

Total No. of Printed Pages:03

**SUBJECT CODE NO:- H-4009**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**Final B.Tech. (Mech.) (Sem-VII)**  
**Automatic Control System**  
**[Revised]**

[Time: Three Hours]

[Max.Marks: 80]

N.B

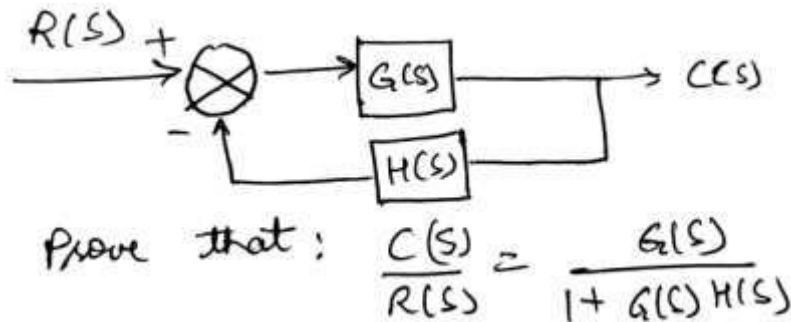
Please check whether you have got the right question paper.

1) Question no. 1 from Section A and Question no. 6 from Section B are compulsory.

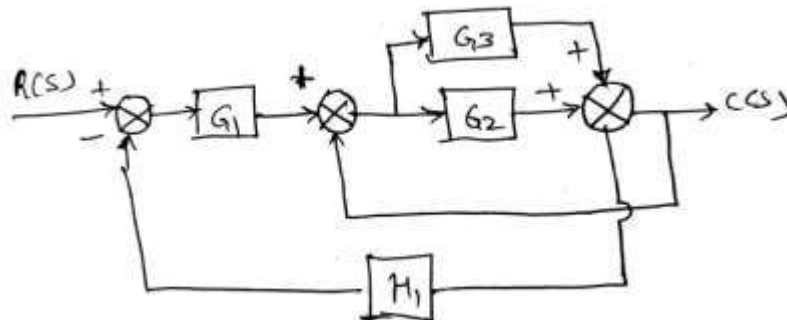
2) Solve any two questions from remaining questions from each Section.

**Section A**

- Q.1 Solve any five of the following: 10
- 1) Explain open loop and closed loop system.
  - 2) Enlist advantages of Block diagram.
  - 3) Describe transfer function.
  - 4) What are the different types of control action?
  - 5) Draw block diagram of a closed loop system.
  - 6) Define one pressure measuring device.
- Q.2 a) For the control system shown in figure below. 08



- b) Find the closed loop transfer function by reducing the block diagram shown below: 07



- Q.3 a) Describe construction and working of Vane Pump. 07  
 b) Explain in detail the following: 08  
 i) Direct analogy  
 ii) Indirect analogy
- Q.4 a) Explain construction and working of 3 way and 4 way hydraulic valve. 07  
 b) Write a note on LVDT. 08
- Q.5 Write short note on any three: 15  
 1) Optical Encoder  
 2) Blocks in cascade  
 3) Stepper motor  
 4) Thermocouple

### Section B

- Q.6 Solve any five of the following: 10  
 1) Give example of ON-OFF controller.  
 2) Describe take off point in Block diagram.  
 3) What are zeros and poles of transfer function?  
 4) Define stability for a control system.  
 5) Describe the proportional control action.  
 6) Describe second order system.
- Q.7 a) Define response of a system? Explain transient and steady state response. 03  
 b) Explain PID control action in detail with figure. 12
- Q.8 a) Define the following i) Step Input 03  
 ii) Ramp input  
 iii) Impulse input  
 b) The open loop transfer function of a unity feedback control system is given by 12  

$$G(S) = \frac{25}{S(S+5)}$$
  
 Obtain maximum overshoot, peak time, rise time and settling time.
- Q.9 a) Determine the stability of a system whose characteristic equation is given by 03  

$$S^4 + 2S^3 + 3S^2 + 4S + 5 = 0$$
  
 b) Draw the Bode plot for the transfer function 12  

$$G(S) = \frac{16(1 + 0.5S)}{S^2(1 + 0.125S)(1 + 0.1S)}$$
  
 From the graph determine:  
 i) Phase Crossover frequency  
 ii) Gain Crossover frequency  
 iii) P.M  
 iv) G.M  
 v) Stability of the system

Q.10 Write short note on any three:

- 1) Modes of control
- 2) Bellows
- 3) Frequency response
- 4) Derivative control action