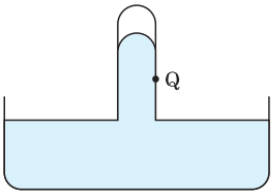
Exam: Class Test	Physics	Max.Marks:35
Solid, Fluid & Thermal		
Date: 20th Jan 2023	Class XI	Time: 1.5H

1. Why are bridges declared unsafe after a long use? **[1]**

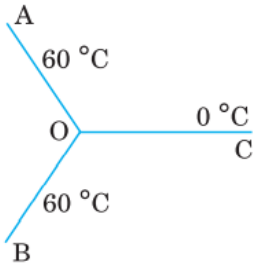
2. Consider a barometer tube filled with mercury as shown in the adjoining figure. If a hole is made at a point Q as shown in the figure, will mercury come out from this hole? Give reasons in support of your answer. **[1]**



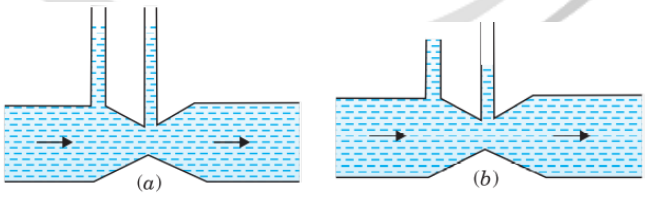
3. Steam at 100 °C is passed into 20 g of water at 10 °C. When water acquires a temperature of 80 °C, the mass of water present will be what. **[2]**

[Take specific heat of water = 1 cal g^{-1} $°C^{-1}$ and latent heat of steam = 540 cal g^{-1}]

4. Three identical rods A, B and C of same length are joined as shown in the figure. The left and right ends are at temperatures 60 °C and 0 °C, respectively. Calculate the temperature of junction point O. **[2]**



5. Figures (a) and (b) refer to the steady flow of a (non-viscous) liquid, which of the two figures is incorrect? Why? **[2]**



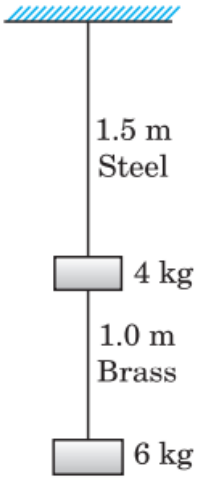
6. The temperature of a rod is increased by ΔT and as a result, temperature and moment of inertia of the rod are T and I, respectively and coefficient of linear expansion of the rod is α, then $\frac{\Delta I}{I}$ will be.? **[2]**

7. The pressure of a medium is changed from 1.01 X 10^5 pa to 1.165 X 10^5 pa and changed in volume is 10% keeping temperature constant. Find the bulk modulus of the medium. **[2]**

8. The breaking stress for a metal of density 8×10^3 kg/m^3 is 8×10^9 N/m^2 . What maximum length of a wire made of this metal can be suspended without breaking? Take g = 10 N/kg **[2]**

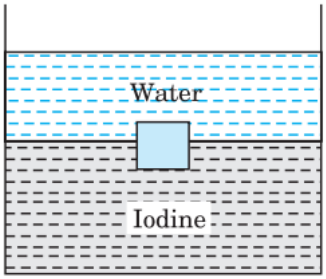
9. What pressure is required to stop the increase in volume of steel block when it is heated from 30°C to 60°C. Coefficient of linear expansion of steel is 1.1×10^{-5} °C^{-1} and bulk modulus of elasticity is 1.6×10^{11} N/m^2 . **[3]**

10. Two wires of diameter 0.25 cm, one made of steel and the other made of brass, are loaded as shown in the figure. The unloaded length of steel wire is 1.5 m and that of brass wire is 1.0 m. Compute the elongations of the steel and the brass wires. (Given $Y_{steel} = 2 \times 10^{11} \frac{N}{m^2}$, $Y_{Brass} = 0.9 \times 10^{11} \frac{N}{m^2}$.) **[3]**



11. A capillary tube of length 25 cm and diameter 0.1 cm is fitted horizontally to a vessel full of a liquid of coefficient of viscosity 0.012 cgs unit. The depth of the capillary tube below the surface of liquid is 15 cm. If the density of liquid is 0.8 g/cm^3, calculate the amount of the liquid that will flow out in 7 minutes. Take g = 980 cm/s^2. **[3]**

12. A tank contains iodine and water as shown in the adjoining figure. An Aluminum cube of side 5 cm is in equilibrium as shown. Calculate the fraction of volume of cube inside the iodine? Take. Relative density of iodine = 4.927 Relative density of Aluminum = 2.7 **[3]**



13. Calculate the elastic potential energy stored in a steel wire when it is stretched through 3 mm. The length of wire is 3m and cross-sectional area is 5 mm^2 and Young's modulus for steel is 2×10^{11} N/m^2. **[3]**

14. Derive the expression for Adiabatic process.

A balloon pumped to a pressure of 2.275 atmosphere and at 25 °C suddenly bursts. What will be the temperature of escaping air? Given, γ = 1.5 **[3]**

15. At a depth of 1000 m in an ocean (a) What is the absolute pressure? (b) What is the gauge pressure? (c) Find the force acting on the window of area 20 cm × 20 cm of a submarine at this depth, the interior of which is maintained at sea-level atmospheric pressure.

(The density of sea water is 1.03×10^3 kg/m^3 , g = 10 m/s^2 . **[3]**