P P SAVANI UNIVERSITY

Seventh Semester of B. Tech. Examination

December 2022

SEME4011 Control Engineering

17.11.2022, Thursday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

			CO	BTL
Q – 1(a)	Define transfer function. List important characteristics of transfer function.	**[03]**	**1**	**1**
(b)	Explain closed loop control system by giving any two examples.	**[04]**	**1**	**1**
(c)	What does a block diagram and signal flow graph represent? List its salient characteristics.	**[05]**	**1,2**	**1,2**
Q - 2	For a mechanical system shown in fig 1. (i) draw the mechanical network (ii) write the differential equations of performance (iii) draw the force voltage and force current analogous networks.	**[09]**	**2**	**2,3,4, 5,6**

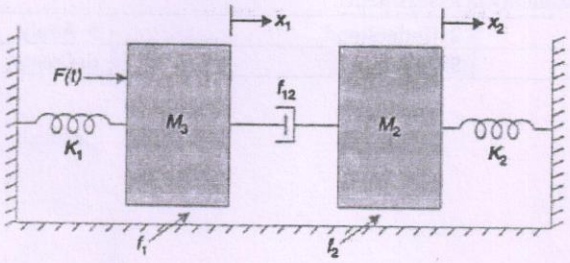

Fig 1.

OR

Q - 2 (a)	Find out transfer function of given signal flow graph using mason's gain formula as shown in fig.2.	**[06]**	**2**	**2,3**

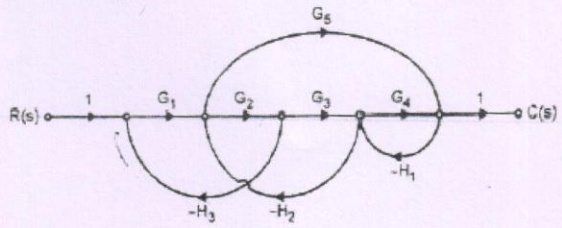

Fig 2.

(b)	Compare block diagram representation versus Signal flow graph representation.	**[03]**	**1,2**	**2**
Q - 3 (a)	Define concept of stability of a dynamic system. How can the stability of system determined from Routh array?	**[04]**	**3**	**1,2**
(b)	By means of Routh criterion, determine the stability of the systems represented by the following characteristics equations. For systems found to be unstable, determine the number of roots of the characteristic equation in	**[05]**	**3**	**3,5**

right half s-plane.

(i). $s^4 + 2s^3 + 8s^2 + 4s + 3 = 0$ (ii) $s^5 + s^4 + 3s^3 + 9s^2 + 16s + 10 = 0$

OR

Q - 3 (a)	Write any three salient features of Root Locus plot.	**[03]**	**3**	**1**
(b)	Explain the method to determine breakaway points in root locus	**[06]**	**3**	**2**

SECTION – II

Q - 1 (a)	What are different frequency domain specification? Explain any three in detail.	**[07]**	**4**	**1**
(b)	Draw a bode plot of $G(s) = K/s$ (or) K/s^n. Assume any suitable value of "ω"	**[05]**	**4**	**2,3**
Q - 2	What are the basic elements involved in Hydraulic circuit? Briefly explain the principle behind the hydraulic control system	**[09]**	**5**	**1,2**

OR

Q – 2	What are the different control action? Explain their advantages and limitations	**[09]**	**5**	**1,2**
Q – 3	Differentiate between Pneumatic system and Hydraulic system.	**[09]**	**5**	**1**

OR

Q - 3	Explain the basic elements and principle involved in pneumatic circuit.	**[09]**	**5**	**2**

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create