PVP 14

Code: EC4T1

II B.Tech - II Semester – Regular Examinations – May 2016

CONTROL SYSTEMS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

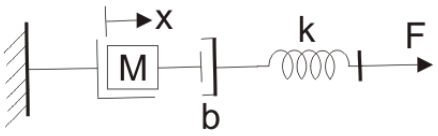
Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1)

a) Define Control system.

b) Draw the Equivalent Electrical circuit for the mechanical system shown in fig using Force –Voltage Analogy.



c) What are the Advantages and disadvantages of Proportional Controller?

d) Define Maximum Overshoot and Steady State Error.

e) Define type and order of the system.

f) What are the Properties of Hurwitz Polynomials.

g) Define Gain Margin and Phase Margin.

h) Explain Nyquist stability criterion

i) Define state and state variable.

j) Write formulae for State Transition Matrix

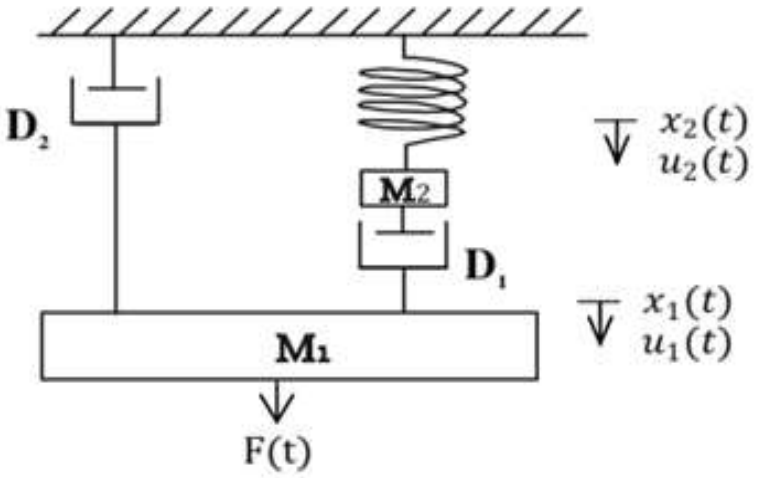
k) Define Controllability and write condition for it.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2) Obtain the electrical analogy (FV & FI analog circuits) for the Machine system shown & also write the equations. 16 M

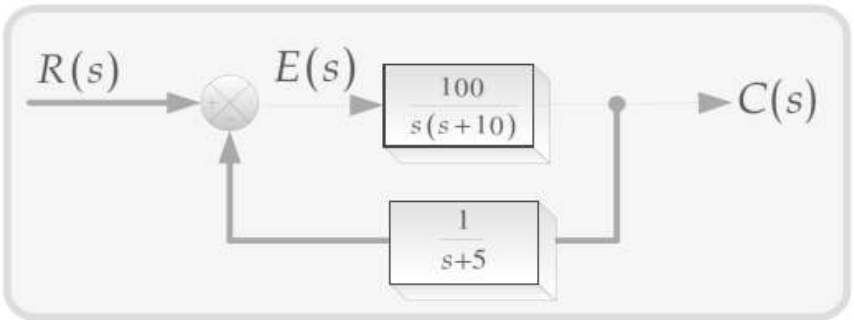


3)

a) What are the Time domain specifications and derive them. 8 M

b) For the system shown below, find 8M

- The system type
- Appropriate error constant associated with the system type, and
- The steady state error for unit step input



4)

a) By means of Routh criterion, determine the stability of the system represented by the characteristic equation $s^4+s^3+2s^2+2s+5=0$. Comment on the location of the roots of the characteristic equation. 8 M

b) The characteristic equation of a second order feedback control system is $s^2+7s+(K+12)=0$. Show that there exists a break-away point on the real axis for the root locus of the system. Find the break-away point, the value of K at this point, the open-loop poles and the closed loop poles. 8 M

5) Draw the log-magnitude plot and phase plot for a system with open-loop transfer function

$$G(s)H(s)=\frac{12650}{(S+10)(S+20)^2}$$

16 M

And obtain the gain margin and phase margin of the closed-loop system.

6)

a) Obtain the state space representation of an armature controlled dc motor. 8 M

b) The state equation of a linear system is given by

$$[\dot{x}] = \begin{bmatrix} -1 & -2 \\ 0 & -4 \end{bmatrix} [x] + \begin{bmatrix} 1 \\ 0 \end{bmatrix} [u]$$

Obtain the state transition matrix. 8 M