GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–III EXAMINATION – WINTER 2015

Subject Code:130904   **Date:05/01/2016**
Subject Name: Electrical Machine-I
Time: 2:30pm to 5:00pm   **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)**	Explain the internal and external characteristics of D.C. Shunt Generator.	**07**
	(b)	A d.c. shunt motor runs at a speed of 1000 r.p.m on no load taking a current of 6 amp. from the supply, when connected to 220 V d.c. supply. Its full load current is 50 Amp. Calculate its speed on full load. Assume R_a=0.3 ohm and R_{sh}=110 ohm.	**07**
Q.2	**(a)**	State and explain the various losses which takes place in a d.c.machine.	**07**
	(b)	Explain voltage build up process of D.C. Generator. Also derive E.M.F.equation of D.C. Generator.	**07**

OR

	(b)	A 4 pole, lap wound long shunt compound generator has 1200 armature conductors. The armature, series and shunt field resistance are 0.1ohm, 0.15 ohm and 250 ohm respectively. if flux/pole is 0.075 Wb. Calculate the speed at which the machine should be driven so that it can be deliver the load of 50Kw at 500V. take overall voltage drop due to brush contact as 2 V.	**07**
Q.3	**(a)**	Explain how rotating magnetic field is produced in a three phase induction motor.	**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)**	Define the term slip and explain the operating principle of 3- phase induction motor.	**07**
	(b)	Rotor resistance and standstill reactance per phase of a 3-phase induction motor are 0.04 ohm and 0.2 ohm respectively. What should be the external resistance required at start in rotor circuit to obtain (i) maximum torque at start (ii) 50% of maximum torque at start.	**07**
Q.4	**(a)**	Draw a no load phasor diagram of a 1- phase transformer and explain.	**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**

OR

Q.4 **(a)** A 5 kVA, 500/250 V, 50 Hz, 1- phase transformer gave the following readings. **07**
O.C test : 500 V,1 A, 50 Watt (L.V. side open)
S.C test : 25 V, 10 A, 60 Watt (L.V. side shorted)
Determine : (i) efficiency on full load, 0.8 lagging p.f.
(ii) voltage regulation on full load, 0.8 leading p.f.

(b) Explain the direct load test for determination of voltage regulation and **07**
efficiency of transformer with necessary diagram.

Q.5 **(a)** Discuss the conditions of parallel operation of synchronous generator. **07**
(b) Explain the basic concept of static speed control of D.C. Machine. Also **07**
discuss the Ward Leonard method for D.C. Motor.

OR

Q.5 **(a)** Define Voltage regulation of alternator. State various methods to find voltage **07**
regulation and Explain any one method in detail.

(b) Define "All day efficiency" of transformer. Explain the construction **07**
and working principle of Autotransformer.

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