

Seat No.: _____

Enrolment No. _____

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. **07**
- Given:
Max torque = Full load torque.
Armature resistance = 0.4 ohm.
Efficiency = 85%.
Also determine the speeds at which notching takes place.
- 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**

OR

- Q.5** **(a)** What is electric load? Giving examples classify different types of load. **07**
 (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.
