

Exercise for Module - 5

Answer the following

1. Write down the relation among the pressure units Pascal, Torr, micron and Standard atmosphere.
2. What are the important and desirable properties of the manometric fluids?
3. How can the sensitivity of the liquid column manometer be improved?
4. With the help of sketches explain the working of a mercury barometer.
5. For the given material, what decides the sensitivity of the Bourdon gauge?
6. What are the common materials used for Bourdon gauge?
7. Write down the expression relating the central deflection of the elastic diaphragm and the applied pressure.
8. How are the natural frequency and the sensitivity of the elastic diaphragm type pressure gauge related?
9. Why are corrugated diaphragms used in pressure gauges?
10. Explain a diaphragm pressure transducer working on capacitance principle.
11. Sketch and explain an electric resistance gauge for high pressure measurement.
12. Name a couple of artificial piezo electric crystals. What range of frequencies of dynamic pressures they can be employed?
13. Explain a McLeod gauge. Mention its drawbacks.
14. Differentiate between Pirani and thermocouple gauges.
15. Explain a cold cathode ionization gauge.
16. Why are the wall static pressure holes very small?
17. Graphically show the variation of measurement error with increasing value of wall static orifice.
18. What is understood by 'stem effect' and 'nose effect' in Prandtl tubes.
19. Sketch a probe marking the position of orifices for static pressure measurements in supersonic flows.

20. Pitot tubes are used both in subsonic and supersonic flows. Is the measurement principle different in the two cases?

Work out the following numerical problems

1. In the measurement of low pressure using a McLeod gauge [whose volume above cut off is 200cc and capillary diameter 0.6mm], the level difference between the two limbs is seen as 6mm. Find the pressure measured.
2. An experimental rocket powered aircraft is flying at a velocity of 1035m/s at an altitude corresponding to $0.720 \times 10^5 \text{ N/m}^2$ and 216.6K. A pitot tube is mounted in the nose of the aircraft. What is the pressure measured by the Pitot tube? What is the pressure measured if the aircraft is assumed to fly at 200m/s at the same altitude.