GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VIII • EXAMINATION – SUMMER 2014

Subject Code: 181702   **Date: 31-05-2014**

Subject Name: Motion Control

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.**

Q.1 **(a)** Explain the role of backlash and dead zone for motion control system. Derive waveform for various outputs / sketches for continuous and pulse input, with appropriate mathematical formulae and justification.   **07**

(b) Explain the need of suppression ckt in step motor drives. Enumerate various scheme of it and explain in brief.   **07**

Q.2 **(a)** List out the types of step motors. Mention its Adv., Disadv. and Applications.   **07**

(b) Describe the Magnetic pickups as encoder with relevant sketches.   **07**

OR

(b) Enumerate the various selection points of step motors and explain any three in detail.   **07**

Q.3 **(a)** Explain the term lead angle and discuss the effect of lead angle in closed-loop control of step motors.   **07**

(b) Draw the Discrete – differentiation peak detector ckt for current sensing control of step motor and explain-analyse it.   **07**

OR

Q.3 **(a)** Draw and explain bidirectional four-phase single and two phase on logic sequencer circuit for each pulses, with waveforms of output phase.   **07**

(b) Discuss the effect Torsion resonance on system stability. Enumerate the remedies to minimize it.   **07**

Q.4 **(a)** Differentiate the terms PLL and PLS. Explain it in detail.   **07**

(b) Draw and explain the need of current limiting ckt for DC motor control, supported by necessary calculation.   **07**

OR

Q.4 **(a)** Describe in brief, the performance of the variable –unit time delay Controller type speed control for step motor with relevant sketches.   **07**

(b) What do mean by optimal control, suboptimal and nonoptimal control for IMC? Explain it with appropriate mathematical justification.   **07**

Q.5 **(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) Discuss the PM step motor with its associated features in detail.   **07**

OR

Q.5 **(a)** List out the various selection criteria For DC motor for IMC Applications and explain in brief.   **07**

(b) Derive and Explain the torque velocity transfer function for a DC control system with current amplifier, for given parameters. Show the results for step command input and step load-disturbance change. Discuss the results and comments on its. Assume necessary data if required and mention it. Symbols bear their usual meanings. K_t = 0.2 N-m/amp, K_g = 0.05 Volt /(rad/sec) J = 2 x 10-4 Kg-m.   **07**

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