

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 150904****Date: 05/06/2012****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) Give comparison of simplex lap and simplex wave winding. **07**
(b) Find the front pitch; back pitch and winding pitch also draw the winding table for the following simplex lap windings. **07**
(1) 18 slots, 6 poles, 2 coil side/slot
(2) 24 slots, 4 poles, 2 coil side/slot.

- Q.2** (a) A 250 V, 37KW, dc shunt motor has to exert a maximum torque of 150% of full load torque during the starting period. The resistance of armature circuit is 0.2Ω and full load efficiency is 84%. The no. of studs is 8. Determine: **07**
(1) The upper and lower limit of current during starting
(2) The resistances of each section.
(b) Explain with neat sketch power and control circuit of Direct On Line Starter. **07**

OR

- (b) Give design steps for small 1- Φ transformer. **07**

- Q.3** (a) Explain the following terms: **08**
(1) Field form factor
(2) Carter's coefficient
(3) Stacking factor
(4) Gap contraction factor
(b) Determine the air gap length of a dc machine from the following particulars: Gross length of core=0.12 m, no. of ducts=1 and 10 mm wide, slot pitch=25 mm, slot width = 10 mm, Carter's coefficient for slots and ducts =0.32, gap density at pole centre=0.7 wb/m², field mmf per pole =3900A, mmf required for iron parts of magnetic circuit =800A **06**

OR

- Q.3** (a) Name various types of lifting electromagnets commonly used in practice and give comparison between them. **07**
(b) Prove that the maximum mmf that can be produced by an exciting coil, with given overall dimensions, temperature rise, cooling coefficient and space factor is independent of the exciting voltage. **07**

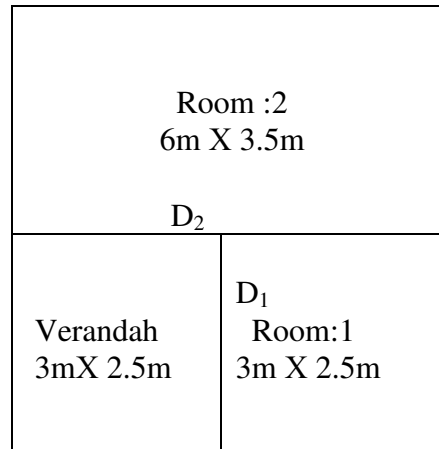
- Q.4** (a) Which are the types of wiring system? Explain any three of them in brief. **07**

- (b) A small office of size 6 m X 6 m is required to be provided with electrical connections in PVC wiring system suitable for 230V, 50 Hz, 1- Φ ac supply. The details of electrical points to be installed are given below. 07

Room:1 -- 1 fluorescent lamp, 1 ceiling fan and 1 plug socket outlet

Room:2 -- 2 fluorescent lamp, 2 ceiling fan, 1 plug socket outlet

Verandah: -- 1 ceiling fan, 1 lamp



D₁, D₂ - Doors

Do the following:

- (1) Mark the location of electrical points and draw the installation plan.
- (2) Estimate the load and decide the no. of sub-circuits.
- (3) Calculate the length of PVC conduit.
- (4) Draw the wiring diagram.

OR

Q.4 (a) Explain the following: 08

- (1) Load factor
- (2) Diversity factor
- (3) Luminous flux
- (4) Illumination

Q.4 (b) It is required to provide an illumination of 120 lumens /m² in a factory hall 30 m X 10 m .Assume that the depreciation factor is 0.8, co-efficient of utilization =0.5, waste light factor =1.2 and efficiency of lamp is 15 lumens .Calculate the no. of lamps and show their disposition.. 06

Q.5 (a) What are the functions of welding transformer? Give the steps for designing reactor for welding transformer. 07

(b) Give the design steps for single phase variable chock coil. 07

OR

Q.5 (a) Write a short note on field regulator. 07

(b) Explain a typical 3- Φ , 4 -wire supply system. 07
