

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: 2131005

Date: 19-12-2025

Subject Name: Electrical Machines

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 the following terms regarding Alternators:(i) Pitch factor(ii) Distribution factor	03
(b) Differentiate between Core type and Shell type transformers.	04
(c) Explain Armature Reaction in DC machines. How does it affect the main flux distribution?	07
Q.2 (a) Draw and explain the power flow diagram (power stages) of a 3-phase induction motor.	03
(b) Write a short note on the Ferranti Effect in transmission lines.	04
(c) Explain Open Circuit (OC) and Short Circuit (SC) tests on a single-phase transformer with necessary circuit diagrams.	07
OR	
(c) Explain Sumpner's method of testing transformers with a necessary circuit diagram.	07
Q.3 (a) Compare Squirrel cage and Slip ring induction motors.	03
(b) State the conditions required for the parallel operation of two single-phase transformers.	04
(c) A 6-pole, 50-Hz, 3-phase induction motor is running at a full load speed of 960 rpm. Calculate:(i). Synchronous speed (ii). Percentage slip (iii). Frequency of rotor current.	07
OR	
(a) Explain the Double Revolving Field Theory for single-phase induction motors.	03
(b) Why is a single-phase induction motor not self-starting?	04
(c) What is Slip in an induction motor? Draw and explain the Torque-Slip characteristics of a 3-phase induction motor.	07
Q.4 (a) Explain the working principle of a DC Motor.	03
(b) Why is a Synchronous Motor not self-starting? How it can be made self starting?	04
(c) Define Voltage Regulation of an alternator. Explain the Synchronous Impedance method (EMF method) for finding regulation.	07

OR

- (a)** Draw and label the diagram of a 3-point starter for a DC Shunt Motor. **03**
 - (b)** Explain 3-phase, 4-wire distribution system. **04**
 - (c)** What is Commutation in a DC generator? Explain in brief the methods to improve poor commutation. **07**
- Q.5**
- (a)** Define the following terms regarding power plants:(i) Load factor (ii) Diversity factor (iii) Plant utilization factor. **03**
 - (b)** What is an Auto-transformer? Enlist its advantages and disadvantages over a 2-winding transformer. **04**
 - (c)** Define Power Factor. Enlist reasons for low power factor and explain any one method to improve it. **07**

OR

- (a)** List the factors that affect the load sharing in parallel operating generators. **03**
- (b)** How the synchronous motor can be used as a synchronous condenser? **04**
- (c)** Draw and explain the schematic diagram of a Thermal Power Station. **07**
