

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2019

**Subject Code: 2130904**

**Date: 18/06/2019**

**Subject Name: DC Machines and Transformer**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) What are different parts of a DC machine? Explain the use of commutator.	<b>03</b>
	(b) Explain construction and working principle of auto-transformer.	<b>04</b>
	(c) Define armature reaction. Explain armature reaction effect in DC machine. How it can be minimized?	<b>07</b>
<b>Q.2</b>	(a) Mention the conditions for satisfactory parallel operation of three phase transformers.	<b>03</b>
	(b) Explain the internal and external characteristics of D.C. Shunt Generator.	<b>04</b>
	(c) The armature of a 230-volt shunt motor has a resistance of 0.18 ohm. If the armature current is not to exceed 76 amp, calculate: (a) the resistance that must be inserted in series with the armature at the instant of starting; (b) the value to which this resistance can be reduced when the armature accelerates until $E_c$ is 168 volts; (c) the armature current at the instant of starting if no resistance is inserted in the armature circuit. (Assume a 2-volt drop at the brushes.).	<b>07</b>
	<b>OR</b>	
	(c) Explain voltage build up process of D.C. Generator. Also derive E.M.F. equation of D.C. Generator.	<b>07</b>
<b>Q.3</b>	(a) Why transformer rating is in KVA?	<b>03</b>
	(b) Write a short note on current transformer and its applications.	<b>04</b>
	(c) Terminal voltage of a long-shunt compound generator is 230 V when it delivers 150 A. Determine (i) Induced emf (ii) total power generated by armature. Consider: Shunt field resistance = 92 $\Omega$ , Series field = 0.015 $\Omega$ , Series field diverter resistance = 0.03 $\Omega$ and armature resistance = 0.032 $\Omega$ .	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Explain Scott connection of 3-phase transformer.	<b>03</b>
	(b) Explain: compensating winding and interpoles in dc machine.	<b>04</b>
	(c) Discuss essential and desirable conditions to be satisfied for parallel operation of two single phase transformers.	<b>07</b>
<b>Q.4</b>	(a) Draw and differentiate between long shunt & short shunt compound generator.	<b>03</b>
	(b) Explain the load characteristics of DC shunt generator.	<b>04</b>
	(c) What is the necessity of starter in DC motor? Explain three point starter with neat sketch.	<b>07</b>

- Q.4** (a) Explain “All day efficiency” of the transformer. **03**  
(b) Explain critical field resistance of d.c. shunt generator with its significance **04**  
(c) A 20 kVA, 2200/220 V, 50 Hz, 1- phase transformer gave the following readings. **07**  
O.C test : 220 V, 4.2 A, 148 Watt (L.V. side open)  
S.C test : 86 V, 10.5 A, 360 Watt (H.V. side shorted)  
Determine: (i) Regulation at full load and 0.8 lagging p.f.  
(ii) Power factor on Short circuit.
- Q.5** (a) A 6600/400 V single phase transformer has primary resistance of 2.5  $\Omega$  and secondary resistance of 0.01  $\Omega$  Calculate total equivalent resistance referred to primary and secondary. **03**  
(b) Draw a no load phasor diagram of a 1- phase transformer and explain. **04**  
(c) Explain the direct load test for determination of voltage regulation and efficiency of transformer with necessary diagram. **07**
- OR**
- Q.5** (a) Write a note on – grounding transformer. **03**  
(b) Draw connection diagram and vector diagram for following connections of 3-Phase transformer. **04**  
(i) Dd6  
(ii) Dy1  
(c) Explain on load tap changing of transformer. **07**

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