Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (OLD) EXAMINATION – WINTER 2018

Subject Code:161905 **Date: 20/11/2018**

Subject Name: Control Engineering

Time: 02:30 PM TO 05:00 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 the following statements if true: **07**
(1) Feedback control systems are also referred to as closed–loop systems.
(2) Fixed-time traffic light control system is an example of closed loop control system.
(3) In a multivariable control system there is one input variable but variable outputs.

(b) What do you understand by Transient and steady state response and hence discuss the various types of input test signals used for time response analysis of a control system **07**

Q.2 **(a)** Define transfer function of a linear time invariant control system and hence discuss its properties. Also discuss the role of Laplace Transforms in system analysis. **07**

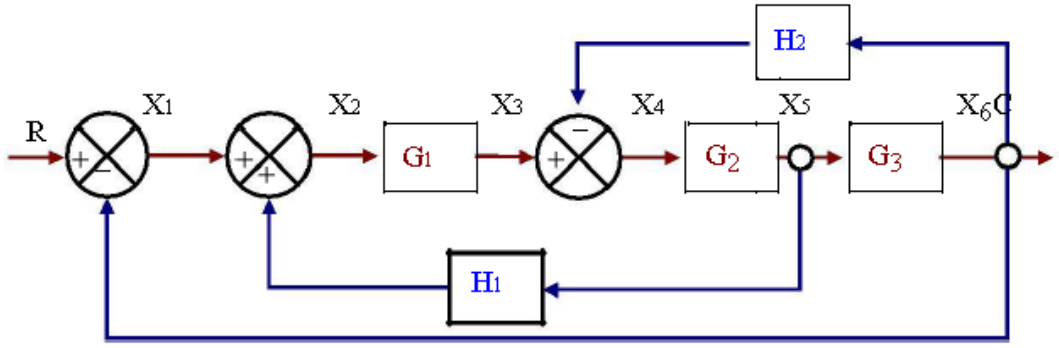
(b) What is modern control theory? Compare modern control theory with conventional control theory. Classify different types of control problems. **07**

OR

(b) What is servo mechanism? Explain how it can be best applied for automation control? Explain servo mechanism in CNC machines. **07**

Q.3 **(a)** What is system analogy? Describe analogy between following systems **07**
• Translational mechanical and Rotational mechanical systems.
• Force and Voltage system.
• Force and current system

(b) Draw the signal flow graph of the block diagram shown in Fig and solve using Mason's gain formula. **07**



OR

Q.3 **(a)** What is signal flow graph (SFD)? Write the steps for solving signal flow graph using Mason's gain formula. **07**

(b) Explain transient response (time domain) specifications of second order control system with neat sketch. **07**

Q.4 **(a)** Explain Routh's stability criterion. What is Advantages and Disadvantages of Routh's criterion? **07**

(b) Define: Root locus. Write steps for solving Problems on Root Locus. **07**

OR

Q.4 **(a)** Find the range of gain for a system whose closed-loop transfer function is **07**

$$H(s) = \frac{K}{s(s^2+s+1)(s+2)+K}.$$

(b) Explain unit step response of first order system. **07**

Q.5 **(a)** Compare hydraulic control system with pneumatic control system in detail. State the different applications of pneumatic control system. **07**

(b) Write short note on : control systems for thermal power plant **07**

OR

Q.5 **(a)** Write short note on: Programmable Logic controller (PLC). **07**

(b) Define fuzzy logic. Explain the concept of Fuzzy logic with a suitable example. **07**

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