Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC– SEMESTER V– • EXAMINATION – SUMMER - 2016

Subject Code: X50902 **Date:24/11/2016**

Subject Name: Elements of Electrical Design.

Time:10:30 AM to 1:00 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)**	Classify the types of armature windings used in ac machines.	**04**
	(b)	Prepare developed winding diagram for the armature of a 3 phase 4 pole 24 slot single layer mush wound a.c. machine.	**10**
Q.2	**(a)**	What is gap contraction factor? Explain in detail.	**07**
	(b)	Write short note on Equalizer connection.	**07**
		OR	
	(b)	What is short pitch winding? When it is used? Discuss its advantages.	**07**
Q.3	**(a)**	A single phase transformer of 90 VA, 230V , 50 Hz is to be designed. It is expected to give an efficiency of 94%. Turns per volt and maximum flux density can be assumed to be 4.6 and 1 wb/m^2 respectively. Determine the dimension of central limb, no. of turns and currents in both windings.	**07**
	(b)	Explain the graphical method for design of resistance sections of dc series motor starter.	**07**
		OR	
Q.3	**(a)**	Find resistance of each of the 5 sections of a starter for a 440 V, DC series motor used for cranes. Motor resistance is 0.32Ω, max permissible starting current is 110 amp. Assume magnetization curve to be a straight line passing through origin.	**07**
	(b)	Explain design procedure of resistance elements used in heaters, electric iron etc.	**07**
Q.4	**(a)**	A 3 BHK apartment has following load connected in it. • 3 T5 tubelights , 2 fans, 1 TV. • Each bedroom contains, 1 tubelight, 2 fan 1A.C. of 1.5 tonne, 1 desktop computer. • Kitchen has a refrigerator of 210 ltr., An exhaust fan of 100W apart from a tubelight and a fan. Average usage of tube lights, fans, ac, T.V. and computers can be taken as 6,8,7,5 and 2 hours per day respectively. The energy cost is Rs. 6 per kWH. Estimate the monthly electricity bill of this apartment.	**07**
	(b)	Write technical note on Real and apparent flux density	**07**
		OR	
Q.4	**(a)**	Classify different types of load. Discuss factors to be considered while selecting illumination scheme for a domestic wiring.	**07**
	(b)	Explain different methods to calculate MMF required for tapered teeth.	**07**

Q.5	**(a)**	Define space factor. Derive equation for it for different arrangement of conductors inside the coil.	**07**
	(b)	Mention 4 basic equations used for electromagnet design. Derive heating equation from first principles.	**07**

OR

Q.5	**(a)**	Derive an equation for temperature rise of an electromagnet coil.	**07**
	(b)	Describe procedure to design a welding transformer.	**07**

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