

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2016****Subject Code:2150904****Date:17/05/2016****Subject Name:Elements of Electrical Design****Time:02:30 PM to 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 grading of starting resistance for DC shunt motor starters. **07**  
(b) Find the Front pitch, back pitch, winding pitch and commutator pitch for a simplex wave wound 13 slots, 4-pole d.c armature with 13 commutator segments. Draw the winding diagram in developed form. Also draw the sequence diagram to indicate the position of brushes. Assume number of coil sides per slot = 2. **07**
- Q.2** (a) Discuss advantages of fractional slot winding. Explain how the slot distribution is done for fractional slot winding. **07**  
(b) Calculate the steps in a 4 section rotor resistance starter for a 3-phase slip-ring induction motor from the following data: **07**  
Full load slip = 2.5% , Maximum starting current = Full load current  
Rotor resistance per phase = 0.02 ohm
- 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) Explain design procedure of a small single phase transformer. **07**  
(b) Give the design steps for single phase variable chock coil. **07**
- OR**
- Q.3** (a) Explain the design procedure to design a field regulator to change the E.M.F generated in a self excited dc generator. **07**  
(b) Explain the design procedure for electrification of a small industry having a load of about 50 KW and a shade area of about 1100 m<sup>2</sup>. **07**
- Q.4** (a) Which are the types of wiring system? Explain any three of them in brief. **07**  
(b) The domestic load in residential building is used in following manner. **07**  
Fluorescent lamps 55 watt each, 4 nos. 6 hrs/day.  
Fans 70 watt each, 4 nos. 8 hrs/day. Refrigerator of 300 watt, 12 hrs/day.  
Heater of 1000 watt, 2 hrs/day. Television of 150 watt, 8 hrs/day. Calculate  
(i) Connected load (ii) Daily load factor (iii) Total cost of electrical energy for 30 days, at the rate of Rs. 3/unit.
- OR**
- Q.4** (a) What is electric load? Giving examples classify different types of load. **07**  
(b) Define real and apparent flux densities in the tooth of a D.C machine armature. **07**  
Explain difference between them and also derive relation between them.
- Q.5** (a) Differentiate clearly between a mush winding and a double layer winding for three phase A.C machine. **07**

- (b) Draw main circuit and control circuit of fully automatic star delta starter for squirrel cage induction motor. **07**

**OR**

- Q.5** (a) Design and develop a mush winding for a stator of 3-phase A.C machine having 4 pole and 36 slots. **07**
- (b) Explain with neat sketch power and control circuit of Direct On Line Starter. **07**

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