

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-III (New) EXAMINATION – WINTER 2015

Subject Code: 2130904

Date: 05/01/2016

Subject Name: DC Machines and Transformer

Time: 2:30pm to 5:00pm

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	Short Questions	14
	1 How eddy current losses can be minimized?	
	2 How can the direction of rotation of a dc motor be reversed?	
	3 What is commutation?	
	4 Can DC supply be applied to a transformer?	
	5 Draw torque v/s current characteristics for DC Series motor.	
	6 What is the function of brushes in DC machine?	
	7 State various speed control method for DC series motor.	
	8 What is transformation ratio?	
	9 Draw phasor diagram for no load condition in transformer.	
	10 Why transformer rating in KVA?	
	11 Write applications of DC series motor.	
	12 Define: Pole Pitch and coil span.	
	13 Which relay is used for the protection of transformer?	
	14 On what principle DC generator works?	
Q.2	(a) Distinguish between singly excited and doubly excited magnetic systems.	03
	(b) Compare lap and wave winding.	04
	(c) What is armature reaction? Explain the methods to overcome the adverse effect of the armature reaction.	07
	OR	
	(c) A 4-pole, lap-wound, d.c. shunt generator has a useful flux per pole of 0.07Wb. The armature winding consists of 220 turns each of 0.004Ω resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current is 50 A.	07
Q.3	(a) Why Secondary of current transformer should not be open?	03
	(b) Explain the load characteristics of DC shunt generator.	04
	(c) A shunt generator delivers 195 A at terminal voltage of 250V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950W. Find: (a) EMF generated, (b) Cu losses, (c) Output of the prime mover, (d) Commercial, Mechanical and Electrical efficiencies.	07
	OR	
Q.3	(a) What is the necessity of starter in a DC motor?	03
	(b) Explain 3 point starter for DC motor in brief.	04
	(c) A 25 kW, 250V, d.c. shunt generator has armature and field resistances of 0.06 Ω and 100 Ω respectively. Determine the total armature power developed when working	07

	(a) As a generator delivering 25 kW output and (b) as a motor taking 25 kW input.	
Q.4	(a) Derive the condition for maximum efficiency of a transformer.	03
	(b) State various losses which take place in a transformer. On which factors do they depend?	04
	(c) A 600 KVA, 1 phase transformer has an efficiency of 92% both at full load & half load at unity power factor. Determine its efficiency at 60% of full load at 0.8 power factor lag.	07
	OR	
Q.4	(a) Explain Scott connection in brief.	03
	(b) Explain Sumpner's test for testing of a transformer.	04
	(c) Discuss conditions for parallel operation of two 3-phase transformers.	07
Q.5	(a) Explain the concept of ideal transformer.	03
	(b) Explain autotransformer as dimmer.	04
	(c) Derive the expression for voltage regulation of a transformer on lagging & leading power factor loads.	07
	OR	
Q.5	(a) Give the classification of DC generator.	03
	(b) What are the advantages and disadvantages of Swinburne test?	04
	(c) Explain O.C. and S.C. test on single phase transformer.	07
