Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV EXAMINATION – SUMMER 2025

Subject Code:3140913 Date:15-05-2025

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)**	List out parts of D.C machine and briefly discuss any two.	**03**
	(b)	Explain principle of energy conservation.	**04**
	(c)	Describe the method to find out voltage regulation of a transformer using open circuit and short circuit tests.	**07**
Q.2	**(a)**	Define: (1) leakage flux. (2) Pole pitch (3) magnetic permeability.	**03**
	(b)	Explain polarity test of transformer.	**04**
	(c)	A 4- pole, d.c. shunt generator with a wave wound armature having 390 conductors has to supply the load of 500 lamps, each of 100W at 250 V. Allow 10V as voltage drop in the connecting leads of the wire between generator and a brush contact drop of 1 volt/brush. Calculate the speed of armature at which the generator should be in driven. The flux/pole is 30mwb.The armature and shunt field resistances are 0.05Ω and 65 Ω respectively.	**07**
		OR	
	(c)	A 600 KVA single phase transformer has an efficiency of 92 % both at full load and half load at unity power factor. Determine its Efficiency at 60 % of full load at 0.8 power Factor lag.	**07**
Q.3	**(a)**	List the applications of d.c. motors.	**03**
	(b)	Derive the EMF equation of a transformer	**04**
	(c)	Explain 3-point starter for d.c. motor.	**07**
		OR	
Q.3	**(a)**	Explain B-H curve and its significance for a magnetic material.	**03**
	(b)	Explain Equalizer connection.	**04**
	(c)	Discuss series field test on D.C machine.	**07**
Q.4	**(a)**	Describe the process of commutation.	**03**
	(b)	Compare singly excited and doubly excited magnetic systems.	**04**
	(c)	Explain Sumpner's test for testing of a transformer.	**07**
		OR	
Q.4	**(a)**	List the advantages and disadvantages of Swinburne test.	**03**
	(b)	Derive condition for maximum efficiency for I - Ø transformer.	**04**
	(c)	Explain the methods of speed control on d.c. shunt motor.	**07**
Q.5	**(a)**	Explain the load characteristics of d.c. series generator.	**03**
	(b)	What is armature reaction? Discuss any one method to counter balance armature reaction.	**04**
	(c)	Derive an expression for saving of copper when auto transformer is used compared to Two winding transformer.	**07**

OR

Q.5	**(a)**	List the conditions for parallel operation of three phase transformer.	**03**
	(b)	Derive the torque equation of a DC motor from first principles.	**04**
	(c)	Draw the vector diagrams and winding connections for the following transformer connections. (1) Dy11 (2) Yd0	**07**

****