

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2021

Subject Code:3140913

Date:03/01/2022

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) Define Biot Savart Law.	03
	(b) Explain Energy Stored in a Magnetic Field.	04
	(c) A 4-pole, lap wound D.C. shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 220 turns each of 0.004 ohm resistance. Calculate the terminal voltage when running at 900r.p.m. if the armature current is 50 amp.	07
Q.2	(a) Explain following parts of D.C. Machine 1) Yoke 2) Poles 3) Commutator	03
	(b) Give the comparison between Lap Winding and Wave Winding	04
	(c) Draw and explain internal and external characteristics of dc series generator.	07
	OR	
	(c) A 200 V, 14.92 kW, dc shunt motor when tested by the Swinburne method gave the following result: Running light: armature current was 6.5 A and field current 2.2 A. With the armature locked, the current was 70 A when a potential difference of 3V was applied to the brushes. Estimate the efficiency of the motor when working under the full load conditions.	07
Q.3	(a) Describe function of compensating winding.	03
	(b) Explain the difference between supply voltage and Back E.M.F. in case of D.C. Motor	04
	(c) Derive the Torque equation of a D.C. Motor	07
	OR	
	(a) Give the conditions to be satisfied for voltage buildup in a d.c. shunt generator.	03
	(b) What are the advantages and disadvantages of Hopkinson's Test?	04
	(c) Enlist the methods of speed control of DC motors. Explain any one of them in detail.	07

- Q-4** (a) Derive condition for maximum efficiency for single phase transformer **03**
- (b) Define All day efficiency and Voltage regulation for a single phase transformer. **04**
- (c) A 40 kVA, single phase transformer has 400 turns on primary and 100 turns on secondary. The primary is connected to 2000V, 50 Hz supply. Determine: (i) The secondary voltage on open circuit (ii) The current flowing through the two windings on full load (iii) The maximum value of flux. **07**
- OR**
- Q-4** (a) Draw the vector diagram of a single phase transformer in case of inductive load. **03**
- (b) Write comparison of autotransformer with two winding transformer. **04**
- (c) Explain O.C. and S.C. test on single phase transformer **07**
- Q-5** (a) Describe the parallel operation of transformer. **03**
- (b) Explain Scott-connection of transformer in detail. **04**
- (c) What is Tap Changer? Explain on load tap changer and off load tap changer of transformer. **07**
- OR**
- Q-5** (a) Differentiate between core and shell-type transformers. **03**
- (b) Draw connection diagram and vector diagram for following connections of three phase transformer. **04**
- (i) Dd6
- (ii) Dy1
- (c) Explain with diagram different cooling methods used for transformer. **07**