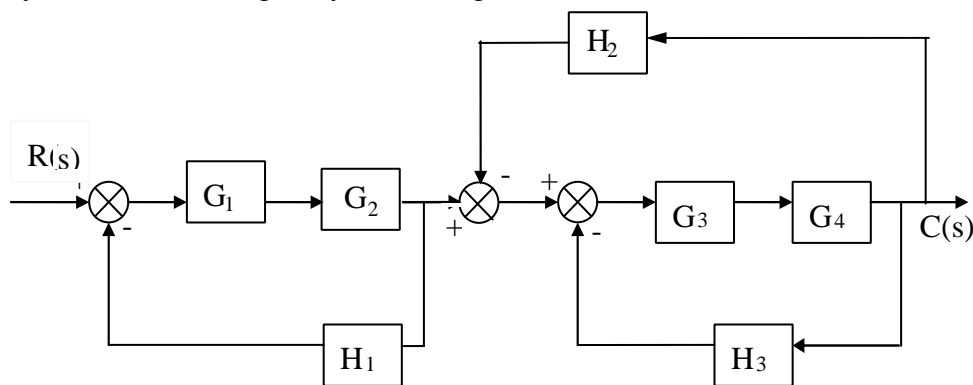


**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
<b>Q.1 Solve Any Two of the following.</b>		<b>12</b>
A) Define Mechatronics with its merits and demerits. Brief in detail any one of industrial application of Mechatronics.	CO1	6
B) Explain briefly any two of the following transducers: <ol style="list-style-type: none"> <li>a. Linear-variable-differential transformer (LVDT)</li> <li>b. Optical Encoder</li> <li>c. Strain Gauges</li> </ol>	CO1	6
C) Explain Analog to Digital Conversion and Describe any one method of analog-to-digital conversion with neat block diagram.	CO2	6
<b>Q.2 Solve Any Two of the following.</b>		<b>12</b>
A) What is the need for signal conditioning? Explain the steps involved in signal conditioning.	CO2	6
B) Explain with neat diagram DC Motor with its industrial applications in Mechatronic domain.	CO4	6
C) Define Transfer Function and Determine the transfer function $C(s) / R(s)$ of the system shown in Fig.1. by block diagram reduction method.	CO4	6



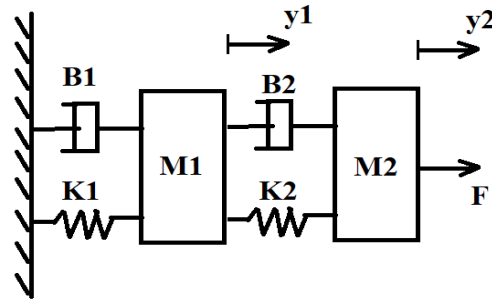
**Fig.1.**

<b>Q.3 Solve Any Two of the following.</b>		<b>12</b>
A) Explain pneumatic sequencing circuit diagram for 2 cylinders with Cascade method.	CO3	6

- |    |  |            |          |
|----|--|------------|----------|
| B) | Explain the different types of directional control valves with neat sketches.  | <b>CO3</b> | <b>6</b> |
| C) | What is a "Microprocessor"? Explain briefly 8085 microprocessor with the help of a block diagram and also uses of microprocessors? | <b>CO5</b> | <b>6</b> |

**Q.4 Solve Any Two of the following.** **12**

- |    |  |            |          |
|----|--|------------|----------|
| A) | Explain Closed Loop Control System with block Diagram. Describe advantages and Disadvantages over Open Loop Control System.            | <b>CO3</b> | <b>6</b> |
| B) | Write the differential equations governing the mechanical translational system as shown in figure and determine the transfer function. | <b>CO5</b> | <b>6</b> |



- |    |   |            |          |
|----|---|------------|----------|
| C) | Explain with block Diagram Programmable Logic Controller (PLC). Write any one industrial application using PLC Programming. | <b>CO4</b> | <b>6</b> |
|----|---|------------|----------|

**Q.5 Solve Any Two of the following.** **12**

- |    |   |            |          |
|----|---|------------|----------|
| A) | Explain different control actions used in Closed Loop Control System (PID, PI, PD ) and write PID Controllers in brief with advantages.                                 | <b>CO6</b> | <b>6</b> |
| B) | Explain the various Force Sensors with industrial applications.   | <b>CO1</b> | <b>6</b> |
| C) | What do you mean by bode plot? Sketch the bode plot for the following transfer function and determine the phase margin & gain margin. $G(S) = \frac{20}{s(1+3s)(1+4s)}$ | <b>CO6</b> | <b>6</b> |

\*\*\* End \*\*\*