Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2022 - 23 Examination

Semester: 3 **Date: 03/10/2022**
Subject Code: 203111205 **Time: 02:00pm to 4:30pm**
Subject Name: Control Theory **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

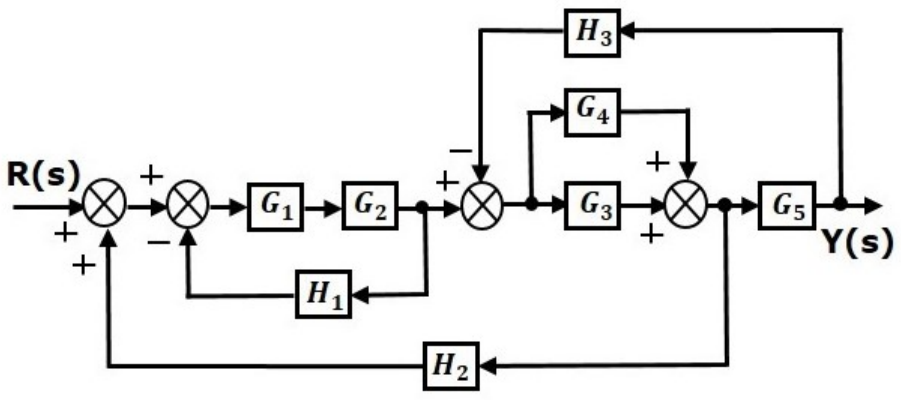
Q.1 **Objective Type Questions** - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. Can we derive transfer function from state space model?
(a) Yes (b) No (c) May be (d) Can't say
2. Root Locus is plotted for open loop transfer function.
(a) True (b) False (c) May be (d) None
3. Impulse response of system is transfer function.
(a) True (b) False (c) May be (d) None
4. Convolution in time domain is multiplication in frequency domain
(a) True (b) False (c) May be (d) None
5. Application of state space analysis are
(a) Used for nonlinear systems also (b) Used for MIMO (c) Both a & b (d) None
6. The mechanism of control of body temperature is _____ system
7. _____law is follow in the principle of linearity?
8. If roots are repeated (double) on the imaginary axis, then the system will be _____
9. Block Diagram reduction technique is used for_____
10._____ is the values of gain margin and phase margin for condition of stability in bode plot.
11. Explain Self loop.
12. What do you mean by Linear Time Invariant Systems?
13. What do you mean by distributed parameters?
14. What is transfer function?
15. What do you mean by mathematical modelling?

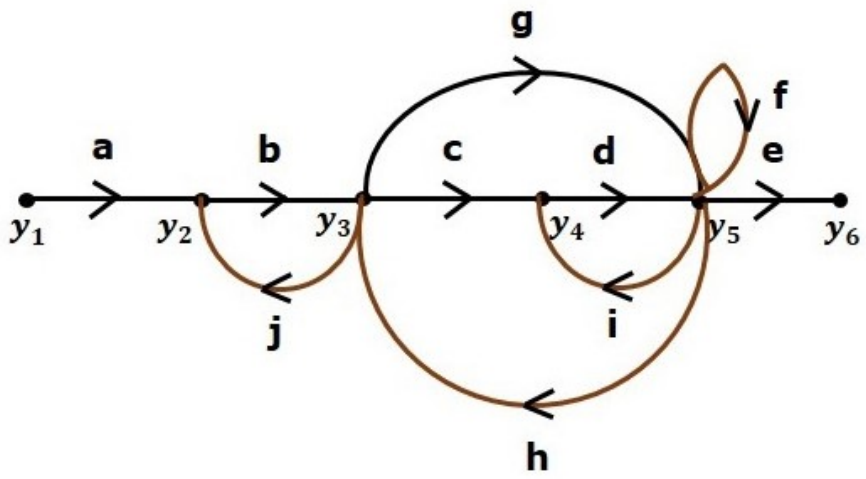
Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Write any four rules of Block Diagram Reduction method.
B) Write and explain Mason's Gain formula in details.
C) Derive the analogy between electrical and mechanical systems for both translational and rotational systems.
D) Write the difference between gain and transfer function.

Q.3 A) Simplify the block diagram shown in Figure and derive transfer function. **(07)**



B) Calculate Transfer function using Mason's Gain formula. **(08)**



OR

B) Derive the transient response of the second order systems and explain the terms of transient response. **(08)**

Q.4 A) Explain the classifications of control systems. **(07)**

OR

A) Write the rules to draw root locus. **(07)**

B) Explain the ON-OFF and all terms of PID control with example. **(08)**