B.TECH DEGREE EXAMINATION

Eighth Semester

Branch: Instrumentation and Control Engineering

INSTRUMENTATION SYSTEM DESIGN IC010 801

Time: 3 Hours Maximum: 100 Marks

Part A
Answer all questions
Each question carries 3 marks

1. Explain the operation of push pull displacement sensor.
2. What is meant by smart transmitter?
3. Write a note on square root extractors.
4. Draw the ISA symbols of (a) Orifice plate (b) Rotameter (c) Nozzle.
5. Explain the concept of multiple earth.

Part B
Answer all questions
Each question carries 5 marks

6. Explain the RTD bridge circuit.
7. Explain the design of instrumentation servo mechanism.
8. Describe the design of Rotameter.
9. Write a note on instrument index sheet.
10. Explain the auto correlation function.

Part C
Answer all questions
Each question carries 12 marks

11. (a) Describe the reference junction compensation of Thermocouple (5)

    (b) Design a reference junction compensation of thermocouple using RTD having hot junction temperature 0-250 ^{o}C and cold junction temperature 0-30 ^{o}C. Voltage corresponding to 30 ^{o}C must be supplied by RTD. Sensitivity of thermocouple is 50μV/^{0}c. Pt-100 RTD with αo=.004. Output voltage range 0-5V. (7)

Or

12. (a) Explain the design of instrumentation amplifier (6)

    (b) Write a note on AC carrier systems (6)

13. (a) Discuss the design of 2 wire and 4 wire transmitters with 4-20 mA output (7)

(b) Describe the design of low level annunciator (5)

Or

14. (a) Explain the design of pneumatic PID controller. (5)

(b) A temperature control system inputs the controlled variable as a range from 0-4V. The output is to be given to a heater requiring 0-8V. A PID controller is to be used with Kp = 2.4% / % Ki=9%(%-min) and Kd=0.7%/(%/min). The period of the fastest expected change is estimated to be 8 seconds. Develop PID circuit with opamps. (7)

15. (a) Explain the design of orifice for a given flow condition (7)

(b)What are the factors affecting the sensitivity of bourden gauges? (5)

Or

16. (a) Explain the design of rotameter (8)

(b) Explain the advantages and disadvantages of bourden gauges (4)

17. Discuss about the instrument specification sheets for flow and pressure (12)

Or

18. Write short notes on :
    a. Analytical instruments and control panels (6)
    b. Process flow sheet (6)

19. Explain the various sources of noise and coupling mechanism (12)

Or

20. Discuss the various methods of reduction of noise (12)