Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEM-V Examination-Nov-2011

Subject code: X50902 **Date: 22/11/2011**
Subject Name: Elements of Electrical Design
Time: 2.30 pm -5.00 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) Define and clearly explain the terms : 06
(1) Front pitch
(2) Back pitch
(3) Commutator pitch
(b) What is electric load? Giving examples. Classify different types of load. 04
(c) Discuss the factors to be considered while designing for the domestic wiring. 04

Q.2(a) Explain necessity of Starter in D.C. Motor, and also write design steps For designing different section resistance in D.C.shunt motor. 07
(b) Design a suitable 5 section starter for a 7.5 KW, 250V, 1000 RPM D.C.shunt Motor from the following data: 07
Maximum starting torque= 1.2 times full load torque
Armature circuit resistance = 0.5 ohm
Full load efficiency = 0.85

OR

(b) A D.C. shunt Motor having armature resistance of 0.5 ohm is to be started by a controller which keeps the current between the upper and lower limits of 60A and 42 A. The supply voltage is 250V. Workout the number of resistance steps and the values of resistance elements. 07

Q.3 (a) Explain leakage flux and leakage coefficient. 04
(b) What is mean by magnetizing curve? Explain its importance and uses in magnetic circuit. 03
(c) Discuss Laws of magnetic circuits. 07

OR

Q.3(a) What is the carter's fringing curve? Why it is used? 07
(b) A single phase transformer is required to be designed to give an output of 4 A at 24 V, from 230 V, 50 Hz A.C. supply. You may assume the efficiency of transformer to be 94%, turns/volt = 4.6, Bm = 1 wb/m2. 07
Determine the dimension of central limb, no. of turns and currents in both windings.

Q.4(a) Give comparison between lap and wave windings used in D.C. machine. 06
(b) Design a continuously rated flat faced armature type circular magnet having following data: 08
Force = 200 kg.; Stroke = 0.7 mm.; Voltage = 6 volt.;
Temperature rise = 60 degree C above an ambient temperature of 20 degree C.
Flux density corresponding to index no 21200 is 1.16wb/m2 and to index no 28400 is 1.2 wb/m2.You may assume c = 0.085degree C-m2/W and space factor = 0.5.
Mmf reqd. for iron parts are 15% of the mmf required. for air gap.
The ratio of coil height to width (hf/df) = 4.
Conductor resistivity =0.022 ohm/m/mm2.

OR

Q.4(a) What are the factors/points that should be considered while designing lighting scheme. 08

(b) Define the terms: 06

1) Utilization Factor
2) Depreciation Factor
3) Space Height Factor
4) Waste Light Factor

Q.5(a) What do you mean by "dummy coil"? What are its applications? Also explain the use of equalizer connections in d.c. armature winding. 07

(b) What is fractional slot winding? Discuss its advantages. 07

OR

Q.5(a) Explain the classification of AC winding in brief. 04

(b) A family has following in his newly built house: 10
Drawing Room, 2 Bed room, Kitchen, Warandah, Reading room, ,Toilet .Carry out the approximate load assessment and determine the number of power and control circuits and draw the schematic wiring diagram.