



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-II Summer 2025	
Exam Seat No.:	
Academic Year: 2024-2025	Semester: IV
Class: SY	Program: B.Tech
Branch Code: ETC	Pattern: 2023
Name of Course: Control Systems	Course Code: 2302211
Max. Marks: 30	Duration: 1.15 Hrs.

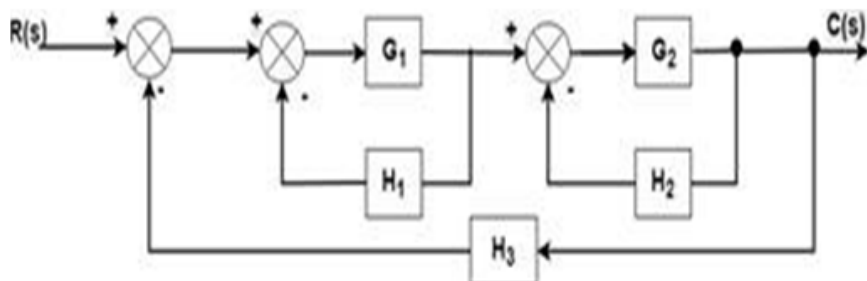
**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
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 column indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Marks CO**

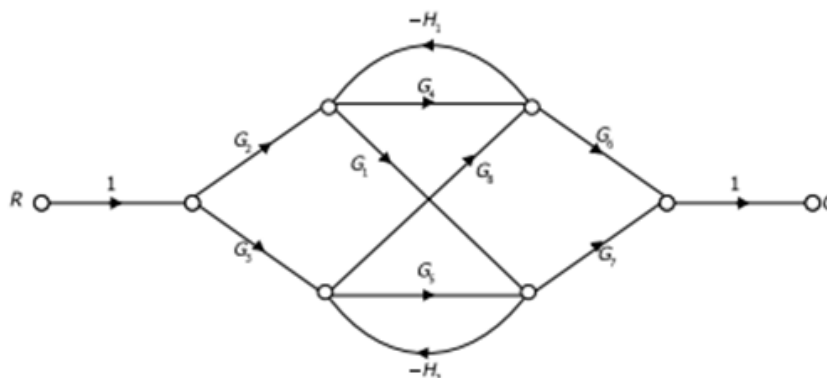
**Question No. 1**

- 1 a) Using block diagram reduction techniques, determine the transfer function for the system shown below: (7) CO1



**Question No. 2**

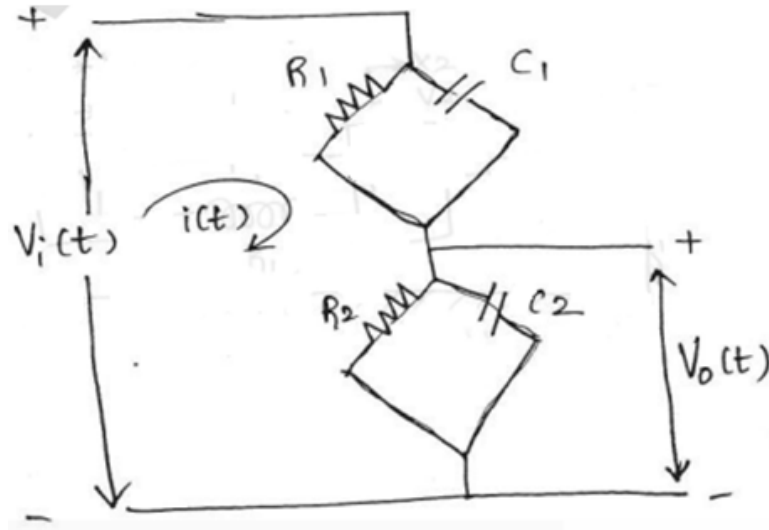
- 2 a) For the Fig. 1 shown below determine the transfer function using Mason's Gain formula. (8) CO1



**OR**

2 b) Obtain Transfer function  $\frac{V_o(s)}{V_i(s)}$  for following electrical network.

(8) CO1



**Question No. 3**

3 a) Determine the stability of the system by using Routh Hurwitz criteria for following characteristic equation:

(7) CO2

$$s^5 + s^4 + 24s^3 + 48s^2 - 25s - 5 = 0$$

**Question No. 4**

4 a) Without using the Routh criteria, find the stability of the following systems

(8) CO2

1.  $X(s) = \frac{10(s+2)}{s^3 + 3s^2 + 5s}$

2.  $Y(s) = s^2 + 5s + 5 = 0$

**OR**

4 b) Draw a root locus plot for  $G(s)H(s) = \frac{K}{s(s+5)(s+3)}$  and comment on stability.

(8) CO2

..... End of question paper.....