



**NAVRACHANA  
UNIVERSITY**

a UGC recognized University

**School:** School of Engineering and Technology  
**Program/s:** Electrical Engineering  
**Year:** 3<sup>rd</sup> **Semester:** 5th  
**Examination:** End Semester Examination  
**Examination year:** December - 2021

**Course Code:** EE 304 **Course Name:** Control System  
**Date:** 08/12/2021  
**Time:** 11:30 am to 1:30 pm

**Total Marks:** 40  
**Total Pages:** 1

**Instructions:**

- Write each answer on a new page.
- Use of a calculator is permitted.
- \* COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

Q. No.	Attempt Any Four:	Marks	COs*	BTL#
Q.1	Sketch the root locus plot of unity feedback system with an open loop transfer function of $G(s) = k/s(s+3)(s+5)$ . Find the range of values of $k$ for which the system has damped oscillatory response. What is the greatest value of $k$ for which the system has damped oscillatory response. What is the greatest value of $k$ which can be used before continuous oscillations occur. Also determine the frequency of continuous oscillations. Also determine the value of $k$ so that the dominant pair of complex poles of the system has a damping ratio of 0.7.	10	CO1,CO2	3,4
Q.2	Draw polar plot of $G(s)H(s) = 150/s(s+3)(s+9)$	10	CO3	1,3,4
Q.3	For the system having the open loop transfer function $G(s)H(s) = 10/s(s+1)(s+10)$ Determine the stability of the system by plotting the Bode plot of the system.	10	CO4	4,5,6
Q.4	Draw the Bode plot of a system with open loop transfer function: $G(s)H(s) = 10(s+3)/s(s+1)(s+2)$ .	10	CO4	4,5,6
Q.5	The open loop transfer function of a control system is given by $G(s) = k/s(s+2)(s^2+6s+25)$ Sketch the complete root locus as $k$ varies from 0 to infinity.	10	CO3	3,4,5,6

\*\*\*\*\*End of Question Paper\*\*\*\*\*