Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023

Subject Code:3140913 Date:13-07-2023

Subject Name:Electrical Machine- I

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	State and explain Ampere's circuital law.	**03**
	(b)	Derive the emf equation of a DC generator.	**04**
	(c)	Draw the vector and winding diagram for the following 3-phase transformer connections Dd0, Dd6, Dy1, Yd11.	**07**
Q.2	**(a)**	Give the classification of DC generator.	**03**
	(b)	Draw and explain load characteristics of dc compound generator.	**04**
	(c)	A 250V dc shunt generator delivers a full load current of 130 amp. The resistances of armature and shunt field are 0.1 ohms and 125 ohms resp. Iron losses are 450 watts and mechanical losses are 550 W. Find the full load efficiency, load current for maximum efficiency and the value of maximum efficiency.	**07**
		OR	
	(c)	A 230 V dc shunt motor runs at 1000 RPM and takes 5 amp under no load condition..The armature resistance of the motor is 0.025 ohms and shunt field resistance is 230 ohms. Calculate the drop in speed when the motor is loaded and takes a line current of 41 amp.	**07**
Q.3	**(a)**	State and explain the working principle of DC motor.	**03**
	(b)	Draw and explain performance characteristics of dc series motor.	**04**
	(c)	Explain the procedure and calculations for Field test on identical DC series machines.	**07**
		OR	
Q.3	**(a)**	Derive the torque equation of a DC motor from first principles.	**03**
	(b)	Enlist the methods of speed control of DC shunt motors. Explain field control method in detail.	**04**
	(c)	Explain with neat sketch Swinburne's test to find the efficiency of dc motor. Write its merits and demerits.	**07**
Q.4	**(a)**	Compare core type and shell type transformer.	**03**
	(b)	Explain direct load test on single transformer with circuit diagram.	**04**

	(c)	The iron loss and full load copper loss of 100 KVA single phase transformer are 3 KW & 4 KW resp. Calculate the efficiency at (a) full load 0.8 p.f.(b) half load, at 0.707 pf (c) ¼ load unity p,f	**07**
		OR	
Q.4	**(a)**	Compare auto transformer with two winding transformer.	**03**
	(b)	Explain T-T connection of 3 phase transformer.	**04**
	(c)	The following are the test results of a 100 KVA, 1100/440 V, single phase transformer. O.C. test: with normal primary voltage, 500W S.C. test: 40 V, 850 W when secondary winding is shorted and full load current flowing. Find the full load efficiency and regulation when the power factor is 0.8 lagging.	**07**
Q.5	**(a)**	Mention the conditions for satisfactory parallel operation of three phase transformers.	**03**
	(b)	Define self and mutual inductance with proper formula.	**04**
	(c)	Explain singly excited magnetic field system in detail	**07**
		OR	
Q.5	**(a)**	Explain On Load Tap Changer for transformer.	**03**
	(b)	Write short note on electromechanical energy conversion.	**04**
	(c)	Explain in detail doubly excited magnetic field system.	**07**

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