

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (OLD) EXAMINATION – WINTER 2018****Subject Code: 181702****Date: 15/11/2018****Subject Name: Motion Control****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.

- Q.1** (a) What are the advantages and disadvantages of Step motors? Explain the step motor performance characteristics in detail. **07**
- (b) Give the difference between the PLL and PLS systems. Derive the linearized model for the phase-locked servo systems. **07**
- Q.2** (a) Explain Bipolar PWM DC motor amplifiers. **07**
- (b) Explain effect of lead angle in closed-loop control of Step motors. **07**
- OR**
- (b) Explain the effect of backlash and dead zone in incremental motion. Draw and explain the displacement and velocity waveforms for backlash with low and high friction. **07**
- Q.3** (a) Why Incremental encoders are needed? What are the types of it? Explain each part of the Incremental encoder in details. **07**
- (b) Explain the role of speedup capacitor in active suppression controller. **07**
- OR**
- Q.3** (a) Explain the working of position control system using with and without tachometer feedback. **07**
- (b) List the selection criteria of DC motor as Incremental motion application. Discuss at least any two criteria with justification. **07**
- Q.4** (a) Draw and explain D.C. position control system with potentiometers as error detector. **07**
- (b) List out the selection criteria for Stepper motor. Explain step angle resolution and torque requirements. **07**
- OR**
- Q.4** (a) Explain Resolvers and Magnetic pickups as Encoders. **07**
- (b) What do mean by Optimal control, suboptimal and non-optimal control for IMC? Explain it with appropriate mathematical justification. **07**
- Q.5** (a) What is torsional resonance? Explain its effect in three-body structure. Explain the techniques for minimizing torsional resonance effect in brief. **07**
- (b) Enumerate the types of Pulse sources used in motion control. Explain the digital technique based Rate multiplier type pulse sources in detail. **07**
- OR**
- Q.5** (a) Draw and explain bidirectional four-phase single and two phase on logic sequencer circuit with waveform of output phase for each pulses. **07**
- (b) Why over drive circuits are required for Step motors? Explain dual voltage control circuit **07**
