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SUBJECT CODE NO:- CB-2333
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. F.Y. (Sem-I)
Examination December/January-2022-23
Physics Paper-I   PHY-011
Mechanics & Properties of Matter

[Time: 1:30 Hours]   [Max. Marks: 40]

"Please check whether you have got the right question paper."
N.B.   1. All questions are compulsory.
                               2. Use of logarithm is allowed.

Q.1   Derive an expression of gravitational potential at a point outside to spherical shell?   **10**

OR

a. State Young's Modulus, Bulk Modulus, Modulus of Rigidity, Hook's Law and Bending   **05**
    moment?
b. A uniform circular cross section of iron bar having geometrical moment of inertia   **05**
    0.7855, is rigidly fixed at one end, the other end is at distance of 100 cm is loaded by
    4 Kg produces depression of 1.6 cm. Calculate the Young's Modulus of iron bar?

Q.2   Explain applications of Bernoulli's theorem as (I) Law of hydrostatic pressure (II) Filter Pump.   **10**

OR

a. Define Surface Tension and Write various factors affecting on it?   **05**
b. Calculate the excess pressure inside a soap bubble of radius 3×10^{-3} m, if surface tension   **05**
    of soap solution is 30×10^{-3} Nm^{-1}. Also calculate surface energy?

Q.3   Solve any two of the following.   **10**

a. A Solid Sphere has mass 5 Kg, Calculate magnitude of the gravitational potential at a
    distance 50 cm away from center? ($G = 6.67 \times 10^{-11}$ Nm^2 / Kg^2)
b. Derive an expression for the depression of beam supported at two ends and loaded in the
    middle?
c. Calculate the potential energy per unit volume of liquid having density 1000 Kg/m^3
    flowing from height 50 meter?
d. Write a short note on angle of contact for a liquid in contact with solid.

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Q.4　　　Multiple Choice Questions.　　　**10**

1. Which of the following shape of the body can be considered as Compound Pendulum?
   a) Cuboidal
   b) Cubical
   c) Cylindrical
   d) All of above

2. The formula $V = -GM/r^2$ is used to define the physical quantity at a point in the field region.
   a) Gravitational field intensity
   b) Gravitational potential
   c) Gravitational potential energy
   d) Gravitational force

3. A rectangular brass rod having breadth b = 2 cm and depth d = 1 cm then calculate moment of inertia of brass rod
   a) 3.166 cm^4
   b) 2.166 cm^4
   c) 1.166 cm^4
   d) 0.166 cm^4

4. What is the unit of Young's Modulus?
   a) N/m
   b) N^2/m^2
   c) N
   d) N/m^2

5. The twisting couple acting on a solid cylinder of length X having inner circumference of radius r is
   a) $\frac{\pi\theta\eta y^4}{4X}$
   b) $\frac{\pi\theta\eta y}{4X}$
   c) $\frac{\pi\theta\eta r^4}{2X}$
   d) None of these

6. Volume of liquid that flows per unit time through any cross section is called
   a) Viscosity
   b) Surface Tension
   c) Young's Modulus
   d) None of these

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7. Bernoulli's principle states that, for streamline motion of an incompressible non – viscous fluid
   a) Pressure + kinetic energy = Constant
   b) Pressure + potential energy = Constant
   c) Pressure + kinetic energy + potential energy = Constant
   d) None of these

8. Which of the following parameter of liquid does not effect it's Reynold's number?
   a) Mean fluid velocity
   b) Density of fluid
   c) Temperature of fluid
   d) None of these

9. The rise of liquid in a Capillary tube and Working of ball point pen shows the principle of
   a) Viscosity
   b) Boyle's Law
   c) Gravitational force
   d) Surface Tension

10. The Surface Tension of a liquid is due to
   a) Cohesive force between molecules
   b) Adhesive force between molecules
   c) Nuclear force between molecules
   d) None of these