

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V (New) EXAMINATION – WINTER 2019

Subject Code: 2150904

Date: 06/12/2019

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) Define the following terms used in armature winding design: (1) back pitch (2) Commutator pitch (3) winding pitch	03
	(b) Explain the use of dummy coils and equalizer connections in d.c. armature windings.	04
	(c) Design a mush winding for 3-phase, 4-pole and 24 slots stator. Also show winding diagram for phase R only.	07
Q.2	(a) Give the classification of insulating materials on the basis of maximum permissible temperature rise.	03
	(b) Derive the equation of gap contraction factor for slots.	04
	(c) Determine the air gap length of a DC machine from the following data: Gross core length=0.10m, No. of ducts=1, Width of duct=10mm, slot pitch=24mm, slot width=12mm, Carter's co-efficient for slots and ducts=0.3, gap flux density at pole centre=0.65wb/m ² , Field mmf per pole=3800A, mmf required for iron parts of magnetic circuit=600A.	07
	OR	
	(c) Define real and apparent flux densities in the tooth of d.c. machine armature and give the difference between them. Also derive the relation between them.	07
Q.3	(a) Describe how to calculate the magnetizing current in a machine with distributed winding.	03
	(b) Write short note on use of field regulator in case of DC motor and DC generator.	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
	OR	
Q.3	(a) Give the definition of the following terms with respect to load assessment: (1) demand factor (2) load factor (3) diversity factor	03
	(b) Compare mush winding and double layer winding for three phase AC machine.	04
	(c) Explain the grading of starting resistance for DC Shunt motor starters.	07
Q.4	(a) List any three guidelines for estimation of internal wiring.	03
	(b) Discuss briefly the different types of loads with examples.	04
	(c) Give design steps for small single phase transformer.	07
	OR	
Q.4	(a) Discuss the necessity of starter in DC motors and Induction motors.	03

- (b) Explain the working of star delta starter with neat sketch for squirrel cage induction motor. **04**
- (c) Give the design steps for single phase variable chock coil. **07**
- Q.5**
- (a) Explain working of three point starter for DC motor. **03**
- (b) Discuss types of electrical wiring. **04**
- (c) Explain the grading of starting resistance for three phase induction motor starters. **07**
- OR**
- Q.5**
- (a) List various methods for calculating mmf required for the tapered teeth and explain any one method in detail. **03**
- (b) Compare Simplex lap winding & Simplex wave winding. **04**
- (c) Calculate the steps in a 4 section rotor resistance starter for a 3-phase induction motor having full load slip 2.5%. Maximum starting current = full load current and rotor resistance/phase=0.02Ω. **07**

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