Prabhat Academy Ashtbhuja Nagar, Pratapgarh
Half-Yearly Examination (2019-20)
Class : 11th
Sub. : Physics

Time: 2.30   **M.M. : 100**

Question 1

(A)   Answer the following questions briefly and to the point: [5]

    (i)   A bullet fired vertically upward falls at the same place after some time. What is the displacement of the bullet?

    (ii)   A constant retarding force of 100N is applied to a body of mass 10kg moving initially with a speed of 30ms-1. What is the retardation of the body?

Question 2   [5]

    (a) Round off 3.7846 up to 3 significant figures.

    (b) What is meant by **absolute** error?

Question 3   [6]

State any two limitations of dimensional analysis.

Question 4   [6]

Write an expression for magnitude of the **resultant vector** 'R' of two vectors $\vec{A}$ and $\vec{B}$ acting at a point. When will this resultant vector 'R' be **maximum**?

Question 5   [6]

    (a)   A box of 50kg is lifted by a man of mass 60kg to a height of 50m. Calculate the work done by the man

    (b) How much mass of water can be lifted by a pump motor of 9.8KW in one minute to a height of 5m?

Question 6   [8]

A shot fired from cannon explodes in air. What will be the changes in the momentum and the kinetic energy?

Question 7   [8]

Two bodies of masses 0.5kg and 1kg are lying in the X-Y plane at points (-1, 2) and (3, 4) respectively. Locate the centre of mass of the system.

Question 8   [8]

    (a) Calculate the acceleration '**a**' of the system and the tensions T_1 and T_2 in the strings as shown in figure 1. (Assume that the table and the pulleys are frictionless and the string is massless and inextensible).
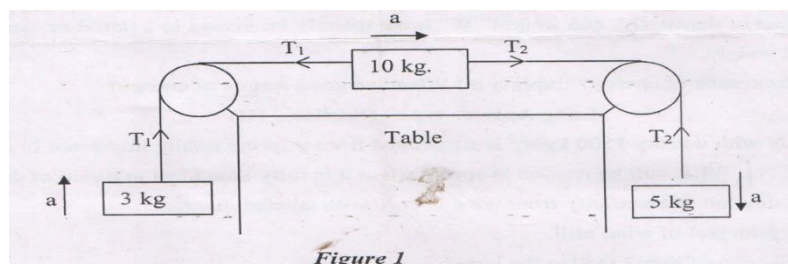

Figure 1

Question 9 [8]

    (b) A body of mass 50kg is hung by a spring balance in a lift. Calculate the reading of the balance when:

    (i) The lift is ascending with an acceleration of $2m/s^2$.

    (ii) The lift is descending with a constant velocity of 2m/s.

    (iii) The lift is descending with an acceleration of $2m/s^2$.

Question 10 [8]

    Derive an equation for displacement of a projectile fired at an angle θ from the ground.

Question 11 [8]

    When a cyclist negotiates a circular path of radius 'r' with velocity 'v', making an angle θ with the horizontal, show that $\tan θ = \dfrac{V^2}{rg}$

Question 12 [8]

    A fly wheel is rotating at a speed of 160 r.p.m. whose weight is 20 Kg and its centre of mass is at a distance of 0.01m from the axis of rotation. Calculate:

    (i) moment of inertia of the fly wheel.

    (ii) the energy stored in the fly wheel.

Question 13 [8]

    (a) (i) - If $A = -\hat{i} + 3\hat{j} + 2\hat{k}$ and $B = 3\hat{i} + 2\hat{j} + 2\hat{k}$ then find the value of $\vec{A} \times \vec{B}$.

    (ii) Using the second law of motion show that impulse is equal to the change in momentum.

Question 14 [8]

    (a) (i) Calculate the work done when $F = (-5\hat{i} + 3\hat{j} + 2\hat{k})N$ and $S = (3\hat{i} - \hat{j} + 2k)$ m

    (ii) Show with the help of a vector diagram that the work done is a scalar product of force and displacement.