draw a no load phasor diagram of a 1- phase transformer and explain.	**07**
Q.4	**(a)**	Explain the full wave rectifier in detail with the help of circuit diagram and waveform.	**07**
	(b)	Discuss the disadvantages of a low power factor. Also explain the methods of power factor improvement.	**07**
		OR	
Q.4	**(a)**	What are the conditions to be fulfilled for parallel operation of two synchronous machine? Give any one method of synchronizing.	**07**
	(b)	Explain the difference between core type and shell type transformer. Also give the comparison for power transformer and distribution transformer.	**07**

Q.5	**(a)**	What is Logic-Gate ?Draw the Truth table & symbol for NAND, NOR, OR Gate. Also State & Explain De-Morgan's Theorem.	**07**
	(b)	What is a tariff? Explain the types of tariff.	**07**

OR

Q.5	**(a)**	Find the most economical power factor ,when the tariff is Rs 100/- per KVA of maximum demand plus a flat rate per KWh. Assume additional cost of condenser of Rs 80/- per KVA. Rate of interest & depreciation is together to be taken as 10 %	**07**
	(b)	Define following Terms. (i) Demand Factor (ii) Load Factor (iii) Diversity Factor (iv) Connected Load (v) Plant capacity Factor (vi) Maximum Demand (vii) Average Load	**07**

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