HALF YEARLY EXAMINATION, 2017-18
PHYSICS

Time : 3 hrs.   **Class - XI**   **M.M. : 70**

Date – 19.09.2017 (Tuesday)

Name of the student _____ Section _____

General Instructions :

- All questions are compulsory.
- There are 26 questions in total. Q. Nos. **1 to 5** carry **1 mark** each, Q. nos. **6 to 10** carry **2 marks** each, Q. Nos. **11 to 22** carry **3 marks** each, Q. No. **23** is a value based question carrying **4 marks,** Q. Nos. **24 to 26** carry **5 marks** each.

Q.1 1 Parsec is how much light year.

Q.2 Write the dimension of Moment of force, Angular acceleration.

Q.3 Two bodies are thrown with the same initial velocity at angle α and $(90^0 - \alpha)$ with the horizontal. What will be the ratio of the maximum heights attained by them?

Q.4 At what point of the projectile path speed is minimum? At what point maximum?

Q.5 A soda water bottle is freely falling. Will the bubbles of the gas rise in the water of the bottle? Explain.

Q.6 Check the correctness of the equation dimensionally $t = 2\pi \sqrt{\dfrac{l}{g}}$. Where t is the time period, 'l' is effective length and 'g' is acceleration due to gravity.

Q.7 Find the value of λ so that the vectors $\vec{A} = 2\hat{i} + \lambda\hat{j} + \hat{k} \ and \ \vec{B} = 4\hat{i} - 2\hat{j} - 2\hat{k}$ are perpendicular to each other.

Q.8 A boy playing on the roof of a 10 m high building throws a ball with a speed of 10 m / sec. at an angle of 30^0 with horizontal. How far from the throwing point will the ball be at the height of 10m from the ground. Given $g = 10m/sec^2$

Q.9 A light string passes over a smooth pulley connects two blocks of masses m_1 and m_2 vertically. If the acceleration of the system is g/8 , find the ratio of the two masses.

Q.10 A bird is sitting on the floor of a closed glass cage and the cage is in the hand of the girl . Will the girl experience any change in the weight of the cage when the bird flies upward with an acceleration? Explain your answer.

Q.11 A body moving with velocity 'u' covers a distance 'S' in time 't'. It possesses acceleration 'a', derive the relation among the given physical quantities using calculus method.

Q.12 In successive measurements , the reading of the period of oscillation of a simple pendulum were found to be 2.80S, 2.56S, 2.63S, 2.42S and 2.71S in an experiment.

Calculate:

i) Mean period of oscillation.   ii) Absolute errors in different measurements

iii) Mean absolute error   iv) relative error

v) percentage error

Q.13 Determine in the given diagram the acceleration' a' of the system and the tensions T1 and T2 of the strings . Assume that the table and the pulleys are frictionless and the strings are massless. (g=9.8m/s^2)
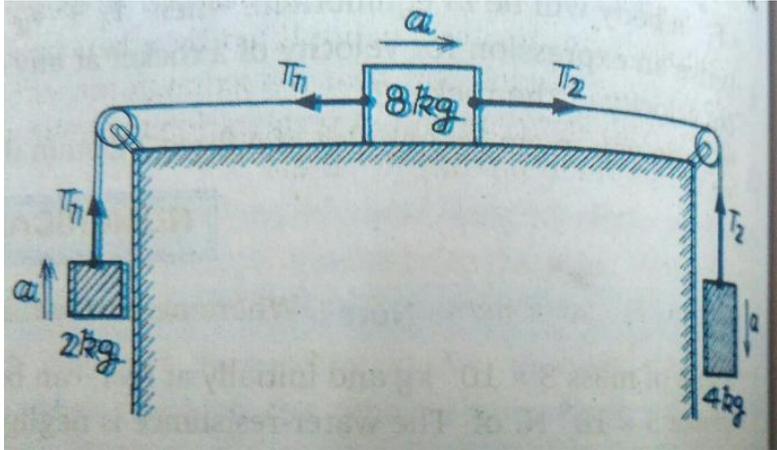
Q.14 On a long horizontally moving belt, a child runs to and fro with a speed of 9Km/hr. (with respect to the belt) between his father and mother located 50m apart on the moving belt. The belt moves with a speed of 4 Km/hr. For an observer on a stationary platform outside, what is the

i)   Speed of the child running in the direction of the motion of the belt.

ii)   Speed of the child running opposite to direction of the motion of the belt.

iii)   Time taken by the child in i) and ii)

Q.15 A hunter aims his gun and fires a bullet directly at a monkey on a tree. At the instant the bullet leaves the barrel of the gun, the monkey drops. Will the bullet hit the monkey? Substantiate (give proper evidence to prove the truth of) your answer with proper reasoning.

Q.16 Rain is falling vertically with a speed of 30m/s. A women rides a bicycle at a speed of 10m/s in the north to south direction. What is the relative velocity of rain with respect to women? What is the direction in which she should hold her umbrella to protect herself from the rain?

Q.17 Two bodies A and B of masses 5 Kg and 10 Kg in contact with each other rest on a table against a rigid partition. The coefficient of friction between the bodies and the table is 0.15. A force of 200N is applied horizontally at A. What are i) the reaction of the partition ii) the action reaction force between A and B.

Q.18 Show that Newton's second law of motion is the real law of motion.

Q.19 Why is it easier to pull a lawn roller than to push it? Explain.

Q.20 State and derive the expression for law of conservation of linear momentum from Newton's third law of motion.

Q.21 Determine the angle of banking so as to minimize the wear and tear of the tyres of a car negotiating a banked curved road.

Q.22 Derive relation between linear velocity and angular velocity of a body moving in a circular path.

Q.23 Pratap was pulling a big box with the help of a rope attached to the box. He was unable to pull it. Shyam his friend was standing near Pratap. He also started pulling the box along with Pratap. The box was dragged to the desired place.

i) Why was Pratap unable to pull the box?

ii) The box was dragged when both Shyam and Pratap pulled it. Explain why?

iii) What values are shown by Shyam?

Q.24 A projectile is projected at an angle θ with the horizontal from the ground. Its velocity of projection is u. Show that the path travelled by the projectile is parabolic. Also find the

i)   Time of flight

ii)   The maximum height

iii)   The horizontal range

OR

A projectile is projected horizontally from certain height, with velocity u. Show that the trajectory is parabolic. Also find the

i)   Time of flight

ii)   Horizontal range

iii)   Velocity of projectile at any time

Q.25 Derive expression for work done against friction, when

i)   A body slides on a horizontal surface

ii)   A body slides up an inclined plane (without acceleration)

iii)   A body slides down an inclined plane (without acceleration)

OR

State parallelogram law of vector addition. With proper diagram prove that two vectors A and B inclined at an angle θ is $R = (A^2 + B^2 + 2AB \cos \theta)^{1/2}$. And also find the direction of their resultant.

Q.26 A body tied to one end of a sting is made to revolve in a vertical circle. Derive the expression for the velocity of the body and tension in the string at any point. Hence find:

i)   Tension at the bottom and top of the circle

ii)   Minimum velocity at the lowest point to loop the loop

iii)   Minimum velocity at the top.

OR

What is centripetal acceleration? Derive expression for the centripetal acceleration and hence for centripetal force of a body moving in a circular path of radius 'r' with velocity 'v'.