Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER – V • EXAMINATION – WINTER 2012

Subject code: X 50902 **Date: 17/01/2013**

Subject Name: Elements of Electrical Design

Time: 02.30 pm - 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) What is Carter's coefficient? How does it help in estimation of mmf in case of a slotted armature? What are the expressions to be used for estimation? **[7]**

Q.1 (B) Define and clearly explain the terms:
(1) Space factor
(2) Field form factor
(3) Commutator pitch **[7]**

Q.2 (A) Prove that the section resistances of d.c. shunt motor starters are in geometrical progression. **[7]**

Q.2 (B) Explain the design procedure to design a field regulator to change the emf generated in a self excited dc generator. **[7]**

OR

Q.2 (B)Explain the design procedure of a 3-phase variable choke coil. **[7]**

Q.3 (A) Define and clearly explain the terms:
(1) Gap contraction factor for slots and ducts
(2) Stacking factor
(3) Back pitch and front pitch **[7]**

Q.3 (B) What do you mean by "dummy coil"? What is its application? Also explain the use of equalizer connections in d.c. armature winding. **[7]**

OR

Q.3 (A) Differentiate clearly between a mush winding and a double layer winding for three phase ac machines. **[7]**

Q.3 (B) Discuss the factors that should be considered while selecting the type of a wiring system. **[7]**

Q.4 (A) Explain the design procedure for electrification of a small industry having a load of about 50 KW and a shade area of about 1000 metre2. **[7]**

Q.4 (B) Discuss step by step complete procedure to design a horse shoe type electromagnet for a given supply voltage, required force and stroke. **[7]**

OR

Q.4 (A) What is electric load? Giving examples classify different types of load. **[7]**

Q.4 (B) Derive an equation for temperature rise of an electromagnet coil. **[7]**

Q.5 (A) A gentleman has following in his newly built a house. Drawing Room, Bed room, Kitchen, Warandah, Reading room, Kitchen, Bathroom, Toilet and some open space at the back. Carry out the approximate load assessment and determine the number of power and control circuits. **[7]**

Q.5 (B) Determine the critical value of the flux density and the mmf requirement in a variable air gap choke coil to operate at 240 volts, 50 Hz, A.C. supply and to carry a rated current of 10 amps. The length of the air gap varying from 0 to 50mm. **[7]**

OR

Q.5 (A) A DC series motor operates at 250 Volts. It has an armature resistance including series field winding resistance 0.5 ohm. If the maximum starting current is limited to 50 amps and the first and the third resistance sections are 1.35 ohm and 0.98 ohm respectively, calculate the starter design constants alpha, beta and gamma. Also calculate the last resistance section. **[7]**

Q.5 (B) Explain the design procedure completely for a flat face shape electromagnet. **[7]**

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