

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019****Subject Code: 2160912****Date: 04/12/2019****Subject Name: Design of DC Machines and Transformer****Time: 02:30 PM TO 05:30 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) How can one estimate the length of air gap of a dc machine?	03
	(b) What is Specific Electrical and Magnetic Loading? Describe factors affecting size of machines.	04
	(c) Explain various methods of Cooling of Transformer and rotating machines.	07
Q.2	(a) What is window space factor? How it varies with KVA and KV rating?	03
	(b) What do you mean by specific electric loading applied to electric machines? State the factors on which the choice of these loadings depends.	04
	(c) Explain the relation between emf per turn and transformer rating.	07
	OR	
	(c) Calculate approximate overall dimensions for a 200 kVA, 6600/440V, 50 Hz, 3 phase core type transformer. The following data may be assumed: maximum flux density= 1.3 Wb/m^2 , current density= 2.5 A/mm^2 , window space factor=0.3, overall height=overall width, window area = 5/4 times core area(net area of iron core), stacking factor=0.9. Use a 3 stepped core having Width of largest stamping= $0.9d$ and Net iron area= $0.6d^2$, where d=diameter of circumscribing circle.	07
Q.3	(a) Describe importance of mitered joints.	03
	(b) Explain the differences between Power and Distribution transformer.	04
	(c) Discuss the method to calculate no of cooling tubes and its dimensions in transformer.	07
	OR	
Q.3	(a) Discuss how the size of the core of a d.c. machine depends upon its(i) rating (ii) speed	03
	(b) Give reasons for following: 1) Why are tapping provided on HV winding ? 2) Why cores of transformers are stepped?	04
	(c) What are the types of windings commonly used in transformer and on what basis they are selected?	07
Q.4	(a) Why circular coils are always preferred over rectangular coils for winding a transformer?	03
	(b) Discuss Variation of output and losses in transformer with linear dimensions	04
	(c) Write note on selection of number of armature slots in D.C.machine.	07

- Q.4** (a) Why the length of air gap is not uniform under the entire pole face? **03**
(b) Discuss the weight of iron parts and weight of copper parts, for selection of no of poles in d.c. Machine. **04**
(c) Calculate the main dimensions and number of poles of a 400 kW, 500V, 180 rpm, dc generator. Use square pole-face. Given data: Efficiency = 92 %, Pole-arc to pole pitch ratio = 0.7, Average gap density = 0.6 Wb/m², Ampere-conductors per meter = 35000 **07**
- Q.5** (a) Explain the factors affecting for the choice of armature diameter and armature core length in d.c. machine. **03**
(b) How interpole improves commutation in D.C. machine? **04**
(c) Explain steps to design shunt field winding of a DC machine. **07**

OR

- Q.5** (a) Explain the significance of Carter's fringing curves in d.c. machine design. **03**
(b) Explain design of brushes in d.c. machine. **04**
(c) Explain different methods used to improve armature reaction effect in D.C. machine. **07**

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