PHYSICS

BOOKS - SURA PHYSICS (TAMIL ENGLISH)

PUBLIC EXAM QUESTION PAPER MARCH-2019

Part I

1. Which graph pertains to uniform acceleration .

A.

B.

C.

D.

Answer: A::B::C

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2. A body of mass $5kg$ is thrown up vertically with a kinetic energy of $1000J$. If acceleration due to gravity is $10ms^{-2}$, find the height at which the kinetic energy becomes half of the original value.

A. $10m$

B. $20m$

C. $50m$

D. $100m$

Answer: A

3. The process in which heat transfer is by actual movement of molecules in fluids such as liquids and gases is called :

A. Thermal conductivity

B. Convection

C. Conduction

D. Rediation

Answer: B::C

4. If the temperature of the wire is increased,

then the Young's modulus will

    A. increase rapidly

    B. increase by very small amount

    C. remain the same

    D. decrease

Answer: A::C::D

5. The amplitude and time period of a simple pendulum bob are $0.05m$ and 2 s respectively. Then the maximum velocity of the bob is :

A. $0.157ms^{-1}$

B. $0.257ms^{-1}$

C. $0.10ms^{-1}$

D. $0.025ms^{-1}$

Answer: A

6. A closed cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector, its moment of inertia.

A. remains constant

B. depends on the direction of rotation

C. increase

D. decrease

Answer: A::C::D

7. Which of the following represents a wave?

A. $\dfrac{1}{x + vt}$

B. $\sin(x + vt)$

C. $(x - vt)^3$

D. $x(x + vt)$

Answer: B

8. Which of the following parirs of physical quantities have same dimension?

A. Torque and Power

B. Force and Torque

C. Force and Power

D. Torque and Energy

Answer: A::D

9. If the internal energy of an ideal gas U and volume V are doubled, then the pressure of the gas :

A. halves

B. quadruples

C. doubles

D. remains same

Answer: A::D

10. For a satellite moving in an orbit around the earth, the ratio of kinetic energy of potential

A. 2

B. $\sqrt{2}$

C. $-\dfrac{1}{2}$

D. $\dfrac{1}{\sqrt{2}}$

Answer: A::B::C

11. A referigertor has COP of 3 . How much work must be supplied to a refrigertor in order to remove $200J$ of heart from its interior?

A. $33.33J$

B. $44.44J$

C. $66.67J$

D. $50J$

Answer: C

12. If the linear momentum of the object in increased by 0.1% , then the kinetic energy is increased by :

A. 0.4%

B. 0.01%

C. 0.1%

D. 0.2%

Answer: D

13. What is the angular displacement made by a particle after $5s$, when it starts from rest with an angular acceleration 0.2 and s^{-2} ?

A. 4 rad

B. 1 rad

C. 2.5 rad

D. 5 rad

Answer: C

14. In an isohoric process, find which is relevant among the following :

A. $\Delta U = 0$

B. $\Delta T = 0$

C. $W = 0$

D. $Q = 0$

Answer: A

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Part Ii

1. Write any two errors of systematic errors.

Explain them.

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2. Define projectile. Give two examples.

3. State Newton's second law .

4. A car takes a turn with velocity 50 ms^{-1} on the circular road of radius of curvature 10 m.

Calculate the centrifugal force experienced by a person of mass 60 kg inside the car?

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5. Why is it more difficult to revolve a stone tied to a longer string than a stone tied to a shorter string ?

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6. State Stefan-Boltzmann law.

7. What are the factors which effect Brownian motion?

8. Why are army troops not allowed to march in steps while crossing the bridge?

9. The surface tension of a soap solution is $0.03 Nm^{-1}$. How much work is done in producing soap bubble of radius $0.05m$?

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Part Iii

1. What is the torque of the force $\overrightarrow{F} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ acting at a point $\overrightarrow{r} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ about the origin?

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2. Explain various types of friction suggest a few methods to reduce friction

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3. A heavy body and a light body have same momentum. Which one of them has more kinetic energy and why?

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4. Find the rotational kinetic energy of a ring of mass $9kg$ and radius $3m$ rotating with 240 rpm about an axis passing through its centre and perpendicular to its plane.

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5. What do you mean by the term weightlessness?

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6. Derive an expression for the terminal velocit of a sphere falling through a viscous liquid.

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7. Explain linear expansion of solid.

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8. Write down the postulates of kinetic theory of gases.

9. Two waves of wavelength $99cm$ and $100cm$ both travelling with the velocity of $396ms^{-1}$ are made to interfere. Calculate the number of beats produced b then per sec.

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Part Iv

1. The force F acting on a body moving in a circular path depends on mass of the body (m) velocity(v) and radius (r) of the circular path. Obtain the expression for the force by dimensional analysis method $(k = 1)$

2. State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow or fluid.

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3. Prove the law of conservation of linear momentum use it to find the recoil velocity of a gun when a bullet is fired from it

4. State and prove parallel axis theorem

5. What is elastic collision ? Derive an expression for final velocities of two bodies which undergo elastic in one dimension.

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6. How will you determine the velocity of sound using resonance air column apparatus ?

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7. Derive Mayer's relation for an ideal gas.

8. Explain the horizontal oscillations of a spring.

9. (i) Write down the equation of a freely falling body under gravity.

(ii) A ball is thrown vertically upwards with the speed of $19.6 ms^{-1}$ from the top of a

building and reaches the earth in $6s$. Find the height of the building.

10. (i) Define orbital velocity and establish an expression for it.

(ii) Calculate the value of orbital velocity for an artifical satellite of earth orbiting at a height of $1000km$ (Mass of the earth $= 6 \times 10^{24}kg$, radius of the earth $= 6400km$).