Class – XI   **Subject – Physics**
Time – 1 hour & 30 minutes   **Maximum Marks – 50**
Important instructions:
(a) All questions are compulsory
 (b) Use of calculator is not allowed

Q1 (a) A ballet dancer stretches her hand out for slowing down. Name the law of conservation owed
    and Write its Statement.   [2]
(b) Which fundamental law forms the basis of equation of continuity? Derive an expression for the
    equation of continuity   [3]

Q2 (a) Establish the relation between angular momentum and torque acting on a rigid body.   [2]
   (b) At what height above the earth surface the value of g is same as in as in a mine 80 km deep? [3]

Q3 (a) Define Escape velocity. Derive an expression for it.   [2]
   (b) Derive an expression for the terminal velocity of sphere falling through a viscous liquid.   [3]

Q4 (a) Define surface tension. Write its unit.   [2]
   (b)State and prove Bernoulli's theorem. Write its two limitations.   [3]

Q5 (a) Derive the expression for excess pressure inside a liquid bubble.   [2]
    (b) Draw and explain Stress-Strain curve for a wire   [3]

Q6 (a) A solid sphere of radius 10 cm is subjected to a uniform pressure equal to 5×10^8 Nm^{-2}
Calculate the change in volume. [Given: Bulk modulus of the material of the sphere is 3.14×10^{11}Nm^{-2}]   [2]
 (b) If an artificial satellite is moving in a circular orbit around the earth with a speed equal to half the
 magnitude of escape velocity from the earth, then determine the height of the satellite above the
 earth's surface.   [3]

Q7 (a) Define rotational kinetic energy and derive its formula. [2]

    (b) Write the moment of inertia of following: (i) for a disc about its diameter (ii) for solid sphere
       about tangent (iii) for uniform rod about its axis passing through centre of rod.   [3]

Q8 (a) Write the principal of satellite and derive the formula of orbital velocity of satellite.   [2]
    (b) Define elastic potential energy and derive its expression   [3]

Q9 (a) What do mean by capillarity? Explain its cause.   [2]

    (b) Define acceleration due to gravity . Explain effect of height on acceleration due to gravity[3]

Q10 (a)Explain Principle of moments .   [2]

    (b) Define center of mass and derive its expression for a system of two particles.   [3]

_____The End_____