

Vellore Institute of Technology
SCHOOL OF ELECTRICAL ENGINEERING
WINTER SEMESTER 2025-2026
CONTINUOUS ASSESSMENT TEST - II

Programme Name & Branch : B. The (EEE & EIE)
Course Code and Course Name : BEEE303L - Control Systems
Faculty Name(s) : Dr. M. Manimozhi, Dr. Geethanjali P, Dr. Arun N
Class Number(s) : 6624, 2247, 2262
Date of Examination : 16/03/2026
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions; Please provide linear, semilog and polar graph sheets
- Rough work should not be done on question paper. It will be treated as malpractice.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)

Course Outcomes Statements:

CO. 2: Analyze the system performance in time and frequency domains

CO. 3: Determine the stability of linear time invariant system in time and frequency domains

Q. No	Question	M	CO	BL																								
1.	Given the unity feedback system with $G(s) = \frac{k(s+4)}{s(s+6)(s+2)}$ Find the following using Routh-Hurwitz criterion: a. The range of K for the system to be stable and unstable. b. The value of K that makes the system oscillate and the frequency of oscillation:	10	3	4																								
2.	For the given unity feedback system $G(s) = \frac{k(s+2)}{s(s+1)(s+3)(s+5)}$ do the following: a. Sketch the root locus. b. Find the value of gain that will make the system underdamped with $\xi = 0.5$.	10	3	4																								
3.	Unit step response of a 2nd order system is given below. Obtain the corresponding frequency response indices resonance peak (M_r), resonance frequency (ω_r) and bandwidth(ω_b) for the system. <table border="1"> <tr> <td>t(sec)</td><td>0</td><td>0.05</td><td>0.1</td><td>0.15</td><td>0.2</td><td>0.25</td><td>0.3</td><td>0.35</td><td>0.4</td><td>0.45</td><td>0.5</td></tr> <tr> <td>c(t)</td><td>0</td><td>0.25</td><td>0.8</td><td>1.08</td><td>1.12</td><td>1.02</td><td>.98</td><td>.98</td><td>1</td><td>1</td><td>1</td></tr> </table>	t(sec)	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	c(t)	0	0.25	0.8	1.08	1.12	1.02	.98	.98	1	1	1	10	2	3
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REG.NO.:



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4.	Sketch the asymptotic Bode plot for the transfer function given below $G(s) = \frac{k}{s(1 + 0.2s)(1 + 0.5s)}$ From the Bode plot determine: (i) Gain and phase cross-over frequency (ii) the gain and phase margin and (iii) Is the system stable?	10	3	4
5.	The open loop transfer function of a unity feedback system is given by, $G(s) = \frac{k}{s(s^2 + 8s + 20)}$ Using polar plot, determine the value of K, so that phase margin is 50.	10	3	4