



R18 Regulation

Subject code:2P4DB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2025

CONTROL SYSTEMS

(ECE)

Maximum Marks: 70

Date: 18.12.2025

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.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

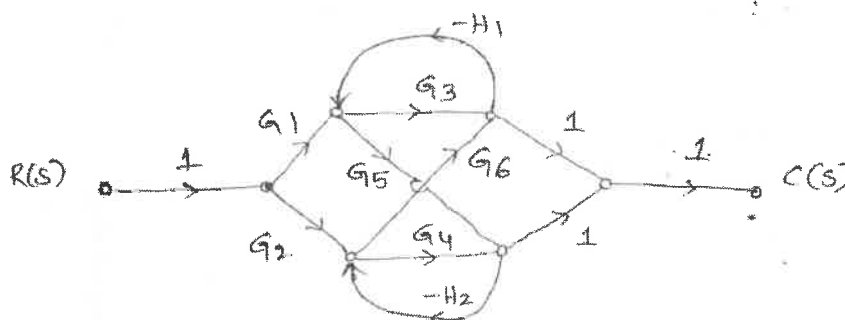
All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	What are advantages and disadvantages of closed loop systems?	2M	1	L1
2	Define the mason's gain formula.	2M	1	L1
3	What is the difference between type and order of the system?	2M	2	L1
4	What are the standard test signals?	2M	2	L1
5	Write the remedies if an entire row is zero while computing elements in R-H array.	2M	3	L1
6	What are frequency domain specifications?	2M	3	L1
7	Draw the pole-zero plot of Lag compensator.	2M	4	L1
8	Draw the polar plot of $G(s) = \frac{1}{1+sT}$.	2M	4	L1
9	What is meant by state in control system?	2M	5	L1
10	Define state transition matrix.	2M	5	L1

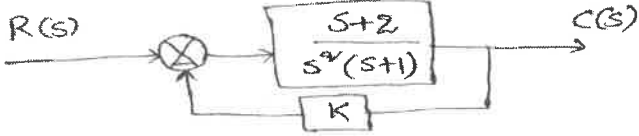
Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) What do you mean by the sensitivity of the control system and discuss the effect of feedback on sensitivity? b) What is feedback? Explain the effects of feedback.	5M 5M	1	L2

OR

12	Find the transfer function using MASON'S gain formula for C(s)/R(S).	10M	1	L2
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13	<p>a) What is steady state error and obtain the mathematical expression for it and find the steady state error for ramp input for 1st order system.</p> <p>b) Find the steady state error for the unit step input signal?</p> 	5M 5M	2	L2
OR				
14	<p>A unity feedback control system has an open loop transfer function is $G(s) = \frac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.</p>	10M	2	L2
15	<p>a) Determine the number of roots of a given polynomial with real parts between zero and -1, $8s^5 + 44s^4 + 126s^3 + 219s^2 + 258s + 85 = 0$</p> <p>b) Sketch the root locus for the following unity feedback open loop transfer function $G(S) = \frac{K}{s(s+1)(s+3)(s+4)}$.</p>	5M 5M	3	L2
OR				
16	<p>A unity feedback control system has the transfer functions $G(s) = \frac{80}{s(s+2)(s+20)}$. Draw the bode plot and determine Gain margin, Phase margin; Further, comment on the stability.</p>	10M	3	L2
17	<p>Sketch the Nyquist plot for the following system and verify whether the system is stable or not</p> $G(S) = \frac{s+2}{(s+1)(s-1)}$	10M	4	L2
OR				
18	<p>Draw the polar plot for the following system</p> $G(S) = \frac{1+4S}{s^2(1+S)(1+2S)}$	10M	4	L2
19	<p>a) Explain the concepts of state, state variables and state model.</p> <p>b) Find the state equation and state variable matrix for the following differential equation.</p> $\frac{d^2y}{dt^2} + 5 \frac{dy}{dt} + 10y = 5u.$	5M 5M	5	L2
OR				
20	<p>a) Derive State Transition Matrix using Laplace transform method.</p> <p>b) Compute state transition matrix, when $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$</p>	5M 5M	5	L2