

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:2150904****Date:05/02/2021****Subject Name:Elements of Electrical Design****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Give classification of insulating material used in electrical machines based on their thermal stability as per I.S.	03
	(b) Explain following terms: (1) Field form factor (2) Carter's gap coefficient (3) Stacking factor (4) Gap contraction factor	04
	(c) Explain design procedure of a small single phase transformer.	07
Q.2	(a) What is the function of starter in d.c. machine? Explain the necessity of starter for a d.c. motor?	03
	(b) What are the various types of starter used for starting squirrel cage Induction motor? Explain one of starter in brief.	04
	(c) Find the resistance of each section of a rotor resistance starter of a slipring induction motor having a full load slips of 4%. Use 7 studs. Assume maximum starting current = full load current. Also determine the slip at various studs.	07
Q.3	(a) What is Carter's fringing curve? Why it is used.	03
	(b) What is mean by magnetization curve? Explain its importance in magnetic circuit.	04
	(c) A salient pole dc machine has a core length of 0.32 m including four ducts of 10mm each, pole arc 0.19 m, slot pitch 65.4 mm, slot opening 5 mm and a flux per pole 52 mWb. Assume Carter's coefficient of 0.18 for opening /gap = 1 and 0.28 for opening/gap = 2, Calculate the mmf required for the air gap.	07
Q.4	(a) What is soft starter? What are the benefits and advantages of soft starter.	03
	(b) Explain the function and necessity of field regulator in case of d.c. shunt generator.	04
	(c) Discuss the design procedure of 3-phase variable choke coil. Also draw the sketch of whole arrangement.	07
Q.5	(a) Define the following terms in illumination scheme: (1) Luminous flux (2) Lumens (3) Illumination (4) Lux	03
	(b) State the rules for electrical wiring as per IS.	04
	(c) A residential building has following load connected in it. Incandescent lamps 100W each, 02 Nos. 6hrs/day Fluorescent lamps 40W each, 04 Nos. 6hrs/day Fans 60W each, 06 Nos. 5hrs/day Electric cooker 1.5 KW each, 01 Nos. 4hrs/day Electric geyser 1 KW each, 01 Nos. 3hrs/day Calculate the total cost of electrical energy for 30 days,	07

at the rate of Rs. 3 per unit.

- Q.6** (a) Distinguish between 'Apperant flux density' and 'Real flux density' in highly saturated armatures. **03**
(b) Give the classification of electrical loads with examples. **04**
(c) A room of size 4 m X 3 m is required to be provided with lamp, fan, tube light and one 5A 3-pin socket outlet. Each of the points is controlled with their respective switches installed in one switch board. Assumes in PVC wiring system. No main switch is to be provided as the entry of the sub-circuit is from nearby room. Do the following: (1) Mark the location of electrical points and draw the installation plan. (2) Draw the wiring and schematic diagram. (3) Calculate the length of PVC conduit. **07**
- Q.7** (a) Differentiate between single layer and double layer winding. **03**
(b) Why equalizer connections are not necessary in case of wave winding. **04**
(c) Calculate the front pitch, back pitch and winding pitch for a simplex lap wound 16 slots, 4 pole d.c. armature. Make the winding table and draw the winding diagram in developed form. Also draw the sequence diagram to show the position of brushes. Assume 2 coil sides/slot. **07**
- Q.8** (a) Differentiate between Tractive type and Portative type electromagnet. **03**
(b) Compare lap and wave winding. **04**
(c) Develop a mush winding for a 3-phase, 4 pole, 24 slots armature. **07**

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