

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2024****Subject Code:3152001****Date:17-12-2024****Subject Name:Electro Mechanical Energy Conversion****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 Ampere's Law & Faraday's Laws.	03
	(b) Explain types of magnetic materials and their properties.	04
	(c) What is electromechanical energy conversion? Explain generated emf with suitable diagram.	07
Q.2	(a) What is fringing and leakage flux? Explain in brief.	03
	(b) Explain Magnetic Hysteresis loop in detail.	04
	(c) Classify DC generator with respect to their excitation and explain any two of them in detail.	07
	OR	
	(c) Draw and explain doubly excited magnetic system.	07
Q.3	(a) Define: Field energy, Co-energy and Singly excited systems.	03
	(b) Derive e.m.f. equation for an alternator.	04
	(c) A 4 pole, lap wound 750 rpm dc shunt generator has an armature resistance of 0.4Ω and field resistance of 200Ω . The armature has 720 conductors and the flux per pole is 30 mWb. If the load resistance is 15Ω , determine the terminal voltage.	07
	OR	
Q.3	(a) A 4 pole 50 Hz induction motor is running at 1400 rpm. Find the speed of stator magnetic field with respected to the rotor?	03
	(b) Explain the basic working principle of DC motor. Derive its torque equation.	04
	(c) A 250 V, d c shunt motor takes a line current of 20 A. Resistance of shunt field winding is 200Ω and resistance of the armature is 0.3Ω . Find the armature current and the back emf.	07
Q.4	(a) Explain various losses occurs in synchronous machines.	03
	(b) A 4 pole, 3 phase, 50 Hz induction motor runs at a speed of 1470 rpm speed. Find the frequency of the induced emf in the rotor under this condition.	04
	(c) Explain how rotating magnetic field is produced in 3 phase induction motor.	07
	OR	
Q.4	(a) Explain various power stages in 3-ph induction motor using suitable power flow diagram.	03
	(b) Give comparison between salient pole and non-salient pole rotor.	04
	(c) Why single phase induction motor not self-starting? Explain double field revolving theory.	07
Q.5	(a) Write a short note on PMDC motors.	03

- (b) Write a short note on universal motor. **04**
(c) List the various types of stepper motor and describe the operation of hybrid stepper motor. **07**

OR

- Q.5** (a) State some important applications of stepper 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) Explain construction and working of BLDC motor in detail. **07**
