Model Question Paper 2

Mechanics of Solids and Fluids 2

11th Standard

Physics

Reg.No. : | | | | | | |

Answer all the Questions

Time : 00:50:00 Hrs

Total Marks : 50

Part A

5 x 1 = 5

1) According to Newton's law of viscous flow in fluids,_____

(a) $F = \eta A \frac{dv}{dx}$ (b) $F = \frac{\eta \frac{dv}{dx}}{A}$ (c) $F = \frac{\frac{\eta A}{dv}}{dx}$ (d) $F = \frac{A\frac{dv}{dx}}{\eta}$

2) Reynold's number is given by the formula_____

(a) $N_R = \frac{\eta \rho D}{V_c}$ (b) $N_R = \frac{\eta V_c D}{\rho}$ (c) $N_R = \frac{V_c \rho D}{\eta}$ (d) $N_R : V_c \rho D$

3) When liquid flows through a horizontal tube, Bernoulli's equation takes the form _____.

(a) $\frac{1}{2}v^2 + \frac{p}{\rho}$=constant (b) $\frac{p}{\rho} + gh$=constant (c) $gh + \frac{1}{2}mv^2$=constant (d) $p + gh + \frac{1}{2}v^2$=constant

4) The angle of contact of pure water with glass rod is _____

(a) 0° (b) 18° (c) 35° (d) 138°

5) The angle of contact of mercury with glass is _____

(a) 0° (b) 8° (c) 18° (d) 138°

Part B

5 x 2 = 10

6) Derive an expression for terminal velocity of a small sphere through a viscous liquid.

7) Define Cohesive force and adhesive force.Give examples.

8) Define (i) molecular range, (ii) sphere of influence and (iii) surface tension.

9) A person standing near a speeding train has a danger of falling the train.Why?

10) Why a small bubble rises slowly through whereas the bigger bubble rises rapidly?

Part C

5 x 3 = 15

11) 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 h for water=10^{-3} N s m^{-2} .

12) Explain surface tension on the basis of molecular theory.

13) Establish the relation between surface tension and surface energy.

14) How do insects run on the surface of water?

15) In a poiseulle's flow experiment, the following are noted.

(i)Volume of liquid discharged per minute=15X10^{-6} m^3

(ii)Head of liquid=0.30 m,

(iii)Length of tube=0.25 m

(iv)Diameter=2X10^{-3} m,(v)Density of liquid = 2300 kg m^{-3}.

Part D

4 x 5 = 20

16) A capillary tube of inner radius 5X10^{-4} m is dipped in water of surface tension 0.075 N m^{-1}.To what height is the water raised by the capillary action above the water level outside.Calculate the weight of water column in the tube.

17) What amount of energy will be liberated if 1000 droplets of water; each of diameter 10^{-8} m, coalesce to form a big drop. Surface tension of water is 0.075 N m^{-1} .

18) Water flows through a horizontal pipe of varying cross-section. If the pressure of water equals 2x10^{-2} m of mercury where the velocity of flow is 32x10^{-2} m s^{-1} find the pressure at another point, where the velocity of flow is 40x10^{-2} m s^{-1} .

19) Obtain an expression for surface tension of a liquid, $T = \frac{hr\rho g}{2}$ by capillary rise method.

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