

Model Question Paper 1
Mechanics of Solids and Fluids 1

11th Standard

Physics

Reg.No. :

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Answer all the Questions

Time : 00:40:00 Hrs

Total Marks : 40

5 x 1 = 5

Part A

- 1) If the length of the wire and mass suspended are double in a young's modulus experiment then young's modulus of the wire
(a) remains unchanged (b) becomes double (c) becomes four times (d) becomes sixteen times
- 2) For a perfect rigid body, young's modulus is.....
(a) zero (b) infinity (c) 1 (d) -1
- 3) Two wires of the same radii and material have their lengths in the ratio 1:2. If these are stretched by the same force, the strains produced in the two wires will be in the ratio.....
(a) 1:4 (b) 1:2 (c) 2:1 (d) 1:1
- 4) If the temperature of a liquid is raised then its surface tension is.....
(a) decreased (b) increased (c) does not change (d) equal to viscosity
- 5) The excess of pressure inside two soap bubbles of diameters in the ratio 2:1 is.....
(a) 1:4 (b) 2:1 (c) 1:2 (d) 4:1

Part B

5 x 2 = 10

- 6) State Hooke's law.
- 7) Explain the three moduli of elasticity.
- 8) Which is more elastic, rubber or steel? Support your answer.
- 9) State and prove Pascal's law without considering the effect of gravity.
- 10) Taking gravity into account, explain Pascal's law.

Part C

5 x 3 = 15

- 11) A wire of diameter 2.5 mm is stretched by a force of 980 N. If the young's modulus of the wire is $12.5 \times 10^{10} \text{ N m}^{-2}$, find the percentage increase in the length of the wire.
- 12) Two wires are made of same material. The length of the first wire is half of the second wire and its diameter is double that of the second wire. If equal loads are applied on both the wires, find the ratio of increase in their lengths.
- 13) The diameter of a brass rod is 4 mm. Calculate the stress and strain when it is stretched by 0.25% of its length. Find the force exerted. Given $q = 9.2 \times 10^{10} \text{ Nm}^{-2}$ for brass.
- 14) Calculate the volume change of a solid copper cube, 40 mm on each side, when subjected to a pressure of $2 \times 10^7 \text{ Pa}$. Bulk modulus of copper is $1.25 \times 10^{11} \text{ N m}^{-2}$.
- 15) In a hydraulic lift, the piston P_2 has a diameter of 50 cm and that of P_1 is 10 cm. What is the force on P_2 when 1 N of force is applied P_1 ?

Part D

2 x 5 = 10

- 16) Calculate the viscous force on a ball of radius 1 mm moving through a liquid of viscosity 0.2 N sm^{-2} at a speed of 0.07 m s^{-1} .
- 17) A U-shaped wire is dipped in soap solutions. The thin soap film formed between the wire and a slider supports a weight $1.5 \times 10^{-2} \text{ N}$. If the length of the slider is 30 cm, calculate the surface tension of the film.
