CBCS SCHEME

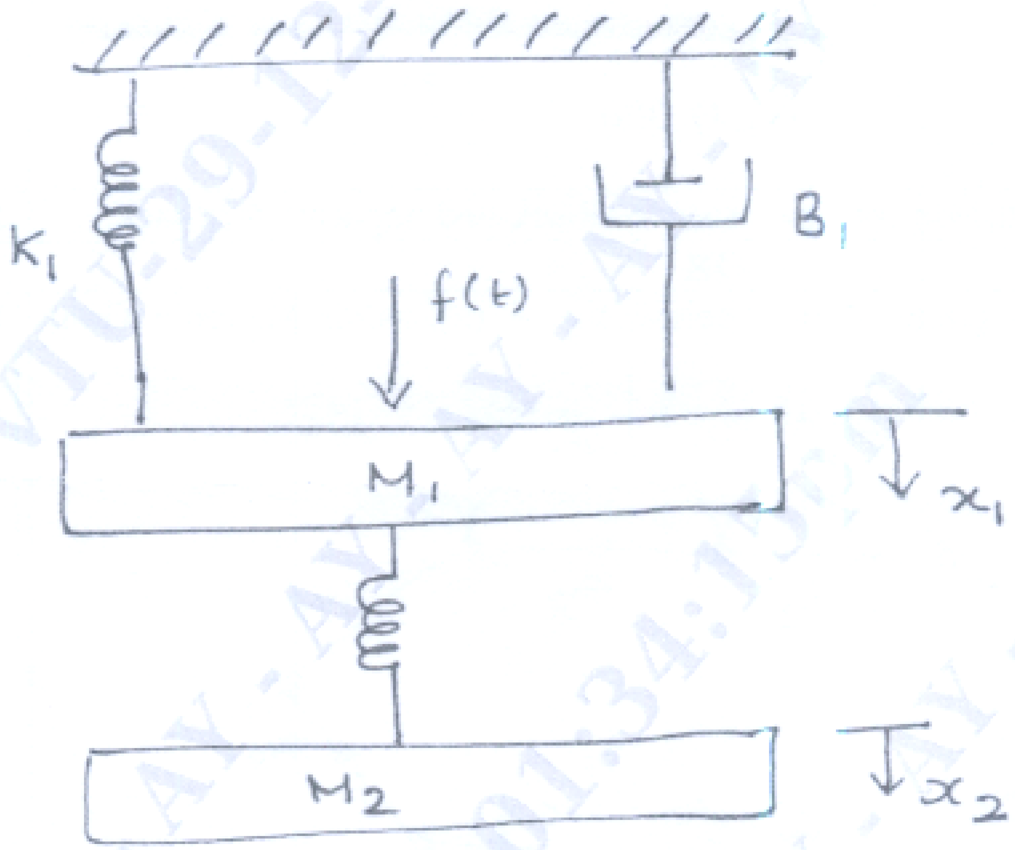
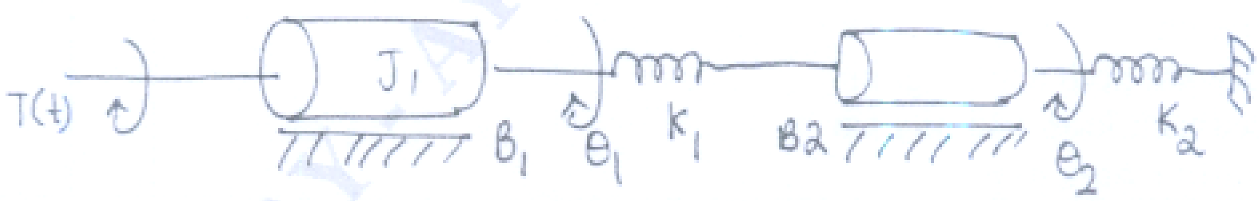
USN | | | | | | | | | | |

BMT503

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Control Theory and Virtual Instrumentation

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Refer the mechanical system shown below fig. 1 (a). Obtain the equations of motion for masses M_1 and M_2 and find transfer function $x_2(s) / F(s)$.  Fig. Q.1 (a)	10	L2	CO1
	b.	What do you mean by Analogous system, explain with example of FV and FI Analogy.	10	L3	CO1
		OR			
Q.2	a.	Refer the rotational system shown fig. 2 (a), draw the mechanical network and write differential equations of performance. Draw the electrical network based on torque voltage analogy.  Fig. Q. 2(a)	12	L3	CO1
	b.	Differentiate closed loop and open loop system.	08	L2	CO1

Module – 2

Q.3	a.	Reduce the block diagram shown in fig. 3 (a) using block diagram reduction techniques and then find C/R.	10	L3	CO2

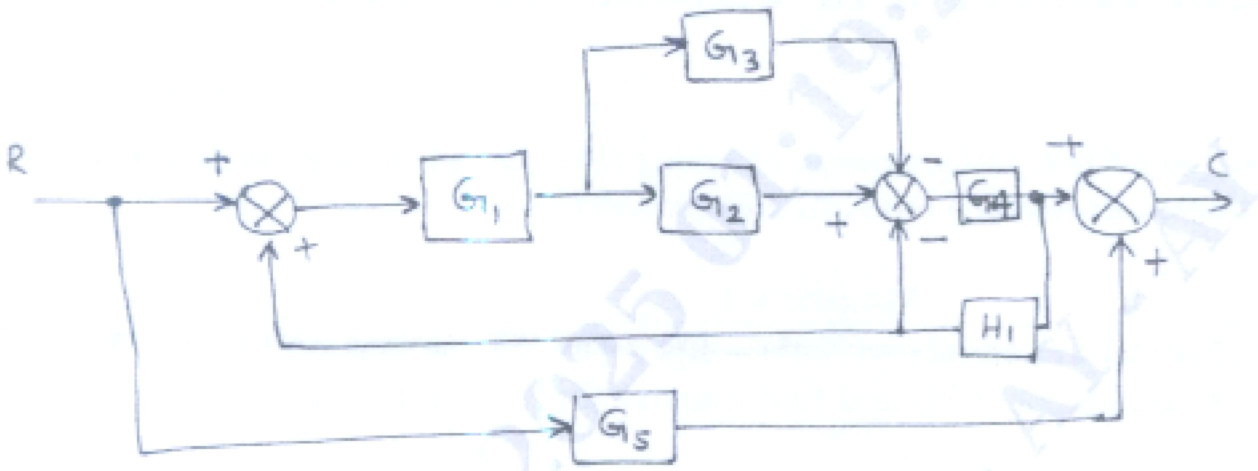


Fig. Q. 3(a)

	b.	Derive a transfer function for a positive feedback and negative feedback.	10	L3	CO2

OR

Q.4	a.	Find C/R for the graph shown below fig. 4 (a) using Mason's Gain Formula.	10	L3	CO2

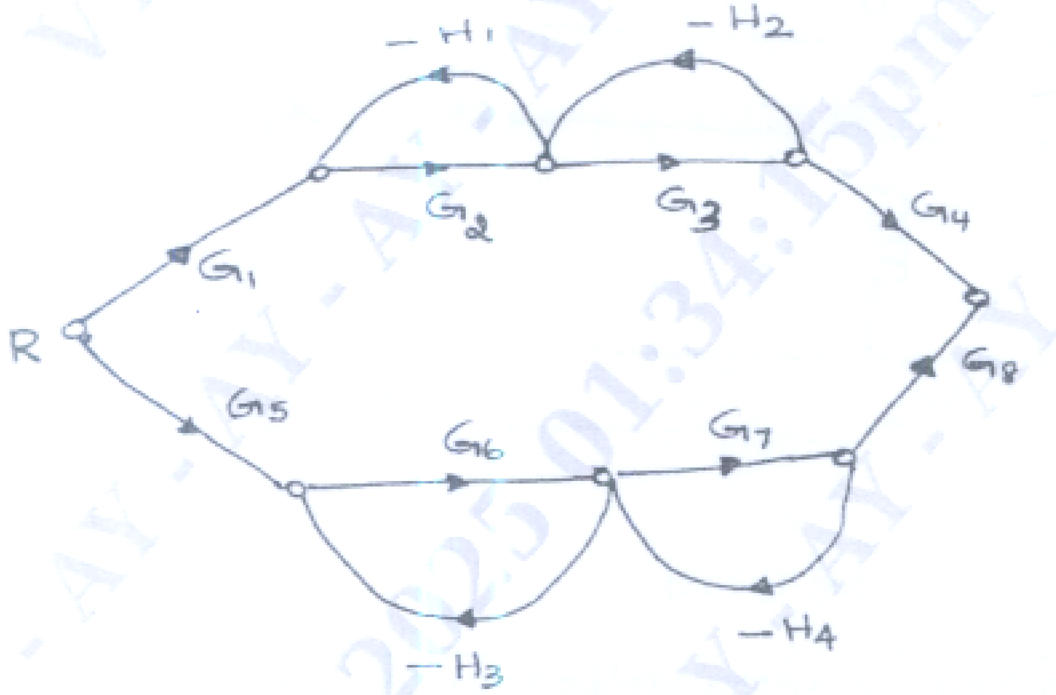


Fig. Q.4(a)

	b.	Define the following terms related to signal flow graph with neat sketch. i) Output nods ii) input nods iii) branch iv) forward path and its gain e) feedback loop and its gain f) non-touching loops	10	L2	CO2

		Module – 3			
Q.5	**a.**	Define Virtual Instrumentation. With the block diagram explain the working of architecture of Virtual Instrumentation.	**10**	**L2**	**CO3**
	b.	List the difference between graphical and textual programming.	**10**	**L1**	**CO3**
		OR			
Q.6	**a.**	Explain the major components of Graphical System Design Model VI with a neat diagram.	**10**	**L2**	**CO3**
	b.	Outline in brief history and need of Virtual Instrumentation.	**10**	**L1**	**CO3**
		Module – 4			
Q.7	**a.**	Distinguish between for and while loop. Sketch an VI to find factorial of any numbers using both loops.	**10**	**L3**	**CO4**
	b.	Describe arrays in Labview, list the array functions in labview in detail.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Illustrate different types of structure, show the use of case structure in Labview through an example.	**10**	**L2**	**CO4**
	b.	Explain modular programming with an example of VI in Labview.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	With a neat sketch summarize OSI / ISO model for serial bus.	**10**	**L3**	**CO5**
	b.	With sketch summarize USB tree architecture and explain the need of USB.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Illustrate MODBUS in detail with diagram.	**10**	**L3**	**CO5**
	b.	Outline difference between RS232, RS422 and RS485	**10**	**L2**	**CO5**

* * * * *