

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (Old) EXAMINATION – WINTER 2019****Subject Code: 150904****Date: 02/12/2019****Subject Name: Elements Of Electrical Design****Time: 10:30 AM TO 01:00 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 are the functions and necessity of a starter for DC and AC motors. State different types of starters used in AC and DC motors. **07**
- (b) What is armature winding? Define following terms for it: Turn, Coil, Coil side, Single Layer Winding, Double Layer winding **07**
- Q.2** (a) Draw main circuit and control circuit of star delta starter for 3 phase squirrel cage induction motor. **07**
- (b) Prove that the section resistances of DC shunt motor starters are in geometrical progression. **07**
- OR**
- (b) Design a suitable 8 sections starter for a 20 hp, 250 V, 1000 rpm DC shunt motor from the following data:
Max. Torque= full load torque, Armature resistance= 0.4Ω , Efficiency=.85%,. **07**
- Q.3** (a) Explain the terms: Field Form Factor, Carter's Coefficient, Staking Factor, Gap Contraction Factor. **07**
- (b) Explain various methods for calculating the mmf required for tapered teeth. **07**
- OR**
- Q.3** (a) Discuss step by step procedure to design horse shoe type electromagnet for a given supply voltage, required force and stroke. **07**
- (b) Name various types of lifting electromagnets commonly used in practice and give comparison between them. **07**
- Q.4** (a) Draw the winding diagram of a DC machine with 4 poles, 14 slots, progressive double layer lap winding. Show the position of brushes. **07**
- (b) Explain how the induced emf in stator winding of an AC machine is affected by Pitch Factor and Distribution Factor. **07**
- OR**
- Q.4** (a) Explain design procedure of small transformer in steps. **07**
- (b) Prove that for a given variable choke coil, flux linkages remain constant with constant supply voltage and frequency. Also explain how variable inductance is obtained by varying air gap. State assumptions made if any. **07**
- Q.5** (a) It is required to provide illumination of 120 lumens/m^2 in a factory hall $30\text{m} \times 10\text{m}$. Assume that the depreciation factor is 0.8, coefficient of utilization= 0.5, waste light factor=1.2 and efficacy of lamp is 15 lumens. Calculate number of lamps and their disposition. **07**
- (b) What do you mean by service connection. Give its types. Explain any two types. **07**
- OR**
- Q.5** (a) Which are types of wiring system? Explain any three of them. **07**
- (b) Explain with neat sketch power and control circuit of Direct On line Starter. **07**
