

Total No. of Questions : 5]

SEAT No. :

**P2682**

**[5034]-41**

[Total No. of Pages : 2

**M.Sc. (Electronic Science)**

**EL4UT - 06 : CONTROL SYSTEMS THEORY AND APPLICATION  
(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Use of non-programmable calculator is allowed.*

**Q1) Solve any TWO**

**[2 × 8 = 16]**

- a) Giving a neat diagram explain feedback control system. Discuss each block function in detail.
- b) What is block diagram? How it can be used for the analysis of control system? Explain any four rules of block diagram reduction.
- c) Explain frequency response method of control system analysis.

**Q2) Solve any TWO**

**[2 × 8 = 16]**

- a) What is PLC processor scanning? Explain the program sweep for series go-30 PLC.
- b) What is meant by PID control mode? How it can be implemented using opamp. List the applications of PID control.
- c) Draw the block diagram of PLC architecture and explain each block of PLC. Why isolation is used to input and output blocks?

**Q3) Solve any Four**

**[4 × 4 = 16]**

- a) For  $G(s) = \frac{K}{s(s+4)}$ , test a point  $s = -2 + j5$  for its existence on root locus and find the value of K.
- b) Evaluate the stability of control system having following characteristics equation  
$$s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15 = 0$$

**P.T.O.**

- c) Write a short note on annunciator.
- d) Explain the operation of synchro-servo motor.
- e) What is meant by quarter amplitude criterion? Discuss in short.

**Q4) Solve any Four**

**[4 × 4 = 16]**

- a) Explain the working of ON-OFF controller using LM 35 temperature sensor.
- b) Justify “Traffic signal system is open loop system”.
- c) Explain the terms control lag and dead time in process control application.
- d) State the advantages and disadvantages of Nyquist plot method.
- e) Draw a ladder diagram to realize two input EX-OR Gate.

**Q5) Solve any Four**

**[4 × 4 = 16]**

- a) Compare Continuous Control and discrete state control with suitable example.
- b) Explain the nature of bodeplot for
  - i) Poles at origin
  - ii) Simple Pole and
  - iii) Simple zero
- c) An integral controller is used for speed control with a set point 12 rpm with range of 10 to 15 rpm. Initial controller output is 22%. The constant  $K_I = -0.15\%$  Controller output per second per percentage error. If speed jumps to 13.5 rpm, calculate the controller. Output after  $z$  seconds for constant ep. where  $K_I$  is integral gain and  $e_p$  is error.
- d) Describe OFF\_delay timer instruction of PLC.
- e) Write a short note on solenoid.

