

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2022****Subject Code:3160918****Date:08/06/2022****Subject Name:Element 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.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|-----|---|-----------|
| Q.1 | (a) | Give the comparison between Lap winding and Wave winding. | 03 |
| | (b) | Explain the use of dummy coils and equalizer connections in d.c. armature windings. Also explain why equalizer connections are not necessary in case of wave windings? | 04 |
| | (c) | 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 the winding diagram in developed form. Also draw the sequence diagram to indicate the position of brushes. Assume number of coil sides per slot=2. | 07 |
| Q.2 | (a) | Define the real and apparent flux densities in the tooth of d.c machine armature. | 03 |
| | (b) | Give the classification of insulating materials used in electrical machines based on their thermal stability as per IS along with examples. | 04 |
| | (c) | Explain various methods for calculating the mmf required for tapered teeth. | 07 |
| | | OR | |
| | (c) | Determine the air gap length of a D.C. machine for following data. gross core length=0.10m, no of ducts=01, width of duct=10mm, slot pitch=24mm, slot width=12mm, ceters coefficient for slot and ducts=0.3, gap flux density at pole centre=0.65wb/m ² , field MMF per pole=3800A, mmf required for iron part of magnetic circuit=600A. | 07 |
| Q.3 | (a) | Write a short note on field regulator. | 03 |
| | (b) | Explain the working of star delta starter with neat sketch for squirrel cage induction motor. | 04 |
| | (c) | Prove that the section resistances of d.c. shunt motor starters are in geometrical progression. | 07 |
| | | OR | |
| Q.3 | (a) | Draw different types of stampings used for making the core of 1-Ø transformer. | 03 |
| | (b) | What is choke coil? State the function of chokes used in Tube-lights. | 04 |
| | (c) | Give the design steps for designing the single phase transformer. | 07 |
| Q.4 | (a) | Explain the factors to be considered while selecting the type of wiring. | 03 |

	(b)	Explain the load assessment and permissible voltage drop for electrical installation.	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
		OR	
Q.4	(a)	Discuss in brief points to be considered while determination of the size of conductor.	03
	(b)	Discuss the rules for electrical wiring as per IS standard.	04
	(c)	Explain the installation plan, wiring diagram and single line diagram for electric wiring based on a given load. Also give the rules for deciding the number of sub circuits and power circuit.	07
Q.5	(a)	Why AC system is preferred over DC system for transmission and distribution of electrical energy?	03
	(b)	What is control panel? State and explain the various components/devices used in the control panel.	04
	(c)	Find the diversity factor of a power station which supplies the following loads: Load A : Motor load of 150 KW between 10 a.m. to 7 p.m. Load B : Lighting load of 50 KW between 7 p.m. to 11 p.m. Load C : Pumping load of 60 KW between 3 p.m. to 10 a.m.	07
		OR	
Q.5	(a)	Define load factor, demand factor and diversity factor	03
	(b)	What is electric load? Giving examples classify different types of load.	04
	(c)	Explain with neat sketches, the different systems of wiring used for domestic installations.	07
