

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**

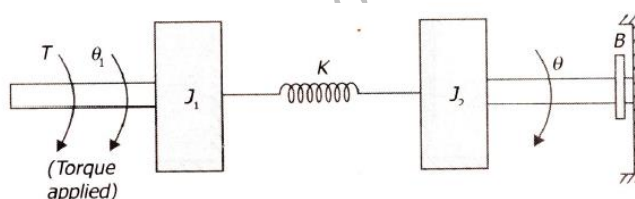
- Q.2**
- (a) Briefly explain Signal flow graphs with their properties. Also explain Mason’s gain equation for signal flow graph. **07**
 - (b) Write short note on: Analogue models of mechanical and electrical system. **07**

OR

- 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**



- 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**

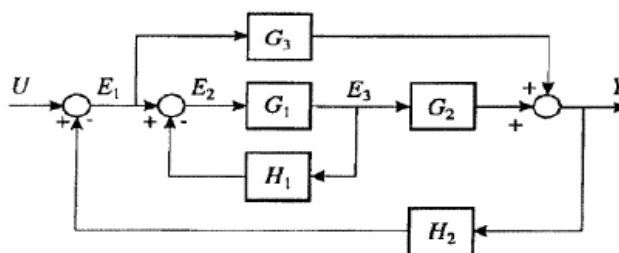
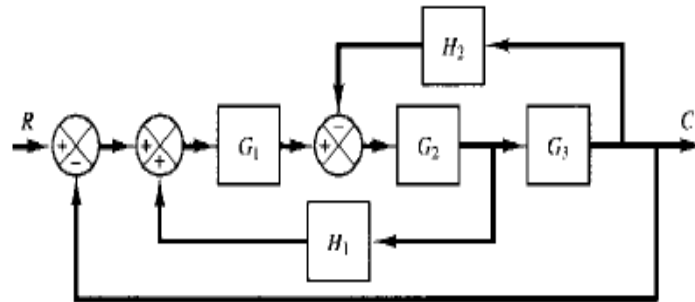


Fig 1

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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