R20 Regulation *Subject code: 3P4BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

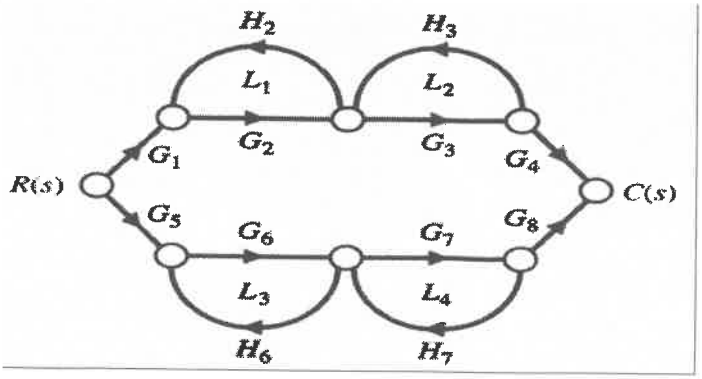
B.Tech IV Semester Supplementary Examinations, December 2024

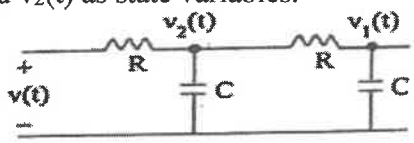
CONTROL SYSTEMS

(Electrical & Electronics Engineering)

Maximum Marks: 70 Date:10.12.2024 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 control systems.	1	L1
2	What are the basic components of block diagram?	1	L1
3	Write the characteristic equation of closed loop system	2	L1
4	What is an order of the system?	2	L1
5	Define BIBO stability.	3	L1
6	Define root locus.	3	L1
7	Define phase lag and phase lead.	4	L1
8	What is a compensator and what is the need of a compensator?	4	L1
9	What are the properties of state transition matrix?	5	L1
10	What is state diagram?	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Determine transfer function of Armature Controlled DC Motor. [10M]	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	For servomechanisms with open loop transfer function given below explain what type of input signal gives rise to a constant steady state error and calculate their values [10M] i)G(S)=20(S+2)/[S(S+1)(S+3)] ii) G(S)=20/[(S+2)(S+3)] iii) G(S)=10/[S^2(S+1)(S+2)]	2	L2
	OR		
14	What is meant by transient response and steady state response? Explain in detail about various time domain specifications. [10M]	2	L2
15	Derive the output response of Underdamped second order system for unit step input [10M]	3	L2
	OR		
16	Sketch the root locus of the system whose open loop transfer function is G(s) H(s) = **K** /[***S*** (***S*** + **2**) (***S***+**4**)] [10M]	3	L2
17	Draw the Bode Plot of the open loop transfer function for K=1 and G(S)H(S)=K/[S(S+1) (S+4)] [10M]	4	L2
	OR		
18	Explain the procedure to design the Lag Lead Compensator using Bode plot. [10M]	4	L2
19	Obtain state model of the electrical network for below figure by choosing $v_1(t)$ and $v_2(t)$ as state variables. [10M] 	5	L2
	OR		
20	Construct a state model for a system characterized by the differential equation. $\frac{d^3y}{dt^3} + 6\frac{d^2y}{dt^2} + 11\frac{dy}{dt} + 6y + u = 0.$ Give the block diagram representation of the state model. [10M]	5	L2