Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER • 2014

Subject Code: 150904 **Date: 17-06-2014**

Subject Name: Elements of Electrical Design

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)** Design a suitable 8 section starter for a 15 kW, 220 volt, 1000 rpm d.c. shunt motor. **07**
Given:
Max torque = Full load torque.
Armature resistance 0.45 ohm.
Efficiency = 86%.
Also determine the speeds at which notching takes place.

(b) With neat sketch explain power and control circuit diagram of a star delta starter. **07**

Q.2 **(a)** Prepare winding layout for a d.c. machine having 25 armature slots, 4 pole simplex wave winding. **07**

(b) Show that section resistances of three phase slip ring induction motor starter in geometric progression. **07**

OR

(b) With suitable diagram explain the terms with respect to a.c. armature winding. **07**
(1) Phase spread
(2) Chorded winding
(3) Coil span
(4) Full pitch coils.

Q.3 **(a)** Derive an expression of reluctance of an air gap in d.c. machine. Explain clearly the effects of **07**
(1) Slotting and (2) Ventilating ducts.

(b) Define space factor applied to magnetic coil design and how it can be calculated in bedded and unbedded conductors. **07**

OR

Q.3 **(a)** What is Carter's fringing curves? Discuss its application. **07**

(b) Determine the maximum MMF that can be produced by exciting coil of an electromagnet requiring to dissipate 7 kW . **07**
Given:
Length of mean turn = 2.2 m
Winding area =(0.3 x 0.25)sqr meter
Space factor = 0.55
Resistivity = 0.023 ohm/m/sqr mm.

Q.4 **(a)** Explain design procedure of a small single phase transformer. **07**

(b) Explain the significance of equalizer connection and dummy coils in armature winding. **07**

OR

Q.4 **(a)** Explain the design procedure of a Welding transformer. **07**

(b) Explain how the ratio of height of coil to depth of coil affects electromagnet design. **07**

Q.5	**(a)**	Explain load assessment and permissible voltage drop for electric installations.	**07**
	(b)	An illumination of 150 lumens/sqr meter is required in a seminar hall of 25 meter x 35 meter size. Determine no. of lamps of 100 watts are required and their positions. Given: Depreciation factor = 0.75 Co efficient of utilization = 0.5 Waste light factor = 1.25 Efficiency of lamp = 17 lumens/watt	**07**

OR

Q.5	**(a)**	Critically compare different types of domestic wiring systems.	**07**
	(b)	A building is being supplied with power at a 230 V. The load consists of 150 fluorescent tubes of 40 W each, 50 lamps of 60 watts each and 60 fans of 70 W each. Determine the total load and the current taken by the load assuming an average power factor of 0.7(lag)	**07**

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