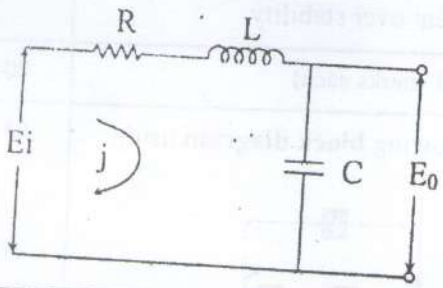
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

~~May-June 20__~~ / Nov - Dec 2024 ~~July-Aug 20__~~ / ~~Feb-March 20__~~
(B. Tech / ~~M. Tech~~.) Program: EXTC Scheme ~~I/II/IIB/~~III: III/II B/II
Regular/~~Supplementary~~ Examination: ~~FY/~~SY/~~TY/LY~~ Semester: ~~I/II/~~III/~~IV/V/VI/VII/VIII~~
Course Code: EXC304 Course Name: Electronic Instrumentation & Control Systems
Date of Exam: 28/11/24 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three (05 marks each)	10		
a)	Write selection criteria of transducer.	5	2	U
b)	Find the transfer function of the electrical network shown in figure below 	5	3	U, AP
c)	Define Accuracy, Precision, Linearity, and Sensitivity with suitable example.	5	1	U
Q 2	Solve any **two** questions out of three (05 marks each)	10		
a)	Determine the number of roots on the imaginary axis for the characteristics equation given below: $B_{(S)} = S^5 + 6S^4 + 15S^3 + 30S^2 + 44S + 24 = 0$	5	5	AP
b)	Explain relative stability using Gain Margin (G.M.) and Phase Margin (P.M.)	5	6	U
c)	Write short note on: Steady state error in feedback control system.	5	4	U

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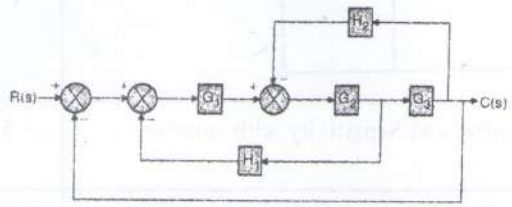
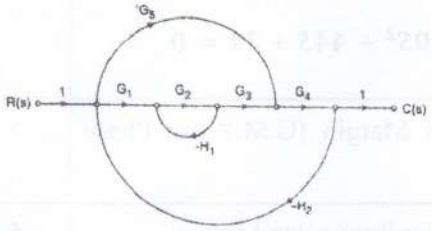
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Derive an Expression for resistance measurement using Wheatstone Bridge.	10	1	U
b)	For a unity feedback system having open loop transfer function $G_{(S)}H_{(S)} = \frac{40\,(S+2)}{S\,(S+1)(S+4)}$ Determine the type of system , all error coefficient, and error for ramp input with magnitude 4.	10	4	AP
c)	An unity feedback system has the open loop transfer function $G_{(S)} = \frac{K}{S\,(S+1)(S+3)\,(S+4)}$ Draw complete root locus and comment over stability	10	5	AP
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a) I	Find the transfer function for the following **block diagram** using block 	05	3	AP
a) II	Find the transfer function for the following **signal flow graph** using **meson's gain formula**. 	05	3	AP

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b)	Construct the bode plot for the following transfer function $$G_{(S)}.H_{(S)} = \frac{100}{S\,(S+1)(S+2)}$$ Find Phase Margin (P.M.), Gain Margin (G. M.), Phase crossover frequency (ω_{pc}), and Gain crossover frequency (ω_{gc}). **(Semi-log Paper Needed)**	10	6	AP
c)	Explain the principle, working, and construction of LVDT. What is meant by residual voltage?	10	2	U

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