

Enrolment No./Seat No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024

Subject Code:3152001

Date:31-05-2024

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.

- Q-1**
- (a) State and explain Faraday's laws and Lenz's law. **03**
- (b) List the various types of Magnetic Materials. Also explain the properties of magnetic materials. **04**
- (c) Explain how magnetic field is established in a long solenoid when a dc current is passes through it using suitable diagrams and expressions. **07**
- Q-2**
- (a) State and explain Ampere's circuital law. **03**
- (b) Explain various effects of Air gap in Ferromagnetic Circuit. **04**
- (c) Drawing suitable diagram explain doubly excited magnetic field system. **07**
- OR**
- (c) Explain construction of dc machines and discuss the working principle of dc generator. **07**
- Q-3**
- (a) Deduce an expression for the frequency of rotor current in an induction motor. **03**
- (b) Explain the basic working principle of DC motor. Derive its torque equation. **04**
- (c) Explain with the help of suitable diagrams, how rotating magnetic field is produced in 3-phase induction motor. **07**
- OR**
- Q-3**
- (a) Distinguish between singly-excited and doubly excited systems. **03**
- (b) Derive e.m.f. equation for an alternator. **04**
- (c) Draw and explain various characteristics for dc series motor. **07**
- Q-4**
- (a) Draw and explain equivalent electric circuit of a single phase induction motor. **03**
- (b) Explain Magnetizing Characteristic of separately excited D.C Generator. **04**
- (c) Why single phase induction motor not self-starting? Explain double field revolving theory. **07**

OR

- Q-4** (a) Explain various power stages in 3 phase induction motor using suitable power flow diagram. **03**
- (b) Describe the working and uses of a reluctance motor. **04**
- (c) Draw the circuit diagram of a capacitor-start capacitor-run single phase induction motor and explain its working. Where is this type of motor commonly used? **07**

PTO

- Q-5** (a) State the advantages of servomotors over large industrial motors. **03**
- (b) What type of permanent magnet materials are used for PMDC motors? State their properties and applications. **04**
- (c) Describe the operation of a variable reluctance type stepper motor. **07**

OR

- Q-5** (a) What are the advantages and disadvantages of stepper motors? State some important applications of stepper motor. **03**
- (b) Explain hysteresis motor in details. **04**
- (c) With neat circuit diagram explain the operation of BLDC motor. **07**
