Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(OLD) – EXAMINATION – SUMMER 2019

Subject Code:161905 Date:14/05/2019

Subject Name: Control Engineering

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)** Justify "Spring is a non liner element over and arbitrary range of Extension". **07**

(b) Write Requirements of a good control system. Critically compare Open loop and Closed loop systems. Is an automatic electric iron an open loop or closed loop control system? **07**

Q.2 **(a)** Briefly explain Signal flow graphs with their properties. Also explain Mason's gain equation for signal flow graph. **07**

(b) Write short note on: Analogue models of mechanical and electrical system. **07**

OR

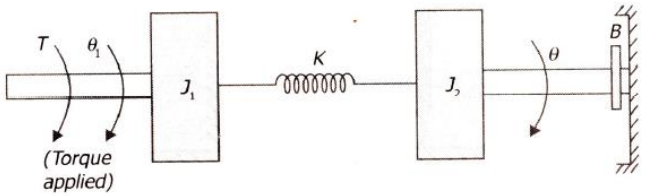
(b) What does a block diagram represent? Explain it in detail. List its salient characteristics. **07**

Q.3 **(a)** Derive the Mathematical modeling of a thermal system. **07**

(b) Explain liquid level system with block diagrams and reduce it to a single block open loop system. Where, Q = Flow rate from control valve to 1st tank, Q_1 = Flow rate from 1st tank to 2nd tank, Q_2 = Flow rate from 2nd tank, H_1 = Height of liquid in 1st tank, H_2 = Height of liquid in 2nd tank. **07**

OR

Q.3 **(a)** What is Transfer function? Obtain the transfer function of mechanical network shown in Figure. **07**



(b) Explain Translational mechanical and Rotational mechanical systems. **07**

Q.4 **(a)** Explain the following : **07**

(**1**) Proportional lag and Controlled lag

(**2**) Linear time invariant and Linear time varying systems

(b) Find the input–output transfer function T=Y/U of the system by reducing the following block diagram. **07**

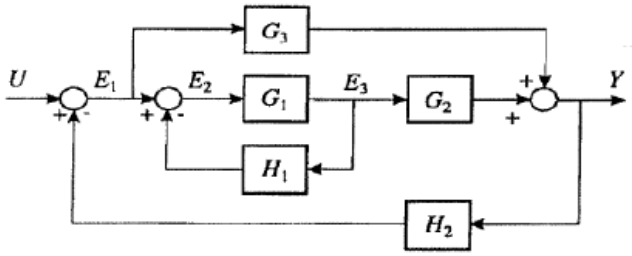
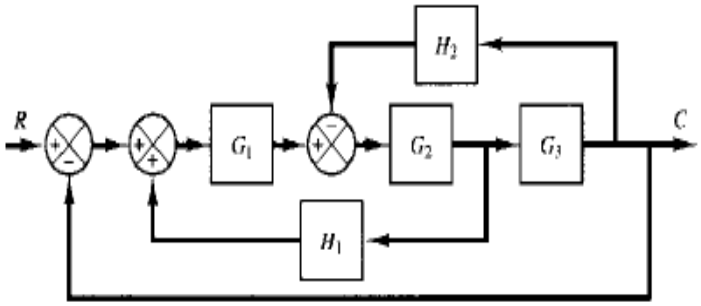


Fig 1

OR

Q.4 **(a)** Compare the hydraulic system with the pneumatic system with appropriate example. **07**

(b) Reduce block diagram as shown in Figure and obtain overall transfer function. **07**



Q.5 **(a)** Compare and contrast pneumatic system with hydraulic system. **07**

(b) Classify DC motors. Discuss their characteristics. Explain the construction and components of a DC motor. **07**

OR

Q.5 **(a)** Write note on "Programmable Logic controller (PLC) with its advantages. Also write its applications **07**

(b) Explain pneumatic nozzle-flapper amplifier with a neat sketch. **07**

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