

REG.NO.:



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: C2 + TC2

SCHOOL OF ELECTRICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech – EEE, EIE & ECS
 Course Code and Course Name : BEEE303L – Control Systems
 Faculty Name : Dr. V. Bagyaveereswaran
 Class Number : VL2025260101035
 Date of Examination : 07/10/2025
 Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- 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 – Analyze, 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.	For the unity feedback system whose open loop transfer function is $G(s) = \frac{k}{s(s+1)(s+2)(s+5)}$ (a) Find the range of k for stability. (b) Find the value of k for marginally stable. (c) Find the actual location of the closed loop poles when the system is marginally stable by using Routh Hurwitz Criterion.	10	3	3
2.	Sketch the root locus for a unity feedback system with open loop transfer function $G(s) = \frac{k}{s(s^2 + 8s + 32)}$ Find the range of k for which the system is stable.	10	3	3
3.	The open loop transfer function of a unity feedback system is given by $G(s) = \frac{k(s+20)}{(s+1)(s+2)(s+10)}$ Construct Bode plot for $k = 10$. Determine phase margin, gain margin, phase cross over frequency and gain cross over frequency.	10	3	3
4.	For the following system sketch the polar plot $G(s)H(s) = \frac{500}{s(s+6)(s+9)}$	10	3	3

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5.	The specifications on a second order unity feedback control system with the closed loop transfer function $T(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$ are that the maximum overshoot must not exceed 30 % and the rise time must be less than 0.2 sec. Find the limiting values of ω_r, M_r and bandwidth.	10	2	3
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