

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024****Subject Code:3172422****Date:19-11-2024****Subject Name: Advanced Industrial Drives****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.

- Q.1** (a) Explain the concept of energy efficient motor. **03**
 (b) Explain the concept of Magnetic levitation. **04**
 (c) Draw and explain the torque – speed characteristics and the equivalent circuit of AC Servo Motor. **07**
- Q.2** (a) Draw the construction of PMBLDC Motor and list the part of it. **03**
 (b) Draw and explain construction and working of PMSM Motor. **04**
 (c) With a block diagram, explain about microprocessor-based control of PMSM. **07**
- OR**
- (c) With a block diagram, explain about microprocessor-based control of PMAF. **07**
- Q.3** (a) Define the following terms for Stepper Motor: 1. Resolution 2. Step Angle 3. Stepping rate **03**
 (b) Describe L- Θ profile of an SRM. **04**
 (c) Draw the block diagram of Microcontroller based control scheme for DC Servo Motor and Explain its working with torque-speed characteristics. **07**
- OR**
- Q.3** (a) A stepper motor is wound for 2- ϕ and has four poles. It has 10 rotor poles. Find its resolution. **03**
 (b) Explain basic principles of operation of stepper motor. **04**
 (c) Derive the transfer function of an AC Servo motor. **07**
- Q.4** (a) The synchronous speed of a LIM is 360 kmph. Find the pole pitch required if the supply frequency is 50 HZ. **03**
 (b) Compare LSM and LIM. **04**
 (c) Derive the thrust equation of an LIM. **07**
- OR**
- Q.4** (a) The frequency of applied voltage to a LIM is 50 HZ. The pole pitch of its double-sided primary is 10 cm. Find its synchronous velocity. **03**
 (b) Compare attraction type and repulsion type LLMs. **04**
 (c) Derive the thrust equation of DCLM. **07**
- Q.5** (a) Define group drive, multirotor drive and individual drive. **03**
 (b) List and explain power factor improvement in Electrical Motor. **04**
 (c) Sketch and explain the torque speed characteristics of PMSM motor and list the various application of PMSM Motor. **07**
- OR**
- Q.5** (a) Explain the concept of conditioning monitoring of Electrical Machine. **03**
 (b) Explain the four functions of Power Electronics Modulator in Electric Motor Drive. **04**
 (c) Sketch and explain the torque speed characteristics of SRM motor and list the various application of SRM Motor. **07**
