

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 3172422****Date: 21/06/2023****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) Compare the hybrid stepper motor with the variable reluctance stepper motor. **03**
 - (b) Discuss the applications of stepper motor. **04**
 - (c) Explain the construction and working of a permanent magnet stepper motor. **07**
- Q.2**
- (a) What are the merits and demerits of SRM? **03**
 - (b) Explain the construction and working of SRM. **04**
 - (c) Explain principle of operation and control of SRM. **07**
- OR**
- (c) Obtain the thrust equation of DCLM. **07**
- Q.3**
- (a) Discuss the losses in electric drive system. **03**
 - (b) Draw the characteristics of Linear Electric Machine. **04**
 - (c) A vehicle is propelled by a linear induction motor. The motor has 100 poles with a pole pitch of 0.5 m. Find the vehicle speed in kmph when the vehicle is running with a slip of 0.25 at a frequency of 50Hz. **07**
- OR**
- Q.3**
- (a) A 3-Phase 3-Stack variable reluctance stepper motor has 10 rotor teeth. Find its step angle. **03**
 - (b) A stepper motor has a resolution of 200 steps/rev. Find the pulse rate required to run the motor at 2400 rpm. **04**
 - (c) A BLDC motor has no load speed of 6000 rpm when connected to the 120V DC source. Armature resistance is 2.5Ω . Find the speed when it is supplied with 60V and developing a torque of 0.5 N-m. Neglect constant losses. The no load current is 1A. **07**
- Q.4**
- (a) Distinguish between AC and DC Servo Motor. **03**
 - (b) Draw and Explain performance characteristics of PMDC. **04**
 - (c) A permanent magnet DC motor has a no-load speed of 6000 rpm, when connected to 230V supply. The armature resistance is 1.2Ω . Find the speed when the supply voltage is 115V and torque is 0.5 N-m. Neglect constant losses. **07**
- OR**
- Q.4**
- (a) Compare Axial and Radial Permanent Magnet Motor. **03**
 - (b) Explain construction and working principle of PMDC. **04**
 - (c) A five-phase stepper has 40 rotor teeth. It drives a lead screw having a pitch of 10 threads per cm. The lead screw, in turn, produces a linear motion cutting tool. The input pulse is applied 10 times. Find the distance covered by the cutting tools. **07**
- Q.5**
- (a) What are the advantages and disadvantages of Linear Induction Motor? **03**
 - (b) Compare BLDC motor and PMSM. **04**
 - (c) Discuss PMAF Machine in brief. **07**
- OR**
- Q.5**
- (a) Discuss standards of energy efficient motor. **03**
 - (b) With the help of block diagram explain the self-control scheme for PMSM. **04**
 - (c) Explain Microcontroller based control of SRM. **07**
