

**Avisnashilingam Institute for Home Science and Higher Education for Women  
(Deemed to be University) Coimbatore – 641 043  
Bachelors Degree Examination - November 2018  
SEMESTER-I**

**Class: I B.SC.  
Major : Physics**

**MAX.MARKS: 100  
Time : 3 Hours**

**18BPHC01 PROPERTIES OF MATTER**

**Part-A**

**(10 x 1 = 10 MARKS)**

**Choose the correct answer**

1. The restoring force per unit area referred as
  - a. elasticity
  - b. Stress
  - c. Strain
  - d. modulus of elasticity
2. In a torsional oscillation, if the  $\theta$  and  $c$  are being angle of twist and torque per unit angular twist, the potential energy stored in the wire due to twist is
  - a.  $cg\theta$
  - b.  $mg\theta$
  - c.  $\frac{1}{2} c \theta^2$
  - d.  $\frac{1}{2} I (d\theta/dt)^2$
3. The Unit of viscosity is
  - a. pascal
  - b.  $Nm^{-2}$
  - c. pascal / second
  - d. pascal second
4. According to the Bernoulli's theorem, the expression  $p/\rho g + v^2/2g + h = \text{constant}$ , here  $h$  is
  - a. height of incompressible liquid
  - b. pressure head
  - c. gravitational head
  - d. velocity head
5. Dimension of surface tension is
  - a.  $MLT^{-2}/L$
  - b.  $MLT^{-2}$
  - c.  $M^{-1}LT$
  - d.  $MLT^{-2}/T$
6. The amount of work done in increasing the surface area of liquid film by unity is referred as
  - a. Surface energy
  - b. cohesive energy
  - c. Surface tension
  - d. potential energy
7. The Boy's experiment, to determine
  - a. acceleration due to gravity
  - b. gravitational constant
  - c. force due to earth
  - d. gravitational potential
8. Statement 1: Gravitational Potential on the surface of spherical shell =  $-GM/a$   
Statement 2: Gravitational Potential inside the spherical shell =  $-GM/a$ 
  - a. Statement 1 is true, Statement 2 is false
  - b. Statement 1 is false, Statement 2 is true
  - c. both are true
  - d. both are false
9. Berkeley and Hartley method is utilized to determine
  - a. vapour pressure
  - b. osmotic pressure
  - c. coefficient of diffusion
  - d. surface energy
10. At constant temperature the osmotic pressure of a dilute solution is directly proportional to \_\_\_\_\_ of the solution
  - a. vapour pressure
  - b. coefficient of diffusion
  - c. volume
  - d. concentration

**Part-B**

**(5X6=30 MARKS)**

**Answer ALL questions**

**Each answer should not exceed 400 words or two pages**

- 11 a. Derive an expression for bending moment.  
(or)
- 11 b. Find the amount of work done in twisting a steel wire of radius  $10^{-3}$ m and length 0.2 m through an angle  $4^\circ$ . Given for steel (Rigidity: modulus) =  $8 \times 10^{10}$  Nm<sup>-2</sup>.
- 12 a. With definition, deduce the expression for critical velocity and write about the significance of Reynold's number.  
(or)
- 12 b. State and explain Bernoulli's theorem.
- 13 a. Discuss about the variation of surface tension with temperature.  
(or)
- 13.b. The pressure of air in a soap bubble of  $7 \times 10^{-3}$  m diameter is  $8 \times 10^{-3}$  m of water above the atmospheric pressure. Calculate Surface Tension of the soap solution.
- 14 a. Deduce the Newton's law of gravitation from Kepler's law.  
(or)
14. b. Obtain the expression for the time period of oscillation of a compound pendulum.
15. a. what is known as Osmotic Pressure? Describe with an experiment using funnel and sugar solution.  
(or)
15. b. State and explain the laws of diffusion.

**Part-C**

**(5X12=60 MARKS)**

**Answer ALL questions**

**Each answer should not exceed 800 words or four pages**

- 16 a. Describe, with necessary theory, how the rigidity modulus of the material of a rod is determined by static torsion method.  
(or)
- 16 b. Define different moduli of Elasticity and establish the relation between them.
- 17 a. Write Poiseuille's formula. describe about experimental method for determining the coefficient of viscosity of a liquid at room temperature.  
(or)
- 17 b. Apply the Bernoulli's theorem to discuss the following  
i) Torricelli's theorem  
ii) Venturimeter
- 18 a. Prove that the excess pressure on one side of a soap film of surface tension  $\sigma$  over that on the other side is given by  $p= 2\sigma (1/R_1 + 1/R_2)$ .  
(or)
- 18 b. With theory and experimental diagrams, explain the drop-weight method of determining the surface tension of a liquid.
- 19 a. Define "gravitational constant G" and describe the method of determination of G by Boy's method, list some of their advantages.  
(or)
- 19 b. Explain how g varies with altitude, latitude and depth. Obtain a general relation for the variation of g in each case.
- 20 a. Describe a method of determining osmotic pressure with appropriate diagram.  
(or)
- b. Write the laws of Osmotic pressure. Establish a theory which is relating the osmosis and vapour pressure of a solution.

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