R18 Regulation *Subject code:2P4BD & 2P4DB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

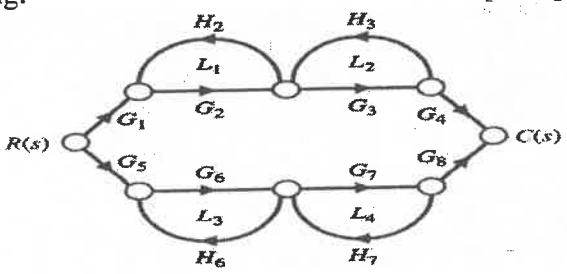
B.Tech IV Semester Supplementary Examinations, July 2024

CONTROL SYSTEMS

(Common to EEE & ECE)

Maximum Marks: 70 Date:20.07.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A		
All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	Define transfer function.	1	L1
2	Distinguish between open loop and closed loop systems.	1	L1
3	Define transient response.	2	L1
4	Define steady state error.	2	L1
5	Define stability.	3	L1
6	Calculate the angel of departure and angel of arrival in root locus?	3	L1
7	What is use of type number and order of a system in case of drawing of polar plot ?	4	L1
8	Define Nyquist plot.	4	L1
9	Write the advantages of state space representation	5	L1
10	Define controllability and observability.	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	A. Discus the characteristics of feedback in control system [5M] B. Define the impulse response of the system. Also find the impulse response of the system with open loop transfer function [5M] $$G(S) = \frac{10}{S(S+3)}$$	1	L2
	OR		
12	Find C(s)/R(s) for a control system represented by signal flow graph shown in Fig. [10M] 	1	L2

13	Find all time domain specifications for the system transfer function given below $T(s)=\frac{64}{(s^2+8s+64)}$ [10M]	2	L2
	OR		
14	A. Obtain the response of unity feedback system whose open loop transfer function is $G(s)=\frac{k}{S(s+5)}$ *and when the input is unit step input* [5M] B. Write short notes on effect of PI controller and PD controller [5M]	2	L2
15	The open loop transfer function of a unity feedback system is given by $G(s) = K/(s(S^2+S+1)(S+2))$. examine the range of k for stability of the closed loop system using RH-Criteria [10M]	3	L2
	OR		
16	Sketch the root locus for open loop transfer function $G(s)=\frac{K}{s[s+2][S+4]}$ [10M]	3	L2
17	A. Draw the electrical equivalent circuit of lead compensator and obtain its transfer function. [5M] B. Explain the gain margin and phase margin in polar plot. [5M]	4	L2
	OR		
18	A. Derive maximum lead angle ϕm and α of a lead compensator. [5M] B. Compare polar plot and Nyquist plot. [5M]	4	L2
19	Obtain the state response of the system described by [10M] $\begin{bmatrix}\dot{x}_1(t)\\ \dot{x}_2(t)\end{bmatrix}=\begin{bmatrix}0 & 1\\ -1 & 2\end{bmatrix}\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix}+\begin{bmatrix}1\\ -1\end{bmatrix}u(t)$ With initial conditions $\begin{bmatrix}x_1(0)\\ x_2(0)\end{bmatrix}=\begin{bmatrix}0\\ 1\end{bmatrix}$ ***and*** $y(t)=[0 \quad 1]\begin{bmatrix}x_1(t)\\ x_2(t)\end{bmatrix}$ **for Step input.**	5	L2
	OR		
20	A. Explain the components in a state space representation. [5M] B. Write the advantages and dis advantages of state space representation. [5M]	5	L2