Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:2130904 Date:06/03/2021

Subject Name:DC Machines and Transformer

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Draw the circuit models for two types of DC compound motors and state their voltage –current relations	**03**
	(b)	Explain the construction details of core and shell type transformers.	**04**
	(c)	Explain with a neat sketch, the construction of a DC machine.	**07**
Q.2	**(a)**	Justify: 1) C.T secondary should never be kept open in any circumstances. 2) Pole shoe section of DC machine is made larger than its body.	**03**
	(b)	Which are the two types of winding used in a DC machine? Compare them.	**04**
	(c)	Draw the internal and external characteristics of DC shunt generator.	**07**
Q.3	**(a)**	Draw connection diagram and vector diagram for following connection of three phase transformer i) Y y 6 ii) D y 11	**03**
	(b)	What are the conditions necessary for parallel operation of DC generator.	**04**
	(c)	An ideal 25 KVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz supply. Calculate 1) Primary and Secondary current on full load 2) Secondary e.m.f. 3) Maximum core flux.	**07**
Q.4	**(a)**	What are the advantage and limitation of an auto-transformer.	**03**
	(b)	State the applications of various types of DC generators.	**04**
	(c)	A delta – delta bank consisting of three 40 KVA, 2300/230 V transformer supplies a load of 80KVA. If one transformer is removed, find for the resulting V-V connection. i) KVA load carried by each of the transformer ii) Percent of rated load carried by each transformer iii) Total KVA rating of the V – V bank iv) Ratio of the V – V bank to Δ -Δ bank transformer ratings v) Percent increase in load on each transformer when bank is converted into V –V bank.	**07**
Q.5	**(a)**	Define: i) Ideal transformer ii) Breather iii) Buchholz relay	**03**
	(b)	Give the classification of DC generators.	**04**
	(c)	A 4-pole, long-shunt lap wound generator supplies 25 kW at a terminal voltage of 500 V. The armature resistance is 0.03 Ω, series field resistance is 0.04 Ω and shunt field resistance is 200 Ω. The brush drop may be taken as 1V.Determine the e.m.f. generated. Also calculate the No. of conductors if the speed is 1200 r.p.m. and flux per pole is 0.02 Weber. Neglect armature reaction.	**07**

Q.6	**(a)**	Define: i) Coil ii) Coil span factor iii) Distibution Factor	**03**
	(b)	State the applications of various types of DC generators.	**04**
	(c)	A shunt generator delivers 195 A at terminal voltage of 250V.the armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950 W. Find: i) Emf generated ii) Cu losses iii) Output of the prime mover iv) Commercial, mechanical and electrical efficiencies.	**07**
Q.7	**(a)**	Briefly explain the concept of electrical degree and mechanical degree in case of rotating machines	**03**
	(b)	Draw and explain the general block diagram of an electromechanical energy conversion device.	**04**
	(c)	Drive e.m.f equation of single phase transformer.	**07**
Q.8	**(a)**	Write a short note on Off load tap changer.	**03**
	(b)	State the types of magnetic systems along with example.	**04**
	(c)	Explain the different methods of controlling speed of DC shunt motor.	**07**

****