

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018

Subject Code:2150904

Date:07/12/2018

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.

		MARKS
Q.1	(a) Write comparison between simplex lap and simplex wave winding applied to dc armature.	03
	(b) Write steps for estimation of domestic wiring.	04
	(c) 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/m ² , field mmf per pole =3900A, mmf required for iron parts of magnetic circuit =800A	07
Q.2	(a) Which are the properties of good insulating materials?	03
	(b) Define and clearly explain the terms: (1) Stacking Factor (2) Gap contraction factor for slots and ducts	04
	(c) Explain grading of starting resistance for DC shunt motor starters.	07
	OR	
	(c) Write steps to design small single phase transformer.	07
Q.3	(a) Write short note on field regulator.	03
	(b) Explain the importance of (a) current carrying capacity and (b) voltage drop while determining the size of conductor	04
	(c) Design and develop a mush winding for a 4-pole, 36 slots, 3-phase stator of ac machine.	07
	OR	
Q.3	(a) State the rules for electrical wiring as per IS.	03
	(b) Compare progressive and retrogressive winding.	04
	(c) Calculate the front pitch, back pitch and winding pitch for a simplex lap wound 16 slot, 4-pole d.c. armature. Make winding table and draw the winding diagram in developed form. Also draw the sequence diagram to show the position of brushes. Assume 2 conductor/slot.	07
Q.4	(a) Explain the following: (1) Load factor (2) Diversity factor (3) Demand factor	03
	(b) Write advantages of fractional slot windings.	04
	(c) Explain various methods for calculating the mmf required for tapered teeth.	07
	OR	
Q.4	(a) Which are the different types of wiring systems used for domestic installation? Explain any one of them.	03
	(b) Generating station has connected load of 50 MW and maximum demand of 30 MW. The units generated 75×10^6 per annum. Calculate (1) Demand factor (2) Load factor	04
	(c) Give the design steps for single phase variable chock coil.	07

- Q.5**
- (a)** What is electrical load? How will you classify loads? **03**
 - (b)** Explain the working of three point starter with neat sketch for DC Shunt motor. **04**
 - (c)** A gentleman has shop of size 8m×4m. Shop is provided with 3- fan, 4-tube light and one 5 A 3-pin socket outlet. **07**
 - (1) Mark suitable location of electrical points in a room and draw installation plan
 - (2) Draw wiring diagram
 - (3) Calculate length of phase wire

OR

- Q.5**
- (a)** With suitable diagram explain the terms with respect to a.c. armature winding. **03**
 - (1) Phase spread (2) Chorded winding (3) Coil span
 - (b)** Explain the use of dummy coils and equalizer connections in dc armature windings. **04**
 - (c)** The domestic load in residential building comprises of the following: 6 lamps of 55W each, 4 fans of 60W each, 1 refrigerator of 300W, 1 heater of 1000W, Television of 100W. 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. (3) Total cost of electrical energy for 30 days, at the rate of 5 Rs/Unit. **07**
