Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – WINTER 2013

Subject Code: 131701 **Date: 30-11-2013**

Subject Name: Electrical Machines

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)**	Derive the e.m.f. equation of a 1-phase transformer. Also prove that voltage per turn in primary and secondary is same.	**07**
	(b)	A 10 kva ,500/250 v, 50 hz,1-phase transformer has a net area of cross section 30 cm^2 and max flux density is 1.2 Tesla. Calculate no of turns on both primary and secondary.	**07**
Q.2	**(a)**	Explain the double revolving field theory for a single-phase induction Motor.	**07**
	(b)	Explain 3-point starter use to start DC motor.	**07**
		OR	
	(b)	Develop equivalent circuit of a 1-phase transformer. Draw the phasor diagrams for no-load and load conditions.	**07**
Q.3	**(a)**	Explain different parts of DC machine with neat and clean diagram.	**07**
	(b)	Explain crawling and cogging of an 3-phase induction motor.	**07**
		OR	
Q.3	**(a)**	Draw and explain the internal and external characteristics of d.c. shunt generators.	**07**
	(b)	Derive the condition for Maximum torque for induction motor and explain Torque - Slip characteristics.	**07**
Q.4	**(a)**	State and explain condition of parallel operation of two 3-phase transformers	**07**
	(b)	Explain armature reaction in DC machines.	**07**
		OR	
Q.4	**(a)**	State the different methods of finding voltage regulation in alternator. explain any one of them in detail.	**07**
	(b)	State and explain condition of synchronizing alternator with infinite bus bar.	**07**
Q.5	**(a)**	What is an auto transformer? Compare auto transformer vs. two winding transformer.	**07**
	(b)	A DC generator has an armature emf of 100 v. when the useful flux per pole is 20 m Wb, and the speed is 800 rpm. Calculate the generated emf (1) with the same flux and a speed of 1000 rpm (2) with flux per pole of 24 m Wb and a speed of 900 rpm.	**07**
		OR	
Q.5	**(a)**	Explain different speed control methods of 3-phase induction motor.	**07**
	(b)	A 3-phase induction motor has a full load speed of 960 rpm. Calculate the speed of rotor field with respect to rotor, stator and stator field.	**07**

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