

**K. V. Dhana, Jabalpur Region**  
**SECOND PERIODIC TEST-2023-24**  
**CLASS- XI ( PHYSICS)**

Time : 90 MIN

Max Mark :40

**INSTRUCTIONS:- All questions are compulsory.**

**SECTION-A**

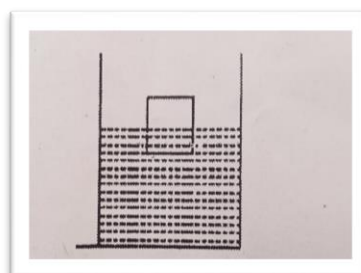
- Q1 The strain perpendicular to the applied force is called. **1**  
(1) Longitudinal strain (2) Volume strain (3) Lateral strain (4) Shear strain
- Q2 The ratio of inertial force to the viscous force represents. 1  
(1) Magnus effect (2) Reynold's number (3) Relative density (4) Torricelli's
- Q3 The ratio of stress and strain , within in proportional limit is called. 1  
(1) Modulus of elasticity (2) Compressibility (3) Poisson's ratio (4) Both (2) & (3)
- Q4 Which of the following statements is incorrect. 1  
(1) Blood is more viscous than water  
(2) The blood pressure in humans is greater at the feet than at the brain  
(3) The angle of contact of mercury with glass is obtuse while that of water with glass is acute  
(4) A spinning cricket ball in air follows a parabolic trajectory
- Q5 The Onset of turbulence in a liquid is determined by. 1  
(1) Pascal's law (2) Stoke's law (3) Reynold's number (4) Avogadro number
- Q6 Which of the following materials is/are close to ideal plastics. 1  
(1) Putty (2) Mud (3) Steel (4) both 1 and 2

**SECTION-B**

- Q7 Solids and liquids both expand on heating. The density of substance decreases on expanding according to the relation 4

$$\rho_2 = \frac{\rho_1}{1 + \gamma (T_2 - T_1)}$$

$\alpha_s$  = Coeff. of linear expansion of solid



Where  $\rho_1$  = density at  $T_1$  ;  $\rho_2$  = density at  $T_2$

$\gamma$  = Coeff. of volume of expansion substances

$\gamma_L$  = coeff. of volume expansion of solid

$\rho_s$  = density of solid at temp. T

$\rho_L$  = density of liquid at temp. T

When a solid is submerged in a liquid, liquid exerts an upward force on solid which is equal to the weight of liquid displaced by submerged part of solid. Solid will float or sink depending on relative densities of solid and liquid.

A cubical block of solid floats in a liquid with half of its volume submerged in the liquid as shown in figure (at temperature T)

1. The relation between density of solid and liquid at temperature T is

- (A)  $\rho_s = 2\rho_L$       (B)  $\rho_s = (1/2)\rho_L$       (C)  $\rho_s = \rho_L$       (D)  $\rho_s = (1/4)\rho_L$

2. If the temperature of system increases, then fraction of solid submerged in liquid

- (A) increases      (B) decreases      (C) remain the same      (D) inadequate information

3. imagine fraction submerged does not change on increasing temperature

- (A)  $\gamma_L = 3\alpha_s$       (B)  $\gamma_L = 2\alpha_s$       (C)  $\gamma_L = 4\alpha_s$       (D)  $\gamma_L = (3/2)\alpha_s$

4. imagine the depth of the block submerged in the liquid does not change on increasing temperature then

- (A)  $\gamma_L = 3\alpha_s$       (B)  $\gamma_L = 2\alpha_s$       (C)  $\gamma_L = 4\alpha_s$       (D)  $\gamma_L = (3/2)\alpha_s$

### SECTION-C

Q8 A boat carrying a number of large stones is floating in a water tank. What will happen to the level of water if the stones are unloaded into the water. 2

Q9 Water at a pressure of  $4 \times 10^4 \text{ Nm}^{-2}$  flows at  $2\text{ms}^{-1}$  through a pipe of  $0.02\text{m}^2$  sectional area which reduces to  $0.01\text{m}^2$ . What is the pressure in the smaller cross section of the pipe 2

Q10 A wire stretches by a certain amount under a load. If the load and radius both are increased to four times. The stretch caused in the wire. 2

OR

27 identical drops of water are falling down vertically in air each with a terminal velocity of  $0.15 \text{ m/s}$ . If they combine to form a single bigger drop, what will be its terminal velocity

Q11 What is surface tension and surface energy? Derive the relation between surface tension and surface energy. 3

Q12 What is Stoke's law? Derive the relation by the method of dimension. 3

OR

Explain 1). elastic body      2). plastic body

Q13 Steel is more elastic than rubber. explain 3

### SECTION-D

Q14 What is Bernoulli's theorem? Show that sum of pressure, potential and kinetic energy in the streamline flow is constant. 5

Q15 State and explain Hooke's law. A wire is fixed at one end and is subjected to increasing load at the other end. Draw a curve between stress and strain. With the help of the curve, explain the term elastic limit, yield point, breaking point and permanent set. How this curve may be used to distinguish between ductile and brittle substances. 5

Q16. Define terminal velocity. Show that the terminal velocity  $v$  of a sphere of radius  $r$ , density  $s$  falling vertically through a viscous fluid of density  $\sigma$  and coefficient of viscosity  $\eta$  is given by 5

$$V = \frac{(s - \sigma) r^2}{\eta}$$