Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI (OLD) EXAMINATION – WINTER 2021

Subject Code:161905   **Date:26/11/2021**
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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	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**
	(b)	Justify the following statements if true: (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.	**07**
Q.2	**(a)**	What is mathematical modeling? Explain the steps for mathematical modeling of any physical system.	**07**
	(b)	Reduce block diagram as shown in Fig. 1 and obtain overall transfer function.	**07**
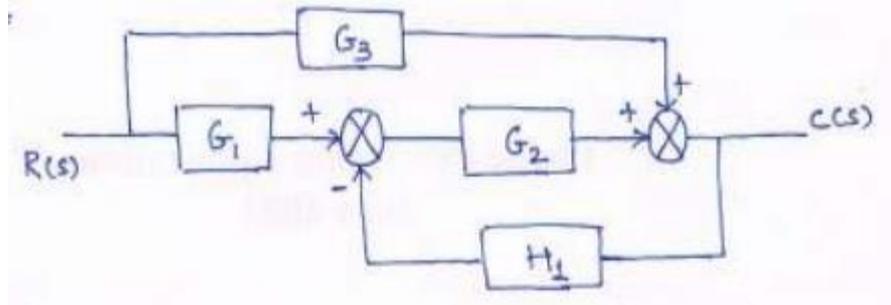
OR

	(b)	Derive a transfer function for a liquid level system. Explain resistance and capacitance of any liquid level system.	**07**
Q.3	**(a)**	Explain and derive the transfer function for an armature controlled D.C. motor.	**07**
	(b)	What is Transfer function? Obtain the transfer function of a liquid level system. Explain resistance and capacitance of any liquid level system.	**07**

OR

Q.3	**(a)**	What is a signal flow graph? What are Properties of signal flow graph? State explain Mason's gain formula for signal flow graph.	**07**
	(b)	What does a block diagram represent? Explain it in detail. List its salient characteristics. Explain the following: Summing point, takeoff point.	**07**
Q.4	**(a)**	Draw a schematic diagram & block diagram for a hydraulic proportional plus derivative control system. Derive expression for transfer function for above mentioned hydraulic PD control systems. Explain how this can be converted to PID controller	**07**
	(b)	Write short note on : control systems for thermal power plant	**07**

OR

Q.4	**(a)**	Compare hydraulic control system with pneumatic control system in detail. State the different applications of pneumatic control system.	**07**
	(b)	List the basic types of control actions and explain the PDI control action in detail.	**07**
Q.5	**(a)**	Explain the transient response of second order system.	**07**
	(b)	Explain the concepts of fuzzy logic and fuzzy control systems.	**07**

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OR

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| Q.5 | **(a)** | Explain unit step response of first order linear time invariant systems. | **07** |
| | **(b)** | Define programmable logic controller. What are the components of PLC? State the Advantages & Disadvantages of it. | **07** |

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