BE/Sem VIII/Prod/CBGS/ACE

Q.P. Code : 800000

Automation & Control Engg. / 02.12.16

(3 Hours) **[Total Marks : 80]**

NB: 1) Question No.1 is compulsory.
2) Answer any 3 questions out of the remaining questions.
3) Assume suitable data if necessary.

1. **Write Short notes on the following :-** **20**
(a) Types of Automation
(b) Digital Hydraulics
(c) Open and Closed loop Control System
(d) Advantages of Bode Plots

2. (a) State the rules used for Block diagram reduction. What are the advantages and disadvantages of block diagram? **10**

(b) Draw a neat and labelled Ladder Diagram to program a PLC to execute the sequence A+, B+, A-, B-, continuously until a stop button is pressed; given that cylinder 'A' is controlled by a double solenoid valve and cylinder 'B' is controlled by a single solenoid valve. Also, show the allocation / assignment list. **10**

3. (a) Using Routh's Criterion, examine the stability of a system with characteristic equation: **06**

$s^5 + 2s^4 + 3s^3 + 6s^2 + 2s + 1 = 0$

(b) Draw the approximate root locus diagram of a unity feedback control system with loop transfer function as given by the following and determine the values of 'K' for marginal stability. **14**

$$G(s) = \frac{K}{s(s+3)(s+1)}$$

4. (a) Design and Draw a Pneumatic control circuit for the following sequence using cascade method. **15**
C- (B+A-) / B- C+ / (A+C-) / dwell C+

(b) Differentiate between microprocessor and microcontroller. **05**

5. (a) Design and Draw an Electro-pneumatic control circuit for the following sequence using double solenoid valves and groups. **14**
(A+ B+ C+) / (B-C-) / delay A-

(b) Determine the departure and arrival angles at complex poles and zeros for. **06**

$$G(s)H(s) = \frac{K(s^2 + 3s + 10)}{s(s+2)(s^2 + 2s + 101)}$$

[TURN OVER]

6. (a) A unity feedback control system has **14**

$$G(s) = \frac{10}{s(s+1)(s+5)}$$

Draw the Bode Plot. Determine G.M. P.M. ω_{gc} and ω_{pc}. Comment on the stability.

(b) For the inputs, a, b, c, d and output Y, the equation for an 'OR' logic operation is as below, **06**

$Y = \bar{a}\,\bar{b}\,\bar{c}\,\bar{d}\ V\ a\,\bar{b}\,\bar{c}\,\bar{d}\ V\ \bar{a}\,\bar{b}\,c\,\bar{d}\ V\ a\,\bar{b}\,c\,\bar{d}$

Using K. Map, simplify this equation and draw the circuit diagram.

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