GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V(OLD) EXAMINATION – SUMMER 2019
Subject Code:150904 
Date:20/06/2019
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) Design and develop a mush winding for a stator of 3-phase A.C machine having 4 pole and 36 slots. 07
(b) With neat sketch explain power and control circuit diagram of a star delta starter. 07

Q.2 (a) Explain the design procedure to design a field regulator to change the Emf generated in a self excited dc generator. 07
(b) An electromagnet coil has an outer diameter of 0.6 m and an internal diameter of 0.3 m. its height is 0.25 m. the outer cylindrical surface of the coil can dissipate 1200 watt/m². Calculate the total mmf of the coil if voltage applied across the coil is 100 Volt. Assume space factor = 0.6, Resistivity = 0.02 ohm/m/mm². 07

OR
(b) Discuss step by step complete procedure to design a horse shoe type electromagnet for a given supply voltage, required force and stroke. 07

Q.3 (a) Define real and apparent flux densities in the tooth of a d.c. machine armature. Explain difference between them and also derive relation between them. 07
(b) Design a suitable 8 section starter for a 14.92 kW, 250 volt, 1000 rpm d.c. shunt motor. Given:
Max torque = Full load torque.
Armature resistance = 0.4 ohm.
Efficiency = 85%.
Also determine the speeds at which notching takes place. 07

OR
Q.3 (a) What is Carter’s fringing curves? Discuss its application. 07
(b) Discuss design procedure of single phase small transformer. 07

Q.4 (a) Discuss the design procedure of 3-phase variable choke coil. 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 winding diagram in developed form. Assume no. of coil Side/slot = 2. 07

OR
Q.4 (a) Name various types of lifting electromagnets commonly used in practice and give comparison between them 07
(b) Explain the design procedure of a Welding transformer. 07

Q.5 (a) Explain how the ratio of height of coil to depth of coil affects electromagnet design. 07
(b) Explain load assessment and permissible voltage drop for electric installations. 07
Q.5  (a)  What is electric load? Giving examples classify different types of load.
(b)  The domestic load in residential building comprises of the following:
6 lamps of 55 watt each, 4 fans of 80 watt each, 1 refrigerator of 300 watt, 1 heater of 1000 watt, Television of 120 watt. Calculate
(1) The total current taken from the supply at a voltage of 230 volts.
(2) The energy consumed in a day, if on average only a quarter of the above load persists all the time.

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