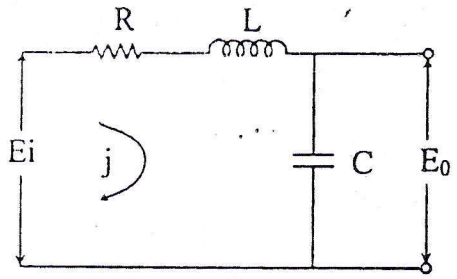
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

carry on ~~May-June 20__/ Nov - Dec 2024 July-Aug 20__/ Feb-March 20__~~ June 2025
(B. Tech /~~M. Tech.~~) Program: EXTC Scheme ~~I/II/IB~~/III: III
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: 30/6/2025 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)	Draw the block diagram of the generalized measurement system and explain its components	5	1	U
b)	Compare temperature transducers, Thermostats and Thermocouples based on principle, characteristics, range and applications.	5	2	U
c)	Find the transfer function of the electrical network shown in figure below 	5	3	U, AP
Q 2	Solve any **two** questions out of three (05 marks each)	10		
a)	What is damping ratio (ξ) and natural frequency of oscillation (ω_n)	5	4	AP
b)	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

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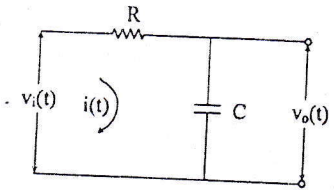
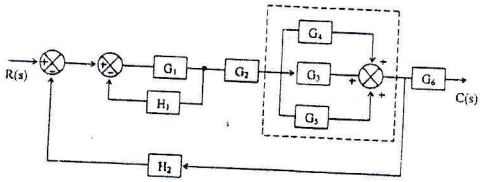
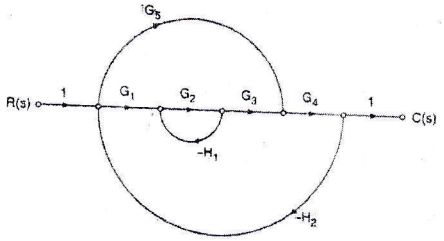
c)	Draw the frequency response (Magnitude and Phase plot) of an R-C network shown below, having transfer function $\frac{Vo_{(S)}}{Vi_{(S)}} = \frac{1}{SRC+1}$. 	5	6	AP
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Draw and discuss Maxwell's bridge and its application for the measurement of inductance.	10	1	U
b)	Explain the working principle of LVDT with a neat diagram and state its advantages and disadvantages.	10	2	U
c) I.	I. Find the transfer function for the following **block diagram** using block 	05	3	AP
c) II.	Find the transfer function for the following **signal flow graph** using **meson's gain formula**. 	05	3	AP

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Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	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
b)	Sketch the complete Root Locus for a system having $G_{(S)}H_{(S)}$ as below also comment on stability. $$G_{(S)}H_{(S)} = \frac{K(S+9)}{S\,(S^2+4S+11)}$$ **(Graph Paper Needed)**	10	5	AP
c)	Construct the bode plot for the following transfer function $$G_{(S)}.H_{(S)} = \frac{1000}{S\,(S+10)(S+50)}$$ 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

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