B.Tech. (Electrical Engineering) Seventh Semester (C.B.C.S.)

Open Elective-II : Fundamental of Control System

P. Pages : 2 **PSM/KW/23/2874**

Time : Three Hours * 2 6 8 7 * Max. Marks : 70

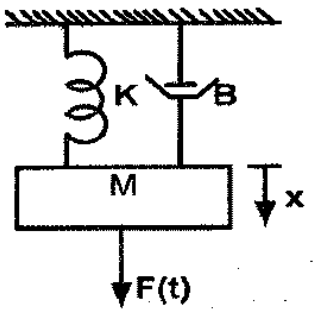
Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Assume suitable data whenever necessary.
8. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Distinguish between Open loop system and closed loop system with example. **7**

b) Define Servomechanism and write a short note on AC & DC Servomotor. **7**

OR

2. a) Determine T.F = X(s)/F(s) for the mass, spring, damper system shown below. **7**



b) What is signal flow graph. Explain Mason's gain formula and derive the transfer function. **7**

3. a) Discuss the Transient Response specifications in details. **7**

b) Derive the expression for response of second order system to a unit step input. **7**

OR

4. a) Distinguish between Transient response and steady state response. **7**

b) For a feedback control system with. **7**

$$G(s)=\frac{8(s+3)}{s^2\left(s^2+4s+8\right)\left(s^2+3s+12\right)} \text{ And } H(s)=\frac{(s+10)}{(s+1)}$$

Find static error constant Kp, Kv, Ka. Find steady state error when subjected to and input. $r(t)=5+2t+3t^2$.

5. a) Explain the performance specification in frequency domain system. **7**

b) Explain the frequency response of standard second order system. **7**

OR

6. a) Write short note on Frequency response specifications. **7**

b) Write a short note on Bode Plot. **7**

7. a) Define stability and explain the types of stability. **7**

b) State and explain Routh's stability criterion with its advantages and disadvantages. **7**

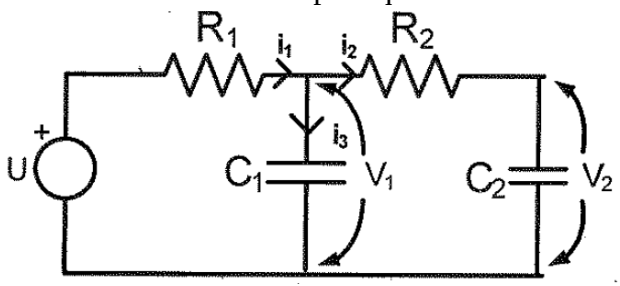
OR

8. a) Explain the concept of stability with bounded input and output. **7**

b) Define root locus and explain the rules for constructing Root locus. **7**

9. a) Define (i) State (ii) State trajectory (iii) State variables. **6**

b) Construct the state model for the system shown below. If $R1 = R2 = R = 1M\Omega$, $C1 = C2 = C = 1\mu F$. Write down state and output equation in Vector matrix form. **8**



OR

10. a) What are the specific advantages & disadvantages of representation of state space model in "phase variable form". **7**

b) Explain Kalman's test for controllability and observability. **7**

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