

B.Tech. Sixth Semester (Food, Pulp & Paper, Oil & Paint and Petro Technology) (CGS)

11045 : Instrumentation & Control : 6 CT 03

P. Pages : 2

Time : Three Hours



AU - 2815

Max. Marks : 80

- Notes :
1. All question carry marks as indicated.
 2. Answer **Three** question from Section A and **Three** question from Section B.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.
 5. Diagrams and chemical equations should be given wherever necessary.
 6. Illustrate your answer necessary with the help of neat sketches.
 7. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) What is measuring instrument? Explain the classification of an instruments in detail. 10
b) Explain Hysteresis error in detail. 4

OR

2. Explain the various source of static error in pressure spring thermometer. How will you compensate it? 14
3. Explain the principle construction and working of "Bourdon pressure gauge". How will you measure gauge pressure, absolute pressure and vacuum pressure using Bourdon pressure gauge? What are its advantages and limitations? 13

OR

4. Explain the various components of electronic pH measurement system with neat sketch. 13
5. a) Explain composition analysis of solids by X-ray diffraction. 6
b) Explain the principle, construction and working of gas chromatography with neat sketch. 7

OR

6. a) Give the application of IR absorption and UV absorption spectroscopy. 7
b) Explain polarizing cell with neat sketch. 6

SECTION – B

7. a) Explain the following valves with neat sketch : 8
1) Globe valve. 2) Butterfly valve.
b) Explain the principle and working of electromagnetic flowmeter. 6

OR

8. a) Explain the construction and working of Lobbed-Impeller flowmeter with neat sketch. Also give their advantages and limitations. 10
- b) Explain butterfly valve with neat sketch. 4
9. a) Solve the following equation using Laplace transform. 8
- $$\frac{d^2q}{dt^2} + \frac{dq}{dt} = t^2 + 2t$$
- $$q(0) = 4, q'(0) = -2$$
- b) A thermometer having a time constant of 10 second is placed in a temperature bath. After the thermometer reaches steady state temperature of 30°C it is suddenly placed into a hot fluid at 60°C. Find the response of the thermometer for time $t = 10$ sec, 20 sec and 30 sec. 5

OR

10. A thermometer having first order dynamics is placed in a temperature bath of 30°C and after reaching the thermometer at steady state, the temperature of the bath is varied in sinusoidal manners about its average temperature of 30°C with an amplitude of 10°C. If the period of oscillation is 25 sec/cycle and the time constant of the thermometer is 6 sec. Sketch the response of the thermometer. Determine the maximum and minimum temperature of the thermometer and the phase lag of the system. 13
11. a) Give the limitations of the Ziegler - Nichols method. 3
- b) Give the comparison of various modes of control. 6
- c) Explain negative and positive feedback control system with suitable example. 4

OR

12. The open loop transfer function of a control system given as : 13
- $$G(s) = \frac{K_C(s+1)}{(10s+1)(0.2s+1)}$$
- Sketch the asymptotic Bode diagram of the control system.

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