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 Ec 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 = 92 Ω, Series field = 0.015 Ω, Series field diverter resistance = 0.03 Ω and armature resistance = 0.032 Ω.	**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**

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 Ω and secondary resistance of 0.01 Ω 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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