

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Examination –2022

Course: B. Tech. Branch: Electrical Engineering Semester: VI

Subject Code & Name: BTEEC601 Control System

Max Marks: 60

Date:

Duration: 3 Hr.

Instructions to the Students:

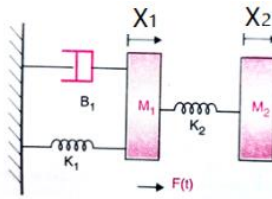
1. All the questions are compulsory.
2. Use of non-programmable scientific calculators is allowed.
3. Assume suitable data wherever necessary and mention it clearly.

Q.1 Solve Any Two of the following.

(Level/CO)

Marks

- A)** For the mechanical system shown below
 i) Write the differential equations of performance.
 ii) Draw the force-current analogous network.



- B)** Compare open loop and closed loop system.

Comprehension

06

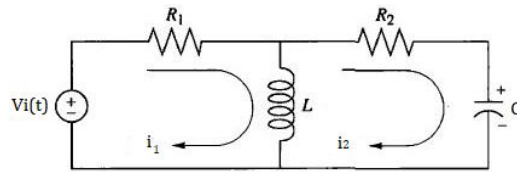
/CO1

- C)** Find the transfer function of the following network.

Comprehension

06

/CO1



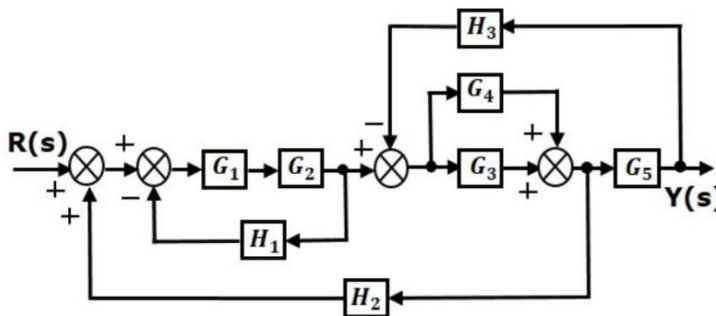
Q.2 Solve Any Two of the following.

- A)** Find the transfer function for the system shown below by using Block Diagram Reduction Technique.

Comprehension

06

/CO2



- B)** Explain Signal Flow Graph in detail with the help of Mason's Gain Formula.

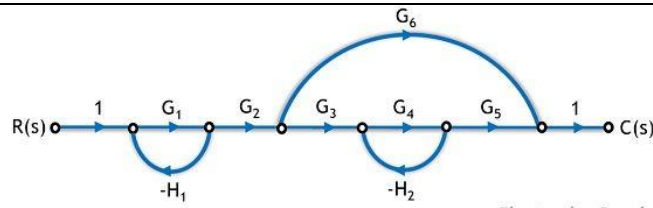
Apply/CO2

06

- C)** Find the transfer function by using Mason's gain formula.

Apply/CO2

06



Q. 3	Solve Any Two of the following.		
A)	Check the following system is stable or unstable using R-H criterion $s^5 + s^4 + 2s^3 + 2s^2 + 2s^2 + 3s + 5 = 0$	Apply/CO3	06
B)	For unity feedback $G(s) = \frac{10(s+1)}{s(s+2)(s+5)}$. Determine i) Stability gain ii) Step, ramp, parabolic error coefficient iii) Steady state error when $r(t)=3+10t$	Apply/CO3	06
C)	A unity feedback control system has an open loop transfer function. $G(s) = \frac{25}{s(s+5)}$. find the rise time, percentage overshoot, peak time and settling time.	Apply/CO3	06
Q.4	Solve Any Two of the following.		
A)	Plot the root locus for unity feedback system with $G(s) = \frac{k}{s(s+6)(s+9)}$	Apply/CO4	06
B)	For the system having the open loop transfer function $G(s) = \frac{10}{s(s+1)(s+10)}$ Determine the stability of the system by plotting the Bode plot of the system.	Apply/CO4	06
C)	Enlist the different Controllers. Write a short note on PI and PID Controller.	Comprehension /CO5	06
Q. 5	Solve Any Two of the following.		
A)	Explain the characteristics and Principle of operation of Proportional – Derivative (PD) Controller and also state advantages and disadvantages.	Comprehension /CO5	06
B)	Consider the system described by $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ $y(t) = [1 \quad 2] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ Is the system controllable and observable?	Comprehension /CO6	06
C)	Obtain the block diagram for $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} b_1 \\ b_2 \end{bmatrix} u(t)$ $y(t) = [c_1 \quad c_2] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + d u(t)$	Comprehension /CO6	06
	*** End ***		