

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V EXAMINATION – SUMMER 2025

Subject Code:3152001

Date:28-05-2025

Subject Name:Electro Mechanical Energy Conversion

Time:02:30 PM TO 05:00 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. (i) Magnetic Flux (ii) Reluctance (iii) Self Inductance	03
(b) State and Explain Faraday's laws and Lenz's Law.	04
(c) State and explain different types of magnetic materials and their properties.	07
Q.2 (a) Explain fringing and leakage flux with suitable diagram.	03
(b) Draw and explain Magnetic hysteresis loop. Also draw hysteresis loop for different magnetic materials.	04
(c) Draw and explain singly excited system and also derive equation for the system.	07
OR	
(c) Draw and explain doubly excited system and also derive equation for the system.	07
Q.3 (a) Explain the working principle of DC motor.	03
(b) Define slip. Why cannot an induction motor run at synchronous speed?	04
(c) What is rotating magnetic field in 3 phase induction motor? Explain it in detail.	07
OR	
Q.3 (a) Derive emf equation of dc generator.	03
(b) Define field energy and co-energy. What is the significance of co-energy?	04
(c) What is double field revolving theory in single phase induction motor.	07
Q.4 (a) Give comparison between salient pole and non-salient pole rotor.	03
(b) Explain various losses that occur in DC Machine.	04
(c) DC shunt generator give 96 A at 200 V. The resistance of armature winding and field windings are 0.1Ω and 50Ω respectively. The combine value of iron losses and friction losses are 2500 W. Determine (i) Generated EMF (2) Total Copper loss (3) Efficiency.	07
OR	
Q.4 (a) Explain with neat diagram the capacitor start single phase induction motor.	03
(b) Explain construction of synchronous AC machine.	04
(c) A 230 V dc shunt motor has constant loss of 500W. If motor takes 12 A from mains, then determine the efficiency of motor. The armature resistance is 0.6Ω and shunt field resistance is 230Ω .	07

- Q.5 (a)** A 6 pole 3-ph induction motor runs at 950 RPM on 50 Hz supply. Determine (i) synchronous speed (ii) % slip (3) frequency of rotor current. **03**
- (b)** Write a short note on AC series motor. **04**
- (c)** Explain Universal motor and Reluctance Motor. **07**

OR

- Q.5 (a)** State some important applications of BLDC motors and PMDC motors **03**
- (b)** What do you mean by servo motor? Briefly explain the principle of operation of DC servo motor. **04**
- (c)** State the different types of stepper motors and explain hybrid stepper motor in detail. **07**
