Code No:A36B0

BVRAJU INSTITUTE OF TECHNOLOGY, NARSAPUR
(UGC - AUTONOMOUS)
III B.Tech II Semester Supplementary Examinations, Feb 2022
CONTROL SYSTEMS
(Electronics and Communication Engineering)

Time: 3 Hours   Max Marks: 70

Note: This Question Paper contains two Parts A and B
- Part A is compulsory which carries 10 marks. Five questions from six units. Answer all questions in Part A at one place only.
- Part-B consists of 6 Questions (numbered from 2 to 13) carrying 10 marks each. Each of these questions is from one unit and may contain a, b, c as sub-questions. For each question there will be an either/or choice (that means there will be two questions from each unit and the student should answer only one question).

PART – A   (5x2 = 10 Marks)

1.		Marks	Bloom Level	CO
a	Define translational mechanical system.	2	1	1
b	Write the rule for moving summing point a head of a block.	2	1	2
c	Find the type and order of the system G(S)=40/s(s+4)(s+5)(s+2).	2	1	3
d	Discuss Critically stable system.	2	1	4
e	Give the definition of controllability as per Kalman's Test..	2	1	6

PART – B   (6x10 = 60 Marks)

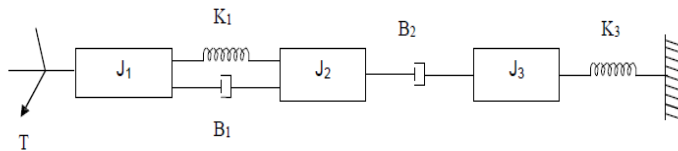|		Marks	Bloom Level	CO
2	Write the differential equations governing the Mechanical rotational system shown in fig.1 Draw the Torque-voltage and Torque-current electrical analogous circuits	10	3	1

fig.1

OR

		Marks	Bloom Level	CO
3	a) Differentiate between open loop and closed loop system.	5	1	1
	b) Explain the temperature control system using open loop as well as closed loop.	5	2	1

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		Marks	Bloom Level	CO
4	Determine the transfer function Y(S)/R(S) for the signal flow graph shown below.	10	2	1

OR
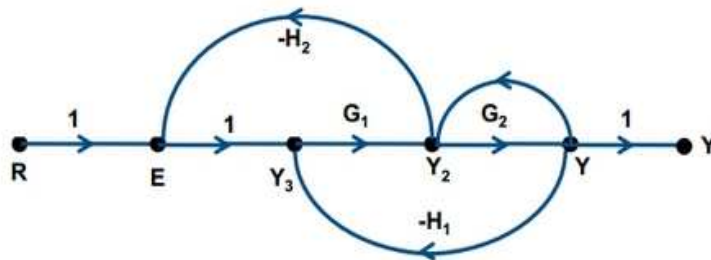
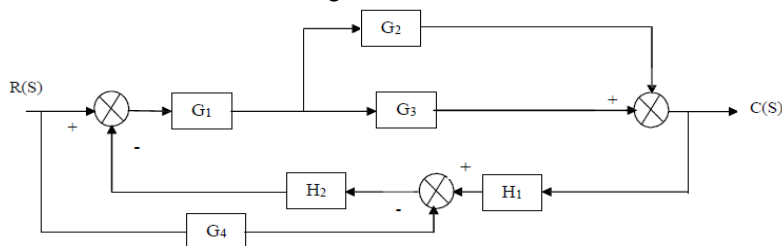|		Marks	Bloom Level	CO
5	a) What is the basis for framing the rules of block diagram reduction technique? Mention its drawbacks.	5	3	2
	b) Draw a signal flow graph and evaluate the closed loop transfer function of a system whose block is shown in fig.2	5	4	2

fig.2

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No.	Question	Marks		

6   Derive the expression for time domain specification of a under damped second order system to a step input.   10   3   3

OR

7   A unity feed-back system is characterized by the open-loop transfer function: $G(s) = \frac{1}{(1+0.5S)(1+0.2S)}$. Determine the steady-state errors for unity-step, unit-ramp and unit-acceleration input. Also find the damping ration and natural frequency of the dominant roots.   10   3   3

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8   a) Explain the necessary conditions for stability.   4   2   4
b) Using the R-H criterion determine the stability of the system represented by characteristic equation is $S^7+9S^6+24S^5+24S^3+24S^2+23S+15= 0$.   6   3   4

0R

9   a) State and explain the advantages and limitations of Routh Hurwitz criteria.   4   2   4
b) Give the important rules for construction of root locus.   6   2   4

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10   Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies.   10   3   5
$G(S) = 10/ S(1+0.4S) (1+0.1S)$

OR

11   Sketch the polar plot for the following transfer function .and find Gain cross over frequency, Phase cross over frequency, Gain margin and Phase margin.   10   3   5
$G(S) = 10(S+2)(S+4)/ S (S^2 -3S+10)$

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12   Given the state equation $\dot{X}= AX$, where   10   2   6
$A=\begin{bmatrix} -3 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$.
Determine the state transition matrix.

OR

13   a) Enumerate the concept of controllability and observability with an example.   5   3   6
b) What is a state model? List the steps involved in deriving state model from block diagram.   5   3   6

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