M 25358

Reg. No. : .....

Name : .....

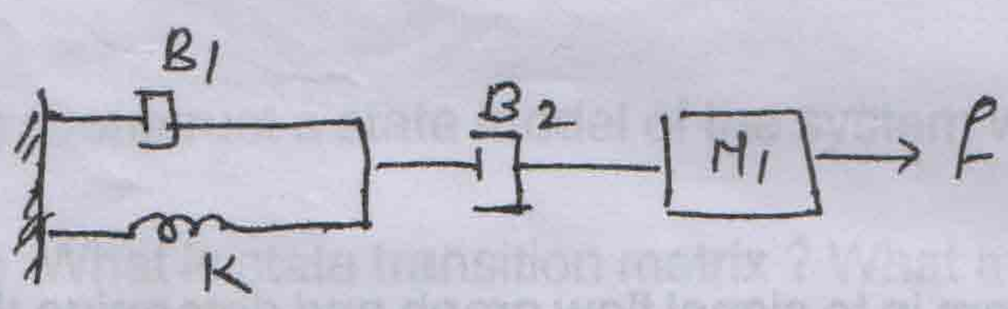
# VI Semester B.Tech. Degree (Regular/Supplementary/Improvement – Including Part Time) Examination, May 2014
## (2007 Admn. Onwards)
## PT2K6/2K6 EE 606 (C) : LINEAR SYSTEM ANALYSIS

Time : 3 Hours Max. Marks : 100

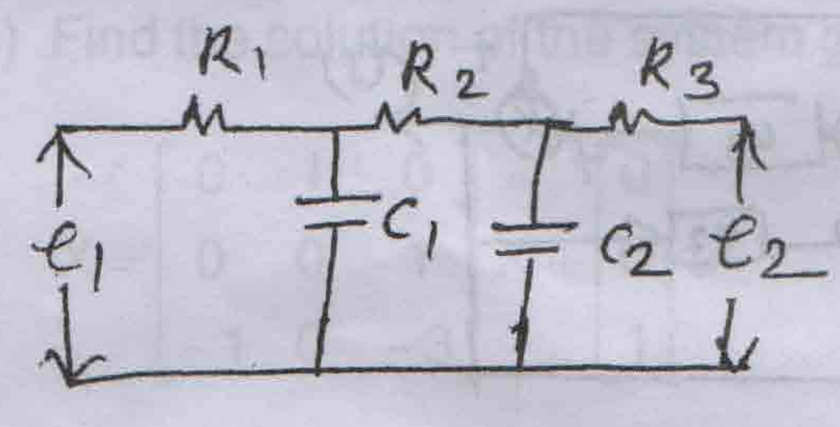
***Instruction** : Answer **all** questions.*

1. a) Differentiate between static and dynamic systems.

   b) Obtain the differential equations describing the following system :




   c) Obtain the transfer function of the following network :




   d) State and explain Mason's gain formula.

   e) Sketch and mark the specifications the unit step response of an under damped second order system.

   f) Explain the concept of stability.

   g) Compare state space and transfer function approaches.

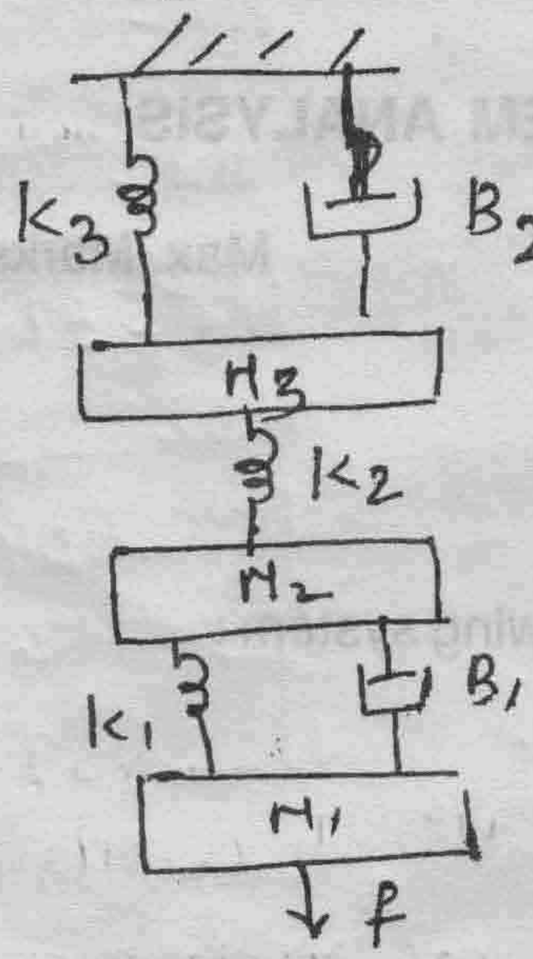
   h) What is meant by controllability ? Explain. **(8×5=40)**

**P.T.O.**

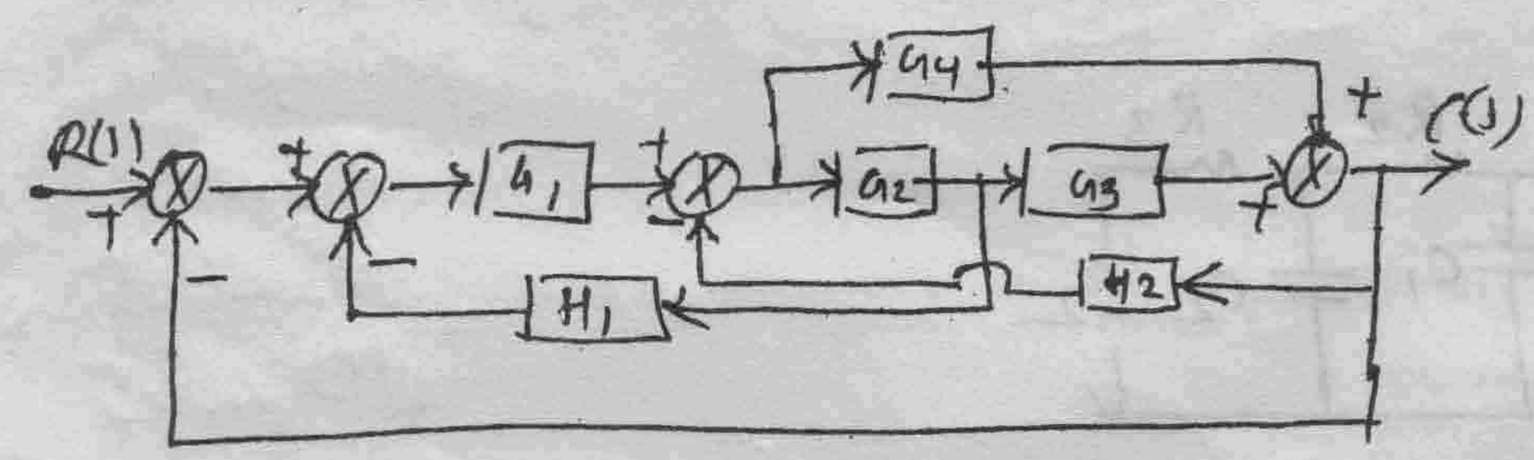
2. a) With suitable examples explain the modelling of pneumatic and thermal systems. **15**

OR

b) For the system shown below find the Force-Voltage and Force-Current analogous circuits. **15**

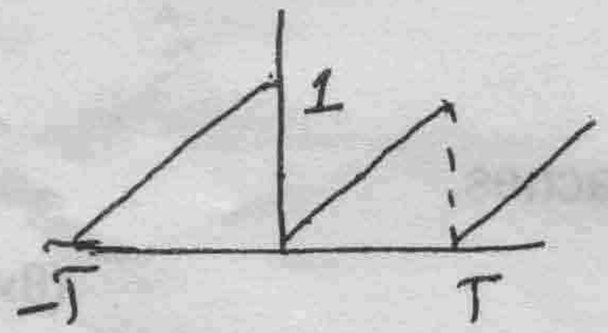



3. a) Convert the following block diagram in to signal flow graph and determine the transfer function : **15**




OR

b) Find the Fourier series of the function shown below : **8**



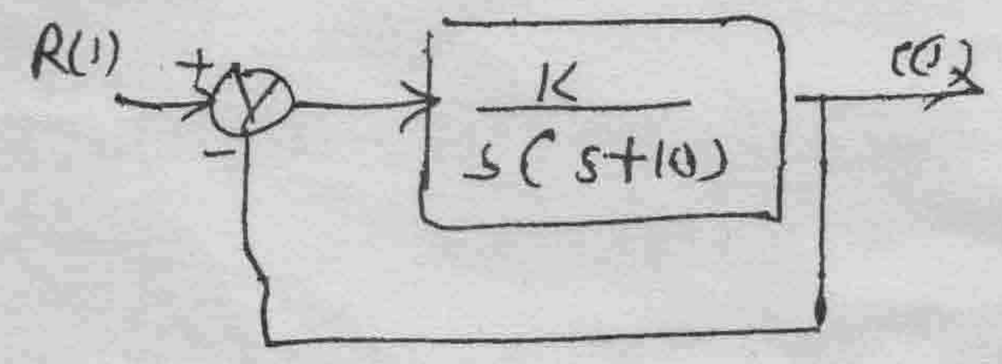

c) Find the Fourier transform of $y(t) = e^{-2t} f(t)$ where f(t) has the Fourier transform $F(w) = \frac{10}{jw+4}$. **7**

4. a) Test the stability of the system whose characteristic equation is $s^6 + s^5 + 3s^4 + 3s^3 + 3s^2 + 2s + 1 = 0$. **10**

b) Define steady state error and steady state error coefficients. **5**

OR

c) For the system shown below find the value of K so that the damping ratio is 0.5. For this value of K find peak time and peak over shoot. Derive the relations used : **15**




5. a) Construct a state model of the system with transfer function $\frac{10(s+4)}{s(s+1)(s+3)}$. **7**

b) What is state transition matrix ? What are its properties ? Explain any one method to find it. **8**

OR

c) Find the solution of the system given by : **15**

$$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$X(0) = [1\ 0\ 0]^T$.