PHYSICS

BOOKS - SURA PHYSICS (TAMIL ENGLISH)

GOVT. MODEL QUESTION PAPER - 1

Part I

1. A substance whose mas is 4.27 g occupies $1.3cm^3$.

The number of significant figure in density is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

2. Which of the following physical quantities have same dimensional formula?

A. Torque and Work done

B. Energy and Angular momentum

C. Force and Torque

D. Angular momentum and Linear momentum

Answer: A

Watch Video Solution

3. The maximum value of fractional error in division of two quantities i.e., $x = \frac{A}{B}$ is

A. $\frac{\triangle x}{x} = \pm\left(\frac{\triangle A}{A} - \frac{\triangle B}{B}\right)$

B. $\frac{\triangle x}{x} = \left(-\frac{\triangle A}{A} + \frac{\triangle B}{B}\right)$

C. $\frac{\triangle x}{x} = \left(+\frac{\triangle A}{A} - \frac{\triangle B}{B}\right)$

D. $\frac{\triangle x}{x} = \left(\frac{\triangle A}{A} + \frac{\triangle B}{B}\right)$

Answer: A

Watch Video Solution

4. The unit vector in the direction of $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ is

A. $\hat{i} + \hat{j} + \hat{k}$

B. $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{2}}$

C. $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

D. $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{6}}$

Answer: C

Watch Video Solution

5. The position vector of the particle is $\vec{r} = 3t^2\hat{i} + 5t\hat{j} + 9\hat{k}$. What is the acceleration of the particle?

A. $6ms^{-2}$ along $\hat{i}$

B. $5ms^{-2}$ along $\hat{j}$

C. $9ms^{-2}$ along $\hat{k}$

D. zero

Answer: B

Watch Video Solution

6. A body is whirled in a horizontal circle of radius vector $\overrightarrow{r}$. It has an angular velocity of $\overrightarrow{\omega}$. The velocity at any point on circular path is

A. $V = r\omega$

B. $V = \frac{\omega}{r}$

C. $V = \frac{r}{\omega}$

D. $V = m\frac{\omega}{r}$

Answer: A

Watch Video Solution

7. When a fast moving bus suddenly stops, the passenger is thrown forward because of

A. inertia of rest

B. inertia of direction

C. moment of inertia

D. inertia of motion

Answer: D

 Watch Video Solution

8. In studying motion of a body, the starting of motion is more difficult than maintaining it because, the coefficient of static friction and kinetic friction satisfy the relation.

A. $\mu_s > \mu_k$

B. $\mu_s < \mu_k$

C. $\mu_s = \mu_k$

D. $\mu_s = \frac{1}{2}\mu_k$

Answer: B

View Text Solution

9. If two masses m_1 and m_2 are experiencing the same force, then the ratio of respective acceleration is

A. $\frac{a_1}{a_2} = \frac{m_1}{m_2}$

B. $\frac{a_1}{a_2} = 1$

C. $\frac{a_1}{a_2} = \frac{m_2}{m_1}$

D. $\frac{a_1}{a_2} = \sqrt{\frac{m_1}{m_2}}$

Answer: C

Watch Video Solution

10. What is the work done by the gravity when an object of mass m is taken from ground to some height h with constant velocity ?

A. W=mgh

B. W= -mgh

C. W=0

D. W = 2mgh

Answer: B

Watch Video Solution

11. If the work done is independent of path, then the force is

A. Non-conservative force

B. Conservative force

C. Newton's force

D. Centrifugal force

Answer: B

Watch Video Solution

12. One horse power is

A. 707 W

B. 786 W

C. 746 W

D. 647 W

Answer: C

 Watch Video Solution

13. Four round objects namely a ring, a disc, a hollow sphere and a solid sphere with same radius R and made of same material start to roll down an inclined

plane at the same time. The object that will reach the bottom third is

A. Solid sphere

B. Disc

C. Hollow sphere

D. Ring

Answer: C

Watch Video Solution

14. Obtain an expression for the power delivered by torque.

A. $P = \vec{\tau} \cdot \vec{\theta}$

B. $P = \vec{\tau} \times \vec{\theta}$

C. $P = \tau\theta \sin\theta$

D. P=0 (zero always)

Answer: A

Watch Video Solution

15. The center of mass for a uniform rod of mass M and length $\frac{1}{2}$ i.e., 0.5 l lies at the

A. l

B. 0.75 l

C. 0.5 l

D. 0.25 l

Answer: D

 Watch Video Solution

Part Ii

1. Write down the number of significant figures in the following (i) 0.007 (ii) 400

 Watch Video Solution

2. Write down the number of significant figures in the following (i) 0.007 (ii) 400

Watch Video Solution

3. Write any two limitations of dimensional analysis. Give relevant examples.

Watch Video Solution

4. The position vectors particle has length 1m and makes 30° with the x-axis. What are the lengths of

the x and y components of the position vector?

Watch Video Solution

5. A particle moves in a circle of radius 10 m. Its linear speed is given by $v = 3t$ where t is the lime in second and v is in ms^{-1}.Compute the centripetal and tangential acceleration at time t = 2s.

Watch Video Solution

6. Consider a lamp (with holder) of mass 50 g (shown in the figure) Draw free body diagram and compute the tension in the string. (assume lamp with holder

as a point mass).

View Text Solution

7. What is meant by

Inertial frame of reference.

Watch Video Solution

8. What is non inertial frame of reference? Explain with example.

Watch Video Solution

9. Potential energy

Watch Video Solution

10. Write the spring force acting on the object at the positions given below (surface is frictionless).

View Text Solution

11. Write the spring force acting on the object at the positions given below (surface is frictionless).

View Text Solution

Part Iii

1. A force of $\vec{F} = \left(4\hat{i} - 3\hat{j} + 5\hat{k}\right)N$ is applied at a point whose position vector is $\vec{r} = \left(7\hat{i} + 4\hat{j} - 2\hat{k}\right)m$. Find the torque of force about the origin.

Watch Video Solution

2. Check the correctness of the equation $E = mc^2$ using dimensional analysis method.

Watch Video Solution

3. Two resistances $R_1(100 \pm 3)\Omega$ and $R_2 = (150 \pm 2)\Omega$ are connected inseries. What is their equivalent resistance?

Watch Video Solution

4. The velocitities of three particles A, B and C are $\overrightarrow{v_A} = \left(3\hat{i} - 5\hat{j} + 2\hat{k}\right)ms^{-1}$, $\overrightarrow{v_B} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right)ms^{-1}$ and $\overrightarrow{v_C} = \left(5\hat{i} + 3\hat{j} + 4\hat{k}\right)ms^{-1}$, respectively. Which particle travels at neither greatest nor lowest speed?

Watch Video Solution

5. Define time of flight.

Watch Video Solution

6. Define Lami's theorem.

Watch Video Solution

7. Write any three uses of copper.

Watch Video Solution

8. Calculate the potential energy of the object of mass m at a height h.

View Text Solution

9. Write down the coefficient of restitution for the following cases :

Perfectly elastic collision

Watch Video Solution

10. Write down the coefficient of restitution for the following cases :

Perfect inelastic collision

Watch Video Solution

11. Write down the coefficient of restitution for the following cases :

Perfect inelastic collision

Watch Video Solution

12. Consider a system of two identical particles having mass m. If one of the particles of mass m is pushed towards the center of mass of the particles through a distance x, by what amount the other particle should

move so as to keep the center of mass of particles at the original position?

Watch Video Solution

Part Iv

1. Obtain an expression for the time period T of a simple pendulum. [The time period T depend upon (i) mass l of the bob (ii) length m of the pendulum and (iii) acceleration due to gravity g at the place where pendulum is suspended.

Assume the constant $k = 2\pi$]

Watch Video Solution

2. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be $2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate

The mean value of the period of oscillation.

Watch Video Solution

3. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be

$2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate

The mean absolute error in each measurement.

Watch Video Solution

4. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be $2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate

The mean absolute error.

Watch Video Solution

5. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be $2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate

The relative error.

Watch Video Solution

6. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be $2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate

The percentage error. Express the results in proper form.

Watch Video Solution

7. In s series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be $2.63s, 2.56s, 2.42s, 2.71s$ and $2.80s$. Calculate The relative error.

Watch Video Solution

8. Derive equations of uniformly acceleration motion by calculus method.

Watch Video Solution

9. Uniform circular motion.

Watch Video Solution

10. An object of mass 100 g is thrown with initial velocity $\vec{V} = 5\left(\hat{i} + \hat{j}\right) ms^{-1}$ with respect to the ground. Neglect the effect of air on the motion of mass and take $g = 10 ms^{-1}$.

What is the impulse transferred by the mass when it hits the ground.

Watch Video Solution

11. An object of mass 100 g is thrown with initial velocity $\vec{V} = 5\left(\hat{i} + \hat{j}\right)ms^{-1}$ with respect to the ground. Neglect the effect of air on the motion of mass and take $g = 10ms^{-1}$.

What is the impulse transferred by the mass when it hits the ground.

Watch Video Solution

12. An object of mass 100 g is thrown with initial velocity $\overrightarrow{V} = 5\left(\hat{i} + \hat{j}\right) ms^{-1}$ with respect to the ground. Neglect the effect of air on the motion of mass and take $g = 10ms^{-1}$.

What is the impulse transferred by the mass when it hits the ground.

Watch Video Solution

13. A man of 50 kg is standing on the school play ground at Trichy. The latitude of Trichy is 10.8°.

Calculate the centrifugal force experienced by the man.

Watch Video Solution

14. A man of 50 kg is standing on the school play ground at Trichy. The latitude of Trichy is 10.8°.

With what mimimum angular speed the earth must rotate so that the magnitude of gravitational force is equal to the magnitude of centrifugal force that he experiences? (Radius of the earth is 6400 km and $g = 10ms^{-2}$.

Watch Video Solution

15. A man of 50 kg is standing on the school play ground at Trichy. The latitude of Trichy is 108°. Calculate the time (in hour) to complete one rotation (one day) of the earth with the new angular speed.

View Text Solution

16. Obtain the expression for the velocities of the two bodies after collision in the case of one dimensional elastic collision ond discuss the specical cases.

Watch Video Solution

17. What does the work - kinetic energy theorem imply ?

Watch Video Solution

18. A uniform rod of mass m and lengh I makes a constant angle θ with an axis of rotation which passes through one end of therod. Find the moment of inertia about this axis.

Watch Video Solution

19. Discuss the bending of a cyclist in curves.

Watch Video Solution