Subject: Control System (ELE-407)   **Date:** 26-04-2019
Time allowed: 1 h 30 m   **Max Marks:** 30

Course Objectives:

CO1: Introduction to control systems, compare and contrast open and closed loop, automatic and manual systems and their applications. To study the effect of feedback system. To determine the mathematical modelling of the physical system.
CO2: Introduction to transfer functions, developing and analyzing block diagrams, evaluating signal flow graphs.
CO3: To determine and analyze the time response of first and second order systems to various standard test inputs.
CO4: Investigate, evaluate and analyze the stability of control systems, compare and contrast absolute and relative stability.
CO5: Study and design of PID controllers, lead-lag Compensators and modeling of dynamic systems in state space.

[Attempt all questions]

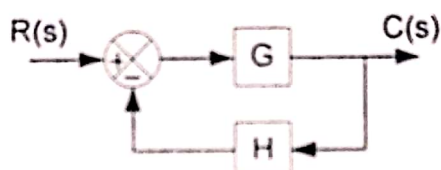| Q. No.		Descriptions of the question	Full Marks
1.	(a)	Define open loop and closed loop control systems and explain with the help of suitable examples. Also mention their merits and demerits.	[3+2=5] [CO1]
	(b)	Explain the effect of feedback on system stability. Also find the sensitivity of T(s) =C(s)/R(s) w.r.t. G & H for the system shown below in Fig. 1.	[2+3=5] [CO1]

Fig. 1

2.	(a)	Draw the equivalent mechanical system of the given system in Fig. 2 and then obtained the electrical analogous circuit using	[1+2+2=5] [CO1]
		(i) Force-Voltage (F-V) Analogy.	
		(ii) Force-Current (F-I) Analogy.	
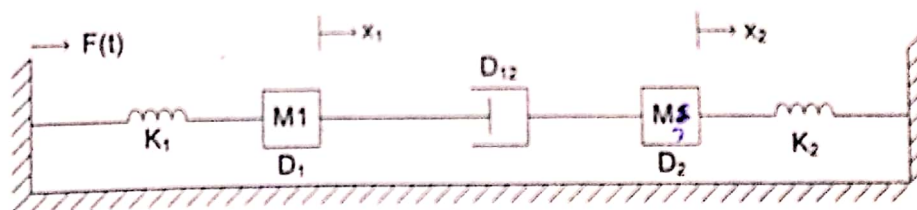
Fig. 2

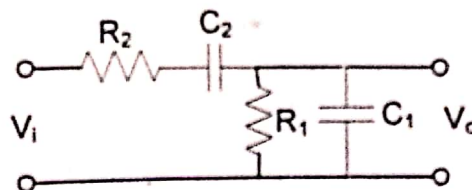|	(b)	Find the transfer function of the network shown in Fig. 3.	[5] [CO2]

Fig. 3

3. **(a)** Using block diagram reduction technique, determine the output variable C, where R and D represent the inputs of the system in given Fig. 4: [5] [CO2]
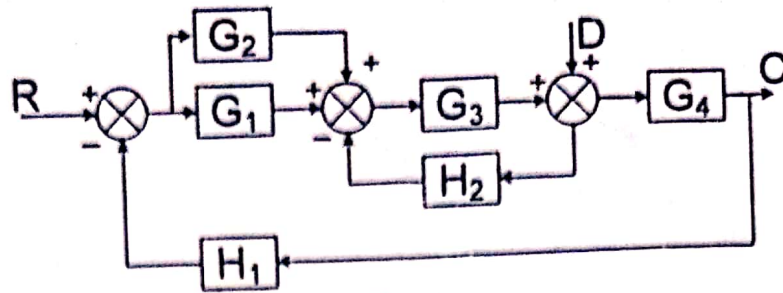

Fig. 4

(b) For the block diagram shown below in Fig. 5, find out the transfer function $\frac{C(s)}{R(s)}$ using block diagram reduction technique. [5] [CO2]
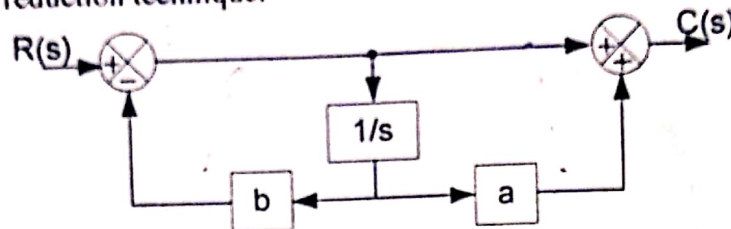

Fig. 5