

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 181702****Subject Name: Motion Control****Date: 12/05/2012****Time: 10.30 am – 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.**

- Q.1 (a)** Classify the types of step motor used in Motion Control servo system. Explain in detail, the Step motor performance characteristics with suitable examples/diagrams. **07**
- (b)** Explain the term - Incremental Motion Control. Discuss the effect of Coulomb friction in IMC with necessary sketches / calculations. **07**

- Q.2 (a)** Enumerate the types of Pulse sources used in motion control. Explain the digital technique based Rate multiplier type pulse sources in detail. **07**
- (b)** List out the various factors associated with the Step motor selection in IMC. Discuss in detail, the torque requirement and mounting provision factors for step motor selection. **07**

OR

- (b)** Discuss the effect of the speed- up capacitors in Active carrier suppression driver scheme for Step motor drives, with the help of relevant diagram. **07**
- Q.3 (a)** Describe the hybrid type step motor with the help of axial, cross-sectional view and relevant waveform/diagram. **07**
- (b)** Discuss the effect of lead angle in Closed- loop control of step motor, with associated sketches. **07**

OR

- Q.3 (a)** Draw the detail functional block diagram for closed loop point to point controller with current sensing method. Explain the main blocks in brief and summarize the procedure of the operation/working of it. **07**
- (b)** Describe in brief, the performance of the fixed –unit time delay controller type speed control for step motor with relevant sketches. **07**

- Q.4 (a)** Write the technical short note on magnetic pick up type encoder sensor in IMC. **07**
- (b)** Discuss the various selection criteria For DC motor for IMC applications. **07**

OR

- Q.4 (a)** What are the approaches used for the minimizing the effects of system resonance, on the servo performance in IMC? Explain in brief. **07**
- (b)** Discuss the Input- Output relationship in linear DC servo amplifier, with the help of schematic and mathematical model. **07**

- Q.5 (a)** Make the tabulation for the operation Modes of PWM amplifier and DC motor configuration for considering various cases. Discuss the power dissipation and effect of switching frequency in PWM amplifier in DC servo system. **07**
- (b)** Describe the factors affecting the velocity variation in Velocity control system in IMC. **07**

OR

- Q.5 (a)** Define the phase locked loop and explain it in detail. Differentiate the terms PLL and PLS. **07**
- (b)** Discuss the components selection criteria for optimum performance of IM servo system, supported by mathematical formulae / justifications. **07**
