Printed Pages – 3 **ME – 605**

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

PAPER ID : 4053 **Roll No.**

B.Tech.

SIXTH SEMESTER EXAMINATION, 2005-2006

AUTOMATIC CONTROLS

Time : 2 Hours *Total Marks : 50*

Note : *(i) Attempt **ALL** questions.*

(ii) In case of numerical problems assume data wherever not provided.

(iii) Be precise in your answer.

1. Attempt ***any four*** parts of the following : **(3.5x4=14)**

(a) Compare between closed loop system and open loop system with a suitable example.

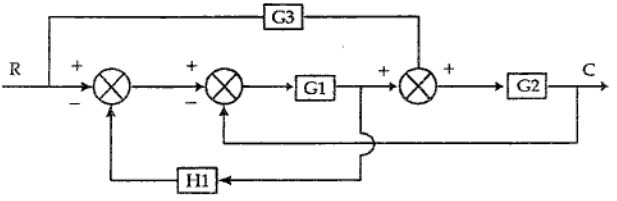
(b) Find the inverse Laplace transform of the following function

$$F(s) = \frac{s^2 + 2s + 3}{(s+1)^3}$$

(c) Find the solution $x(t)$ of the differential equation :

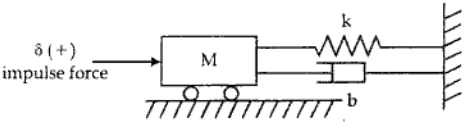
$\ddot{x} + 2\dot{x} + 5x = 3,\ x(0) = 0,\ \dot{x}(0) = 0$

(d) Simplify the following block diagram.



(e) Define servomechanism with an example.

(f) Find the transfer function of given system :



2. Attempt *any four* parts of the following : **(3x4=12)**

(a) A first order system with transfer function $Tf = \frac{10}{(s+2)}$ is subjected to a unit step inputs. Determine the output response for the case.

(b) For the given unity feedback system

$$G(s) = \frac{25}{s(s+5)}$$

obtain maximum over shoot and settling time when the system is subjected to a unit step input.

(c) Find the expression for peak time for a second order system under unit step input.

(d) With a suitable example, explain the working of a two position controller.

(e) Find the transfer function of a PI controller.

(f) Find out the expression for the response of a first order system to a unit ramp input.

3. Attempt *any two* parts of the following : **(6x2=12)**

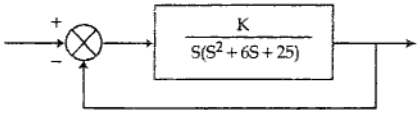
(a) Determine the range of k for stability for the given system $\frac{C(s)}{R(s)} = \frac{k}{s(s^2+s+1)(s+2)+k}$

(b) With a neat sketch, discuss the functioning of a nozzle flapper amplifier.

(c) For a first order liquid level system, determine resistance and the capacitance of the system and their transfer function.

4. Attempt *any two* parts of the following : **(6x2=12)**

(a) Draw the root locus for the give system



(b) Draw the polar plot for the given transfer function when frequency varies from 0 to ∞.

$$G(s) = \frac{k}{s(1+\tau s)}$$

(c) Discuss the bode plot for differential and integral factors.

- o O o -