

Seat No.: _____

Enrolment No. _____

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
Q.1	(a) What are different parts of a DC machine? Explain the use of commutator.	03
	(b) Explain construction and working principle of auto-transformer.	04
	(c) Define armature reaction. Explain armature reaction effect in DC machine. How it can be minimized?	07
Q.2	(a) Mention the conditions for satisfactory parallel operation of three phase transformers.	03
	(b) Explain the internal and external characteristics of D.C. Shunt Generator.	04
	(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.).	07
	OR	
	(c) Explain voltage build up process of D.C. Generator. Also derive E.M.F. equation of D.C. Generator.	07
Q.3	(a) Why transformer rating is in KVA?	03
	(b) Write a short note on current transformer and its applications.	04
	(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 = 92Ω , Series field = 0.015Ω , Series field diverter resistance = 0.03Ω and armature resistance = 0.032Ω .	07
	OR	
Q.3	(a) Explain Scott connection of 3-phase transformer.	03
	(b) Explain: compensating winding and interpoles in dc machine.	04
	(c) Discuss essential and desirable conditions to be satisfied for parallel operation of two single phase transformers.	07
Q.4	(a) Draw and differentiate between long shunt & short shunt compound generator.	03
	(b) Explain the load characteristics of DC shunt generator.	04
	(c) What is the necessity of starter in DC motor? Explain three point starter with neat sketch.	07

OR

- 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 2.5Ω and secondary resistance of 0.01Ω 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**
