Exam.Code:0943
Sub. Code: 6742

2074

B.E. (Mechanical Engineering)-Seventh Semester

MEC-702: Automatic Controls

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.***

x-x-x

1 Attempt the following

a) Draw diagram for summing junction system.

b) What is the significance of feedback linearizing effect?

c) What is potentiometer?

d) Write Nyquist criterion and define its role in stability.

e) Write n^{th} order differential equation for state space representation. 5*2

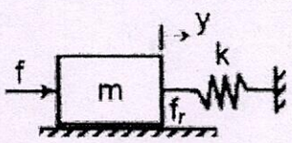
Part A

2 a) Define the static and dynamic systems, give some examples for each type. 5

b) Solve the differential equation using Laplace transformation 5

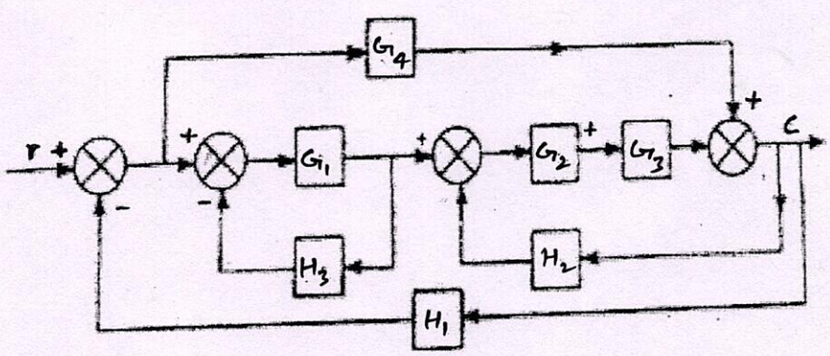
$$\frac{d^2y(t)}{dt^2}+4\frac{dy(t)}{dt}+3y(t)=6 \quad \text{where} \quad y(0)=0 \,\&\, \frac{dy}{dt}(0)=0$$

3 a) Drive transfer function $G(s)=\frac{Y}{F}(s)$ of the given system and give the mathematical expressions for the system gain, natural frequency and damping ratio. 5



b) What is synchro control transformer? What is electrical zero position of synchro detector? 5

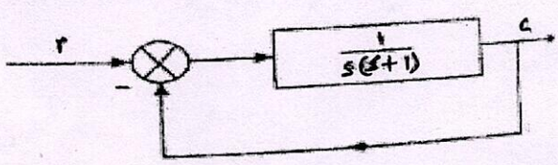
4 a) Draw signal flow diagram and derive expression for c/r using mason's formula. 5



b) Explain in brief ON-OFF control action. 5

Part B

5 a) Draw Nyquist diagram for the control system, with block diagram. 5



b) Explain transient and steady state response 5

6 Write features and procedure for plotting Root Locus Plot. 10

7 Using Routh-Hurwitz criterion determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable 10

$$\frac{K}{S[S(S+10)+T]}$$

x-x-x