

SE-ECS / SEM IV / R-19 / FH-25 / 29-05-25

Paper / Subject Code: 40723 / Controls & Instrumentation

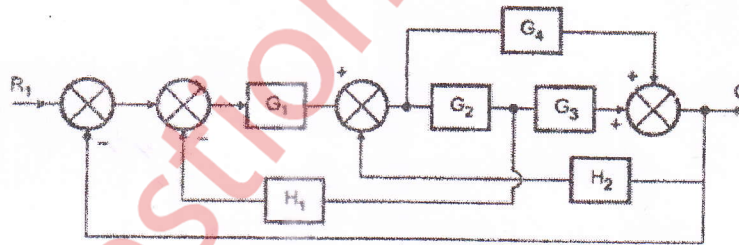
QP CODE: 10082390

Duration: 3hrs

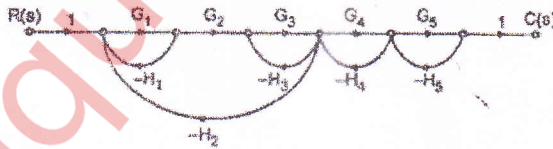
Max Marks:80

- N.B.: (1) Question No 1 is Compulsory.  
 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.

- 1 Attempt any Four. [20]
- a Explain advantages of digital Control system. [5]
- b A unity feedback system has  $G(S) = \frac{K}{s(s+2)(1+0.5s)}$ . Determine steady state error [5]  
 if  $r(t)=3t$  and  $k=4$  also calculate  $K$  for  $ess=0.4$ .
- c Explain fiber optic instrumentation. [5]
- d Explain MODBUS protocol [5]
- e Explain working of strain gauge. [5]
- 2 a Using block diagram reduction technique find close loop transfer function of given system. [10]



- b Using meson's gain formula find transfer function  $\frac{C(S)}{R(S)}$  of given System. [10]



- 3 a Draw the root locus of a unity feedback control system with  $G(S) = \frac{K}{s(s+4)(s+6)}$ . [10]  
 Comment on the stability of the system.
- b Using Routh Harwitz's criterion for the unity feedback system with open loop transfer function  $G(S) = \frac{K}{s(s+1)(s+2)(s+4)}$  Find [10]
- 1) The range of  $k$  for stability
  - 2) The value of  $k$  for marginally stable system.

- 4 a A unity feedback system is characterized by an open loop transfer function  $G(S) = \frac{K}{S(S+10)}$ . Determine the gain  $k$  so that the system will have damping ratio of 0.5. For this value of  $k$  determine, setting time, peak overshoot and time to peak overshoot for unit step input. [10]
- b Construct the bode plot for given Transfer function  $G(S)H(S) = \frac{10(S+10)}{S(S+2)(S+5)}$  [10]
- 5 a Explain Construction and Working of LVDT. Also list applications of LVDT. [10]
- b Explain different types of temperature transducers in detail with suitable diagram. [10]
- 6 a Explain HART communication protocol. [10]
- b Explain Telemetry system and list types of telemetry system. [10]

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