

Reg. No.:

Name :

VIT[®]

Vellore Institute of Technology

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

Continuous Assessment Test (CAT-2) – October 2024

Programme	: B.Tech(CPS)	Semester	: Fall 24 - 25
Course	: Control Systems	Code	: BEEE303L
Faculty	: Dr.Nithya Venkatesan	Class Nbr	: CH2024250101910
Time	: 90 Minutes	Slot	: F1+TF1
		Max. Marks	: 50

Answer All the Questions

Q.No.	Question Description	Marks
1(a)	Find the overall gain of a closed loop negative feedback system having a forward path gain of $G(S) = \frac{2}{(S+5)}$ and a feedback path gain of 0.5?	2
1(b)	Determine the value of K such that the roots of characteristic equation $s^3+10s^2+18s+K$, which lies to the left of the line at $s = -1$.	3
2.	For the unity feedback system with a transfer function given by, $G(S) = \frac{K}{(S+1)^3(S+4)}$ a) Find the range of K for Stability. b) Find the frequency of oscillation when the system is marginally stable.	10
3.	For the unity feedback system, $G(S) = \frac{K(S+2)}{S(S+1)(S+3)(S+4)}$ Find the following breakaway, asymptotes, and the range of gain that will make the system marginally stable. Plot the rough root locus.	15
4.	The open loop transfer function of a unity feedback system is given by, $\frac{Y(S)}{U(S)} = \frac{5}{S(1+0.4S)(1+3S)}$ Sketch the bode plot and determine the gain and phase cross-over frequencies. Also, find the gain margin and phase margin so that the system remains stable.	20