(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2112 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. V) THEORY EXAMINATION 2011-12

CONTROL SYSTEM

Time : 3 Hours *Total Marks : 100*

Note :— **All** questions carry equal marks.

1. Answer any **four** parts of the following : (5×4=20)

   (a) What do you understand by "OPEN LOOP" and "CLOSED LOOP" control systems ? Discuss the comparative statements between open loop and closed loop control systems. Also mention the practical examples of open and closed loop control systems.

   (b) What do you mean by "ANALOG" and "DIGITAL" control systems ? What are the advantages/disadvantages of digital control systems over analog control systems ?

   (c) Define the following terms in regarding with signal flow graph :–

   (i) FORWARD PATH

   (ii) DUMMY Node

(iii) Non-Touching Loops

(iv) Loop gain

(v) Source and Sink node.

(d) Consider the signal flow graph as shown in Fig. 1.

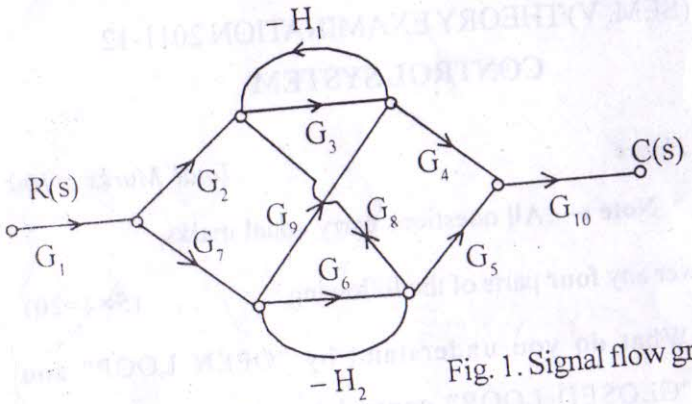

Fig. 1. Signal flow graph

Find $\frac{C(s)}{R(s)}$ by Mason's gain formula.

(e) Consider the block diagram as shown in Fig. 2

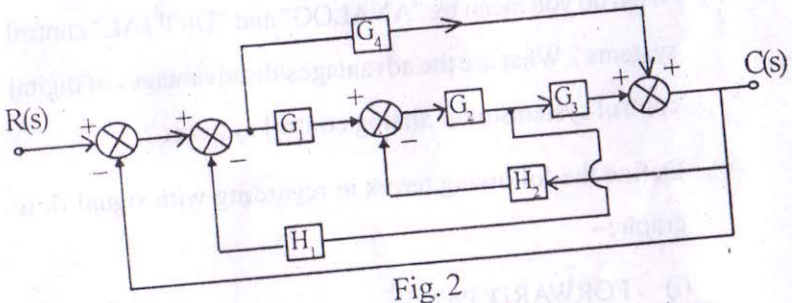

Fig. 2

Find $\frac{C(s)}{R(s)}$ by block diagram reduction technique.

(f) What is block diagram representation ? Explain with a suitable examples. Also mention its advantages and disadvantages. Explain the block diagram reduction rules.

2. Answer any **two** parts of the following : **(10×2=20)**

(a) The response of a system subjected to a unit step input is

$$C(t) = 1 + 0.2\, e^{-60t} - 1.2\, e^{-10t}$$

Obtain the expression for the closed loop transfer function. Also determine the undamped natural frequency and damping ratio of the system.

(b) Fig. 3(a) shows a mechanical vibratory system. When a force of 8.9 N is applied to the system, the mass oscillates as shown in the Fig 3(b). Find the values of M, B and K.

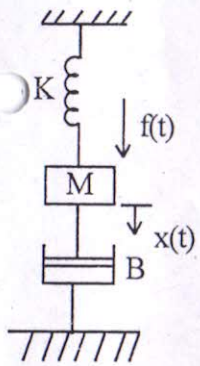

Fig. 3 (a)

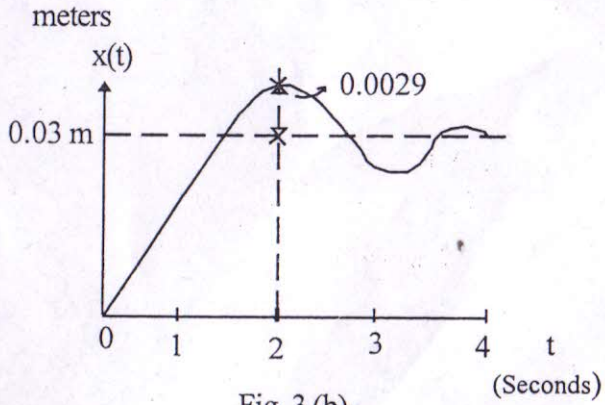

Fig. 3 (b)