

(3 hours)

[Total Marks: 80]



- N.B.:**
1. **Question no. 1 is compulsory.**
  2. Attempt **any three** questions from the remaining five questions.
  3. Figures to the right indicate full marks.
  4. Make and state the assumptions clearly wherever required.
  5. Illustrate your answers with neat sketches wherever required.

**Q1. Solve any four :**

- a) What is automation and explain types of automation? [20]
- b) What is control system and state and explain the types of control system?
- c) Compare the shift register and cascading system of pneumatic circuit design.
- d) Explain the operation of dominant off and dominant ON circuit.
- e) Explain the reed switch and proximity sensors with neat sketch.

**Q2. a)** Design a pneumatic circuit to carry out stamping operation by cylinder A, B & C [14]  
 $B^+ / B^- C^+ / C^- A^+ / A^-$  By cascade system

b) Explain the open loop and closed loop system. [06]

**Q3. a)** Design and draw the electro pneumatic circuit  $A^+ B^+ / B^- C^+ / A^- C^-$  [14]

b) Determine the stability of the system for below equations:- [06]

$$1) S^4 + 6S^3 + 26S^2 + 56S + 80 = 0$$

$$2) S^5 + S^4 + 2S^3 + 2S^2 + 3S + 15 = 0$$

**Q4. a)** Sketch the complete root locus of the system having [14]

$$G(s).H(s) = \frac{K}{S(S+1)(S+2)(S+3)}$$

b) Explain the air service unit with neat sketch. [06]

**Q5. a)** For the unity feed back system [14]

$$G(s) = \frac{800(S+2)}{s^2(s+10)(s+40)}$$

Draw the Bode plot. Determine G.M, P.M  $\omega_{gc}$   $\omega_{pc}$  and comment on stability

b) What is transfer function and what are characteristic of transfer function. [06]

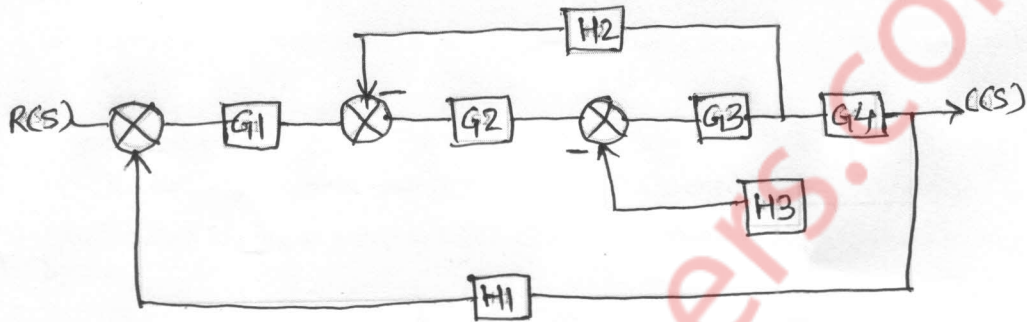
[P.T.O.]

- Q6. a) A) For the inputs a,b,c and output Y, The equation for an OR logic operation is as below, [10]

$$Y = \bar{a} \bar{b} \bar{c} \vee a \bar{b} \bar{c} \vee \bar{a} \bar{b} c \vee a \bar{b} c$$

Using K.Map simplify the equation and draw the circuit Diagram

- b) Reduce the following block diagram and obtain the simplified transfer function. [10]



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