HALF YEARLY EXAMINATION-2019-20

CLASS – XI

PHYSICS

(Theory)

(Maximum marks:70)

(Time allowed :Three hours)

(Candidates are allowed additional 15 minutes for only reading the paper.They must NOT start writing during this time)

All questions are compulsory

This question paper is divided into 4 sections,A,B,C and D as follows

Section A

Question number 1 is of twelve marks.All parts of this question are compulsory

Section B

Question number 2 to 12 carry 2 marks each with two questions having internal choice

Section C

Question number 13 to 19 carry 3 marks each with two questions having internal choice

Section D

Question number 20 to 22 are long-answer type questions and carry 5 marks each. Each questions having internal choice.

The intended marks for questions are given in brackets[ ].

All working,including rough work,should be done on the same sheet as and adjacent to the rest of the answer.

Answer to sub parts of the same question must be given in one place only.A list of useful physical constants is given at the end of this paper.

A simple scientific calculator without a programmable memory may be used for calculations

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Section A

Answer all questions

Questions 1

(a)Choose the correct alternative (A),(B),(C) or D for each of questions given below. **[5]**

(i) Which of the following has the same dimensions as planck's Constant?

[a] Torque [b] Angular Momentum

[c] Work [d] Coefficient of viscosity.

(ii) The slope of distance time graph gives:

[a] Velocity of body

[b] The distance travelled by body

[c] Acceleration of body

[d] Direction of motion of particle.

(iii) The angle between the vectors $4\hat{\imath} + 3\hat{\jmath} - 4\hat{k}$ and $3\hat{\imath} + 4\hat{\jmath} + 6\hat{k}$

[a] 0 [b] $\frac{®}{4}$ [c] $\frac{®}{2}$ [d] $\frac{\pi}{3}$

(iv) A block of mass m is at rest on an inclined plane the coefficient of static friction is μ . The maximum angle of incline before the block begins to slide down is:

[a] $\tan^{-1}\frac{\mu}{m}$ [b] $\tan^{-1}\mu$ [c] $\tan^{-1}\frac{\mu}{2}$ [d] $\cos^{-1}\mu$

(v) What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop .

[a] $\sqrt{g}R$ [b] $\sqrt{2g}R$ [c] $\sqrt{3g}R$ [d] $\sqrt{5g}R$

[B] Answer all question. [7]

(i) An unknown quantity X multiplied by velocity equals power. Recognize X, using Method of dimensions.

(ii) Name physical quantity having dimensions of work.

(iii) The velocity of a body is 36km/hr. Express in SI unit.

(iv) Define velocity and speed.

(v) Define scalar and vector quantity.

(vi) Find the magnitude of $\vec{A}$ if:

$$\vec{A} = -2\hat{\imath} + 2\hat{\jmath} - \hat{k}$$

(vii) Which law of motion does give the measure of force.

SECTION-B

QUESTION-2 **[2]**

A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially win a speed of 15m/sec. How long does the body take to stop?

QUESTION-3 **[2]**

Define Elastic collision.

QUESTION-4 **[2]**

Define parallel axis theorem.

QUESTION-5 **[2]**

Define Parallelogram Law of vector addition.

QUESTION-6 **[2]**

Proof that $n=\frac{1}{2l}\sqrt{\frac{T}{m}}$, where T is the tension in the string.

QUESTION-7 **[2]**

Define angle of friction.

QUESTION-8 **[2]**

A bomb is fired from a cannon with a velocity of 1000m/s making an angle of 30° with the horizontal. At what distance from the cannon the bomb will hit the ground?

OR

Show that the Path of Projectile motion is parabolic.

QUESTION-9 **[2]**

Show that at the top of vertical circle T is minimum while at bottom it is maximum.

QUESTION-10 **[2]**

Write down moment of inertia of solid sphere,Circular Disc .

OR

Define Kepler's Laws of Planetary motion.

QUESTION-11 **[2]**

Find out the value of g above the surface of the earth.

OR

Define Newton's Gravitational law.

QUESTION-12 **[2]**

Define conservative force with examples.

SECTION-C

QUESTION-13 **[3]**

By Calculus method prove that s=ut+$\frac{1}{2}at^2$.

QUESTION-14 **[3]**

Find out the dimension of a and b in $\left(P+\frac{a}{V^2}\right)(V-b)$=RT.

Where P, V and T are pressure, volume and temperature respectively.

OR

Proof that v=rω.

QUESTION-15 **[3]**

Explain when the resultant of two equal vectors:

[a] will be zero,

[b] will be equal to each?

QUESTION-16 **[3]**

Prove that $\left|\vec{A} \times \vec{B}\right|^2 + \left|\vec{A}.\vec{B}\right|^2 = (A\ )^2$.

QUESTION-17 **[3]**

[a] What is meant by law of Inertia?

[b] What is meant by weightlessness?

QUESTION-18 **[3]**

A slab of mass 4.0 kg is placed on a surface. The coefficient of static friction is 0.4. Find the frictional force between the slab and the surface.

QUESTION-19 **[3]**

Define Centre of mass of any system.

SECTION-D

QUESTION-20 **[5]**

State and explain work-energy theorem.

OR

[a] Find out the velocity of 2nd particle with respect to 1st particle in collision process.

[b] Proof that $V_e = \sqrt{2}V_0$.

QUESTION-21 **[5]**

[a] If t=$\sqrt{x}$+3 , find out the displacement of the particle when its velocity is zero.

[b] Find out the tension T in the string and the acceleration of two bodies of masses m_1 a m_2 connected with a string, which passes over a smooth pulley. ($m_2 < m_1$)

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

OR

[a] A solid sphere of mass 10 kg and diameter 1 m rolls without slipping with uniform speed 5m/s on a horizontal surface. Find its total kinetic energy.

[b] A moving body of mass m_1 strikes elastically head on another body of mass m_2 which is initially at rest. Show that the fraction of the initial kinetic energy of the moving body transferred to the struck body is $4m_1m_2/(m_1 + m_2)^2$.

[c] Two balls A and B of masses 100g and 250g connected to the ends of a weightless stretched spring are placed on a smooth horizontal surface. On being released, the ball B goes towards west with an acceleration of 10cm/s^2. With what initial acceleration and in which direction will the ball A go?

QUESTION-22 **[5]**

What is meant by collision? Give a brief account of elastic and inelastic collisions.

OR

At what height above the earth's surface would the acceleration due to gravity be one-fourth of the acceleration due to gravity at the surface of the earth?