PHYSICS

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QUESTION PAPER MARCH 2019

Part I

1. 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:

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2. 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. Radiation

Answer:

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3. Which of the following pairs of physical quantities have same dimension?

A. Torque and Power

B. Force and Torque

C. Force and Power

D. Torque and Energy

Answer:

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

A. 2

B. $\sqrt{2}$

C. $\frac{1}{2}$

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

Answer:

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5. 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. 33.33 J

B. 44.44 J

C. 66.67 J

D. 50 J

Answer:

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6. If the temperature of the wire is increased, then the Young's modulus will

A. increase rapidly

B. increases by very small amount

C. remain the same

D. decrease

Answer:

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7. 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:

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8. 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. 10 m

B. 20m

C. 50m

D. 100m

Answer:

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9. Define acceleration.

A. 

B. 

C. 

D. 

Answer:

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10. In an isochoric process we have

A. $\Delta U = 0$

B. $\Delta T = 0$

C. W=0

D. Q=0

Answer:

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11. 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:

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12. 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. increases

D. decreases

Answer:

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13. Which of the following represents a wave?

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

B. $\sin(x+vt)$

C. $(x-vt)^3$

D. $x(x+vt)$

Answer:

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14. 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:

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15. 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:

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16. In which process heat is transferred directly from one molecule to other ?

A. Thermal conductivity

B. Convection

C. Conduction

D. Radiation

Answer:

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17. Which of the following pairs of physical quantities have same dimension?

A. Torque and Power

B. Force and Torque

C. Force and Power

D. Torque and Energy

Answer:

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

A. 2

B. $\sqrt{2}$

C. $\frac{1}{2}$

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

Answer:

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19. 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. 33.33 J

B. 44.44 J

C. 66.67 J

D. 50 J

Answer:

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20. If the temperature of the wire is increased, then the Young's modulus will

A. increase rapidly

B. increases by very small amount

C. remain the same

D. decrease

Answer:

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21. 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:

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22. 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. 10 m

B. 20m

C. 50m

D. 100m

Answer:

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23. What is uniform motion ?

A. 

B. 

C. 

D. 

Answer:

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24. In an isochoric process we have

A. $\Delta U = 0$

B. $\Delta T = 0$

C. W=0

D. Q=0

Answer:

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25. 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:

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26. 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. increases

D. decreases

Answer:

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27. Which of the following represents a wave?

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

B. $\sin(x+vt)$

C. $(x-vt)^3$

D. $x(x+vt)$

Answer:

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28. 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:

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Part Ii

1. Write any two errors of systematic errors. Explain them.

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2. What is projectile ? Give it's examplees.

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3. State newton's second law

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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.

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7. What are the factors which effect Brownian motion?

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8. "Soldiers are not allowed to march on a bridge". Give reason.

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

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10. Write any two errors of systematic errors. Explain them.

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Part Iii

1. What is the torque of the force $\vec{F} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ acting at a point $\vec{r} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ 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 9 kg and radius 3 m rotating with 240 rpm about an axis passing through its centre and perependicualr to its plane.

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

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6. Explain linear expansion of solid.

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

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

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

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13. What do you mean by the term weightlessness ? Explain the state of weightlessness of a freely falling body.

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

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15. Explain linear expansion of solid.

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

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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 $(k = 1)$

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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

Watch Video Solution

4. State and prove parallel axis theorem

Watch Video Solution

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. Derive Mayer's relation for an ideal gas.

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7. Explain the horizontal oscillations of a spring.

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8. Write down the equation of a freely falling body under gravity.

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9. A ball is thrown vertically upwards with the speed of $19.6ms^{-1}$ from the top of building and reaches the earth in 6 s. Find the height of the building .

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10. Define orbital velocity and establish an expression for it.

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

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12. 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 $(k = 1)$

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Watch Video Solution

15. State and prove parallel axis theorem

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

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

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

Watch Video Solution

19. Explain the horizontal oscillations of a spring.

Watch Video Solution

20. Write down the equation of a freely falling body under gravity.

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