K. K. Wagh Institute of Engineering Education & Research, Nashik

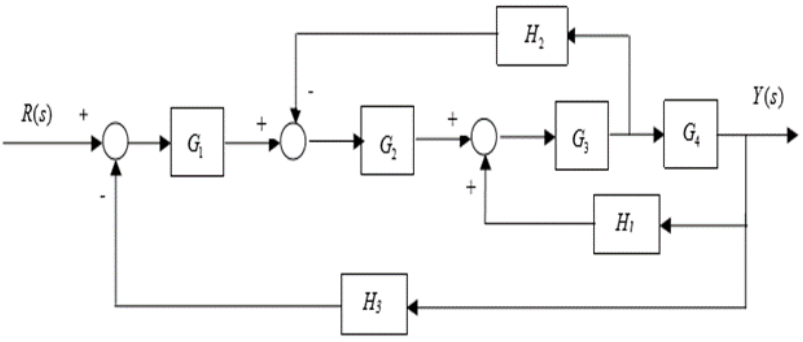
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:MEC	Pattern:2023
Name of Course:Instrumentation and Control	Course Code:2305309
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

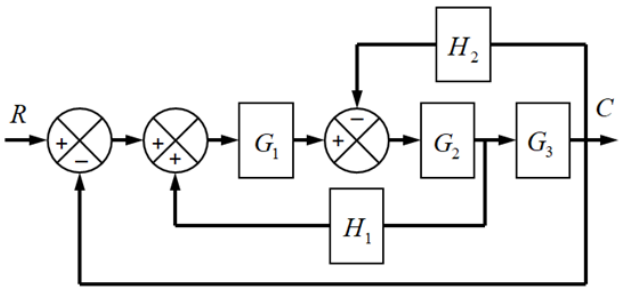
1. This question paper contains 02 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome

		Marks	**CO**
Question No. 1			
1a)	**Explain** servo motor with reference to working, diagram and application.	(6)	CO1
Question No. 2			
2a)	**Explain** various types of Data Acquisition system.	(6)	CO1
Question No. 3			
3a)	For the given block diagram of mechatronics system **determine** overall transfer function.	(8)	CO2



OR

3b) For the given block diagram of mechatronics system **determine** overall transfer function. (8) CO2



3c) **Build** mathematical model for Thermal system using basic building blocks and determine transfer function of the system (8) CO2

OR

3d) **Build** mathematical model for electrical system using basic building blocks and determine transfer function of the system (8) CO2

Question No. 4

4a) **Differentiate** between time and frequency domain also Determine the type of damping for the given system. (8) CO3

$$\frac{C(s)}{R(s)} = \frac{2}{s^2 + 4s + 2}$$

OR

4b) **Differentiate** between relative and absolute stability criteria also Determine the type of damping for the given system. (8) CO3

$$\frac{C(s)}{R(s)} = \frac{2}{s^2 + 2s + 1}$$

4c) **Analyse** the given transfer function of the system for relative stability criteria by pole zero plot. (8) CO3

$$\mathrm{T.F.} = \frac{K(s+6)}{s(s+2)(s+5)(s^2+7s+12)}$$

OR

4d) **Analyse** the given transfer function of the system for absolute stability by Routh's criteria. (8) CO3

$$\frac{1000}{s^3 + 10s^2 + 31s + 1030}$$

Question No. 5

5a) **Deduce** ladder program for following logic gates with truth table AND, OR, EX-OR, EX-NOR (8) CO4

OR

5b) **Summarise** the Latching operation in PLC with suitable ladder diagram with practical application (8) CO4

5c) **Compare** Propositional and Derivative controller with reference to 1. Transfer function 2. Characteristic plot 3. Advantage 4. Limitation (8) CO4

OR

5d) Explain the with neat sketch PID controller with suitable example. (8) CO4

····· End of question paper·····