PVP 14

Code: EE4T5

II B.Tech - II Semester – Regular/Supplementary Examinations – April 2017

CONTROL SYSTEMS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

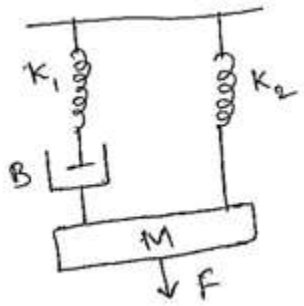
Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22

1.

a) What are the advantages of closed loop system?

b) Write the differential equation of the mechanical system show in figure.



c) Mention the applications of Synchros.

d) Define peak time and peak overshoot.

e) What are the advantages of signal flow graphs with reference to the block diagram?

f) Write the Hurwitz array for the system given by the characteristic equation $4S^3+2S^2+5S+7=0$

g) Sketch the time response plot under Roots lying on the imaginary axis and Roots lying in R.H.S Plane.

h) State Nyquist stability criterion.

i) Write the transfer function of PID Controller.

j) Define i) State ii) State variables

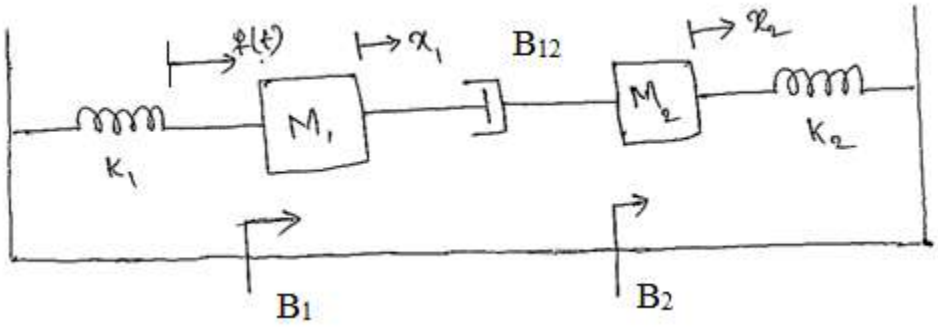
k) What are the properties of state transition matrix?

PART – B

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

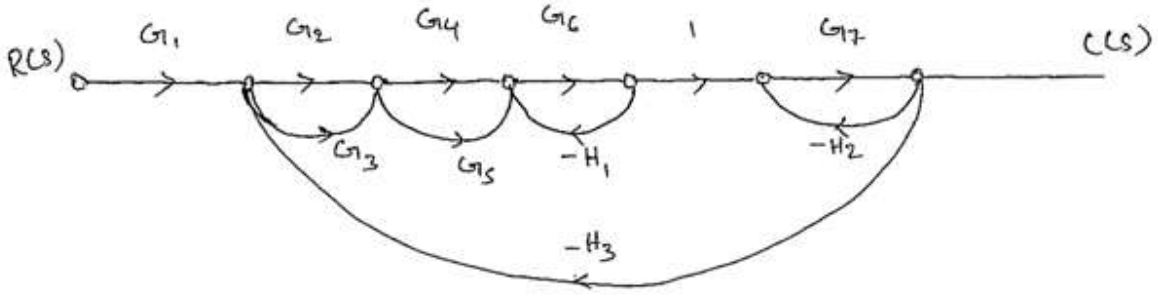
3 x 16 = 48 M

2. a) Write the differential equation for the given mechanical system and draw an analogous electrical circuit based on force-voltage analogy. 10 M



b) Discuss in detail the constructional details of a synchros. 6 M

3. a) For the given signal flow graph, Find $\frac{C(S)}{R(S)}$ using Mason's gain formula. 8 M



b) Define all the time domain specifications. 8 M

4. Sketch the root locus plot of a unity feedback system with an open loop transfer function $G(S) = \frac{K}{S(S+2)(S+4)}$. Determine the value of K, So that the dominant pair of complex poles of the system has a damping ratio of 0.5. 16 M

5. a) Explain the frequency domain specifications of a typical system. 8 M

b) Draw the circuit diagram of a lead compensator and obtain its transfer function. 8 M

6. a) A control system has a transfer function given by $G(S) = \frac{S+3}{(S+1)(S+2)^2}$. Obtain the canonical state variable representation. 8 M

b) A system is described by

$\dot{x}=\begin{bmatrix}1 & -1\\ 1 & -1\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u.\ ,and\ y=[1 \quad 0]x.$ Check the controllability and observability of the system. 8 M