GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEMESTER – V (OLD)• EXAMINATION – WINTER 2017

Subject Code:150904
Subject Name: Elements of Electrical Design
Time: 10:30 am to 01:00 pm

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Derive the steps to calculate the starter resistance for D.C.Series motor. 07
(b) An electromagnet coil has an internal diameter of 0.3 m. its height is 0.25 m. the outer cylindrical surface of the coil can dissipate 1000 w/m². Calculate the total MMF of the coil if voltage applied across the coil is 110 V. assume space factor = 0.6 and resistivity = 0.02 Ω/m/mm² 07

Q.2 (a) Derive temperature rise equation for electromagnet coil. 07
(b) What is the function and necessity of field regulator in case of d.c.shunt motor? 07

OR
(b) Explain with wiring diagram and control circuit, the operation of an automatic direct on line starter. 07

Q.3 (a) Find the front, back winding, and Commutator pitch for a simplex wave wound 13-slots, 4 pole d.c.armature with 13 Commutator segments also develop winding table. 07
(b) Differentiate between integral and fractional slot windings. Also state advantages of fractional slot winding. 07

OR
Q.3 (a) Explain the procedure for designing 3-phase variable choke coil. 07
(b) Design a suitable 4 sections starter for a 15 kw, 250 V, 1000 rpm d.c. shunt motor from the following data.
Maximum starting torque = full load torque
Armature circuit resistance= 0.4 Ω
Full load efficiency = 0.85 07

Q.4 (a) What are the requirements for designing welding transformer? Explain V-I characteristic of welding transformer. 07
(b) Define Index number applied to electromagnet design. Explain significance of the same. 07

OR
Q.4 (a) Clearly explain the concept of real and apparent flux densities. 07
(b) Explain the following
(i) Load factor ii) Diversity factor (iii)Luminous flux (iv)Illumination 07

Q.5 (a) What is electric load? Giving examples classify types of load. 07
(b) Explain the importance of permissible voltage drop while selecting the suitable size of wire for domestic and industrial wiring system. How is it calculated for domestic and industrial wiring system? 07

OR
Q.5 (a) How the number of sub-circuit is decided for domestic and industrial wiring system 07
(b) Explain the different types of wiring system for domestic wiring. 07

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