

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 = (0.3×0.25) sq 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. **07**
- Given:
- Depreciation factor = 0.75
- Co efficient of utilization = 0.5
- Waste light factor = 1.25
- Efficiency of lamp = 17 lumens/watt

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**
