Code: EE4T5

II B.Tech - II Semester – Regular/Supplementary Examinations
October – 2020

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 M

1.
   a) What is meant by Open loop Control System?
   b) Write the advantages of closed loop control system.
   c) What is meant by rotational system?
   d) What is the use of Mason's gain formula?
   e) Explain the block diagram algebra for shifting the take-off point ahead of the block.
   f) Define transient response and steady state response.
   g) What is Absolute stability?
   h) What are the limitations of Routh's criterion?
   i) Write frequency domain specifications.
   j) Define phase margin and gain margin.
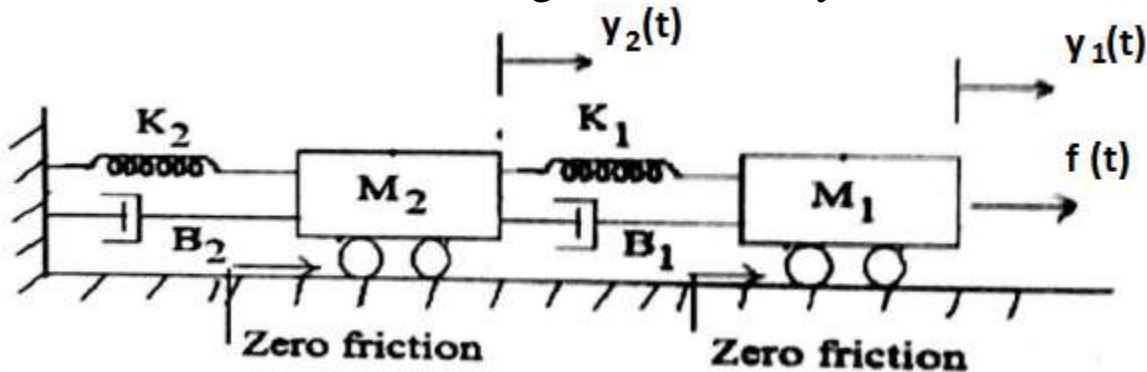   k) How can you determine the order of a system from its state model?

PART – B

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

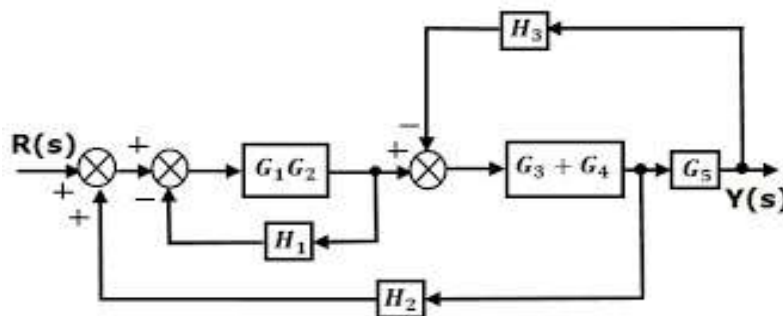$$3 \times 16 = 48 \text{ M}$$

2. a) Derive the transfer function of armature controlled DC servo motor.   8 M

   b) Draw the force-voltage and force-current analogous circuits for the following mechanical system.   8 M

3. a) Obtain the time response of a first order system for a unit step input and plot its response.   8 M

   b) Determine the overall transfer function Y(s)/R(s) for the below system.   8 M

4. a) By using R-H criterion comment on stability for given characteristic equation $S^6+2S^5+S^4+2S^3+3S^2+4S+5=0$.

6 M

b) Sketch the root locus for the characteristic equation is
s(s+1)(s+2)+(1s+1.5)=0

10 M

5. a) Write the differences between lag and lead compensator.

6 M

b) Sketch the bode plot for the given transfer function

$$G(s) = \frac{10}{s(s+1)(s+2)} \, .$$

10 M

6. a) State and explain the concepts of controllability and observability.

6 M

b) Determine the state model of the system characterized by the differential equation
$(s^4+4s^3+2s^2+s+6)y(s) = 10 \, U(s)$

10 M