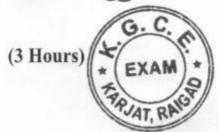
Q.P. Code: 800000

Automation & Control Engg. 102.12.16



[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 :-
 - (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?
 - (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.
- 3. (a) Using Routh's Criterion, examine the stability of a system with characteristic equation: $s^5 + 2s^4 + 3s^3 + 6s^2 + 2s + 1 = 0$
 - (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.

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

- (a) Design and Draw a Pneumatic control circuit for the following sequence using 15 cascade method.
 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 14 sequence using double solenoid valves and groups.

 (A+B+C+) / (B-C-) / delay A-
 - (b) Determine the departure and arrival angles at complex poles and zeros for. $K(s^2 + 3s + 10)$

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

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,

0

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

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