Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–II • EXAMINATION – WINTER • 2014

Subject Code: X20903 **Date: 01-01-2015**

Subject Name: Electrical Machines I and II

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 with neat diagram speed control of D.C. shunt motor.	**07**
	(b)	Explain construction and working of D.C. generator.	**07**
Q.2	**(a)**	Explain necessity of starter for D.C. motor. Discuss three point starter with appropriate diagram.	**07**
	(b)	Derive the equation of torque under starting and running condition for induction motor.	**07**
		OR	
	(b)	Explain power stages of 3-phase induction motor. Establish relation between rotor cu. loss , rotor output and rotor input.	**07**
Q.3	**(a)**	Establish relation between starting torque and maximum torque. Also Establish relation between full load torque and maximum torque	**07**
	(b)	4-pole , 220 V shunt motor has 540 lap-connected conductors. It takes 32 A from the supply mains and develops output power of 5.595 KW. The field winding takes 1 A. the armature resistance is 0.9 Ω and the flux per pole is 30 mwb. Calculate (1) speed and (2) torque developed in N.m	**07**
		OR	
Q.3	**(a)**	Explain the internal and external characteristics of D.C. shunt generator.	**07**
	(b)	A 4-pole, long-shunt lap wound compound generator supplies 30 kW at a terminal voltage of 500 V. The armature resistance is 0.035 Ω, series field resistance is 0.045 Ω and shunt field resistance is 250 Ω. The brush drop may be taken as 2.0 V. Determine the e.m.f. generated. Also calculate the No. of conductors if the speed is 1000 r.p.m. and flux per pole is 0.025 Weber. Neglect armature reaction.	**07**
Q.4	**(a)**	What are different type of losses occur in transformer? Derive the condition of maximum efficiency	**07**
	(b)	A 6600/400 V single phase transformer has primary resistance of 2.5 Ohm and secondary resistance of 0.01 Ohm. Calculate total equivalent resistance referred to primary and secondary.	**07**
		OR	
Q.4	**(a)**	Explain working principle of single phase transformer. Also derive emf equation.	**07**
	(b)	The open circuit & short circuit tests on 10 KVA 200/400V, 50Hz transformer gives following results: OC test: Voc = 230V, Ioc = 1.0 A, Woc = 100W (HV side open) SC test: Vsc = 20 V, Isc =30 A, Wsc = 200W (supply was on HV side) Find parameters of equivalent circuit .	**07**
Q.5	**(a)**	Explain general principal of Induction motor. Also explain main parts of the Induction motor.	**07**

	(b)	State different methods for finding voltage regulation of alternator. Explain in brief any one of them.	**07**
		OR	
Q.5	**(a)**	Explain the difference between cylindrical and salient pole rotors used in Large alternator. Define (1) pitch factor (2) Distribution factor (3) Form factor.	**07**
	(b)	Explain the operating principle of synchronous motor. Draw the vector diagrams when the synchronous motor runs at under excitation and over excitation.	**07**

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