

P. Pages : 2

Time : Three Hours

**AW - 3259**

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 Chemicals 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) Explain principle construction and working of solid expansion thermometer with neat sketch. 7  
b) What is static error? Explain their types. 7

**OR**

2. a) Explain the working substance of liquid expansion thermometer. 6  
b) Explain the importance or necessity of level measurement. 8
3. a) Explain any one Vacuum gauge with neat sketch. 6  
b) Explain the construction and working of psychrometer with neat sketch. 7

**OR**

4. How will you protect the pressure gauge from high temperature and hazardous process fluid. 13
5. a) Explain the principle construction & working of oxygen analysis cell. 7  
b) Give the application of X-Ray absorption and uv- absorption spectroscopy. 6

**OR**

6. Explain composition analysis of gases by thermal conductivity measurement. 13

**SECTION - B**

7. a) Explain any one variable area flowmeter with neat sketch. 7  
b) Explain the working of pneumatic control valve with neat sketch. 7

**OR**

6. You are designing spherical tank to hold water. The volume of liquid it can hold can be computed as

$$V = \pi \cdot h^2 \frac{[3R - h]}{3}$$

Where  $V$  = Volume ( $m^3$ ),  $R$  = Radius (m)

$h$  = Depth of water in tank (m)

if  $R = 3$  m, to what depth must the tank be filled so that it holds  $30m^3$ ? Use any numerical method. you can employ initial guesses of 0 and  $R$ .

### SECTION - B

7. a) What does mean by approximation of function? How Chebyshev polynomials are applicable for the approximation of function 7

b) Explain the applications of least square analysis in the field of chemical technology with suitable example. 6

OR

8. Fit the following data with power model  $y = ax^6$ , use the resulting power equation to predict  $y$  at  $x = 13$  13

x	2.9	3.4	6	8	12	15
y	1.4	1.5	9	7.9	4.9	4.3

9. a) Explain in detail:  
i) Analytical method of optimization ii) Gradient method of optimization 6

b) Maximize: 7

$$f(x) = \begin{cases} x/2 & \text{for } x \leq 2 \\ -x+3 & \text{for } x > 2 \end{cases}$$

in the interval (0,3) by Fibonacci search using  $N = 6$ .

OR

10. a) Give the detailed classification of optimization models. 4

b) Explain the Fibonacci search for n total number of experiments and Uncertainty defined by :  $a \leq x \leq b$  7

c) Explain single variable function. 2

11. a) Explain in detail capacity optimization. 7

b) Explain computer programming in modular form. 7

OR

12. a) Explain block diagrams of preliminary aids in programming. 7

b) Explain subroutine libraries in computer programming and applications. 7

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