Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – SUMMER 2013

Subject Code: 181702 **Date: 13/05/2013**

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)** Derive the displacement and velocity response of the mechanical system shown in figure (1), Assuming spring constant K=Ð. **07**

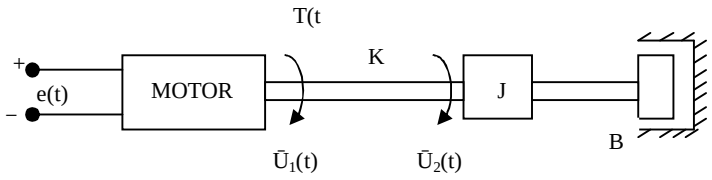

Figure (1).

(b) What are the performance characteristics of step motor? Explain each. **07**

Q.2 **(a)** Explain the basic classes of DC Motors. **07**

(b) Explain the effect of torsional resonance in three body structures. **07**

OR

(b) Explain the techniques for minimizing torsional resonance effect in detail. **07**

Q.3 **(a)** Draw and explain Unidirectional and Bi directional logic sequencer for step motor. **07**

(b) What are the types of variable reluctance type of stepper motor? Explain Single-Stator-Stack VR step motors. **07**

OR

Q.3 **(a)** List out different acceleration-deceleration control schemes used for the stepper motor. Explain any two of them. **07**

(b) Explain Resolvers and Magnetic pickups as Encoders. **07**

Q.4 **(a)** Explain transconductance power amplifier as a current limiter. **07**

(b) Explain the modes of operation of PWM amplifier. **07**

OR

Q.4 **(a)** Derive the response of the system shown in figure (2), for the given input. **07**

Q.4 **(b)** Explain the velocity control system with the voltage amplifier. **07**

Q.5 **(a)** List out the selection criteria for stepper motor. Explain step angle resolution and torque requirements. **07**

(b) Why over drive circuits are required for step motors? Explain dual voltage control circuit. **07**

OR

Q.5 **(a)** Explain the effect of speed up capacitors on 1-ű active suppression driver. **07**

(b) Explain the closed loop control of step motors with help of block diagram. **07**
And also explain how performance can be improved by introducing feedback.

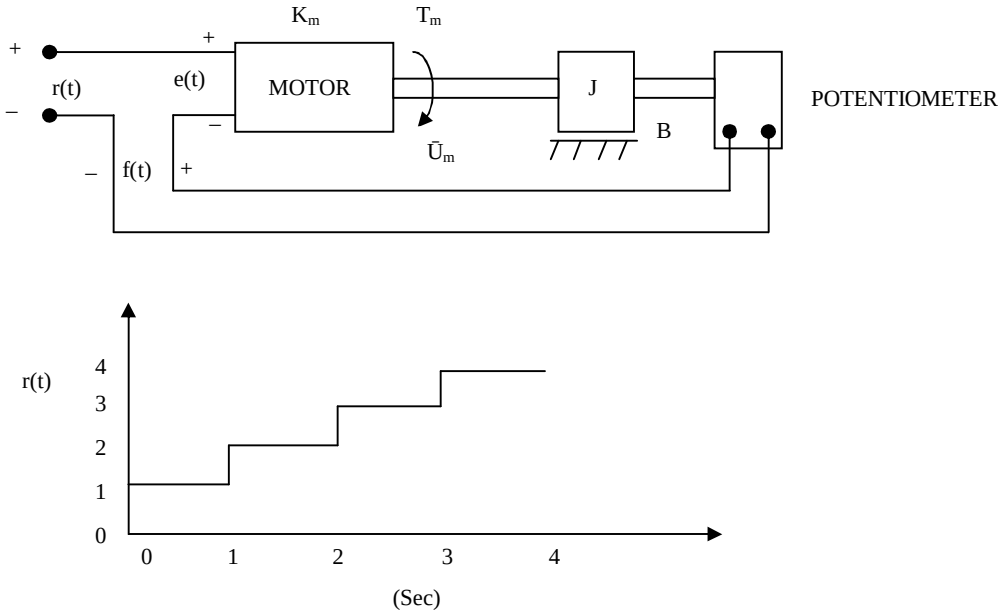

Figure (2).

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