Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–II • EXAMINATION – SUMMER • 2014

Subject Code: X21901 **Date: 20-06-2014**

Subject Name: Electrical Machines and Electronics

Time: 10:30 am - 01:00 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)**	Discuss functions and materials of yoke, armature, commutator and brush of a dc generator. Also draw external and internal characteristics of a dc (i) Series and (ii) Shunt generators.	**07**
	(b)	State different types of DC motor with the help of necessary basic circuits. Derive the expression of armature torque of a dc motor.	**07**
Q.2	**(a)**	Justify the need of a starter for a dc shunt motor. Explain the working of a 3-point starter with necessary diagram.	**07**
	(b)	Compare field and rheostatic methods of speed control of a DC shunt motor.	**07**
		OR	
	(b)	A 250 V shunt motor has armature current of 20 A when running at 1000 rpm against full load torque. The armature resistance is 0.5 ohm. What resistance must be inserted in series with the armature to reduce the speed to 500 rpm at the same torque and what will be the speed if the load torque is reduced to half with this resistance in the circuit? Assume the flux to remain constant and neglect brush drop.	**07**
Q.3	**(a)**	State different types of 3-phase induction motor. Also discuss its slip –torque characteristics.	**07**
	(b)	What are the conditions to be satisfied before putting the alternator in parallel? Discuss lamps method of synchronization of 3-phase alternators	**07**
		OR	
Q.3	**(a)**	Define voltage regulation of an Alternator. Also state the advantages of parallel operation of Alternators.	**07**
	(b)	Write short notes on (i) 1-phase capacitor motor, (ii) 1-phase shaded pole and (iii) universal motor.	**07**
Q.4	**(a)**	Compare shell and core types of transformers. Discuss the use of breather, bushings and conservators in a transformer.	**07**
	(b)	Compare indoor and outdoor sub stations.	**07**
		OR	
Q.4	**(a)**	Define step-up and step-down transformers. Explain working principle of a transformer.	**07**
	(b)	Discuss disadvantages of low poor power factor and different methods to improve it.	**07**
Q.5	**(a)**	State different equipments used in a sub-station. Draw a key diagram of 66/11 kV substation.	**07**
	(b)	Explain centre tap type full wave rectifier with necessary circuit and waveforms. Compare half wave and full wave rectifiers.	**07**
		OR	
Q.5	**(a)**	Discuss the use of OPAM as (i) inverting, (ii) non-inverting, (iii) differential and (iv) comparator	**07**
	(b)	Discuss AND, OR, NOR, NOT, NAND, Ex-OR and Ex-NOR logic gates with their truth tables.	**07**

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