

Model Question Paper 3
Mechanics of Solids and Fluids 3

11th Standard

Physics

Reg.No. :

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Answer all the Questions

Time : 00:45:00 Hrs

Total Marks : 45

5 x 1 = 5

Part A

- 1) The unit of coefficient of viscosity(η) is_____
 (a) Ns (b) Nsm (c) Nsm^{-1} (d) Nsm^{-2}
- 2) Hydraulic lift and hydraulic brake works on the principle of _____
 (a) Hooke's law (b) Law of floatation (c) Pascal's law (d) Stoke's law
- 3) The unit of surface tension is _____
 (a) N (b) Nm (c) Nm^{-1} (d) Nm^{-2}
- 4) According to Stoke's law, _____
 (a) $F = 6\pi a\eta v$ (b) $F = ma$ (c) $F = \eta A \frac{dv}{dx}$ (d) $F = \frac{mv^2}{r}$
- 5) Kinetic energy per unit mass is _____
 (a) $\frac{1}{2}v^2$ (b) $\frac{1}{2}mv$ (c) $\frac{1}{2}\frac{v^2}{m}$ (d) $\frac{1}{2}mv^2$

Part B

10 x 3 = 30

- 6) For cylindrical pipes, Reynold's number is nearly 2000. If the diameter of a pipe is 2 cm and water flows through it, determine the velocity of the flow. Take η for water = $10^{-3} N s m^{-2}$.
- 7) Explain surface tension on the basis of molecular theory.
- 8) Establish the relation between surface tension and surface energy.
- 9) How do insects run on the surface of water?
- 10) In a poiseuille's flow experiment, the following are noted.
 (i) Volume of liquid discharged per minute = $15 \times 10^{-6} m^3$
 (ii) Head of liquid = 0.30 m,
 (iii) Length of tube = 0.25 m
 (iv) Diameter = $2 \times 10^{-3} m$, (v) Density of liquid = $2300 kg m^{-3}$.
- 11) Determine the coefficient of viscosity of water by poiseuille's flow method.
- 12) Describe the construction and working of hydraulic lift.
- 13) Describe an experiment to determine the surface tension of liquid by capillary rise method.
- 14) Obtain the equation of continuity.
- 15) State the applications of Bernoulli's theorem.

Part C

2 x 5 = 10

- 16) Determine the height to which water will rise in a capillary tube of $0.5 \times 10^{-3} m$ diameter. Given for water, surface tension is $0.074 N m^{-1}$.
- 17) A capillary tube of inner diameter 4 mm stands vertically in a bowl of mercury. The density of mercury is $13500 kg m^{-3}$ and its surface tension is $0.544 N m^{-1}$. If the level of mercury in the tube is 2.33 mm below the level outside find the angle of contact of mercury with glass.
