PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER - 20 (SOLVED)

Part I

1. If force $|F|$, velocity $|v|$ and time $|T|$ are taken as to fundamental units then the

dimensions of mass are

A. $FV^{-1}T$

B. $FV^{-1}T^{-1}$

C. FVT^{-1}

D. FVT^{-2}

Answer: A

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2. A sound wave whose frequency is 5000 Hz travels in air and then hits the water surface. The ratio of its wavelength in water and air is
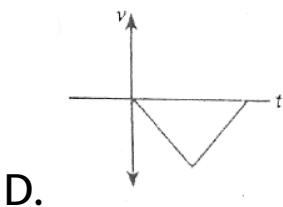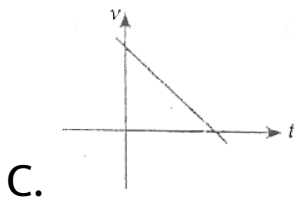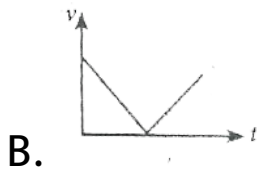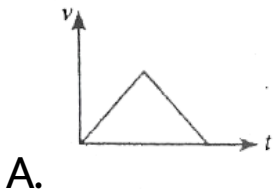
A. 4.3

B. 0.23

C. 5.3

D. 1.23

Answer: A

3. A ball is projected vertically upwards with a velocity v . It comes back to ground in time t. which v-t graph shows the motion correctly ?

A.

B.

C.

D.

Answer: C

4. A body of mass 'M'moving with velocity 'V'explodes into two equal parts. If one comes to rest and the other body moves with the velocity 'v' what is the value of 'v'?

A. V

B. $\dfrac{V}{\sqrt{2}}$

C. $4V$

D. $2V$

Answer: D

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5. Two masses M_1 and m_2 are experiencing the same force where $m_1 < m_2$ the ratio of their acceleration $\dfrac{a_1}{a_2}$ is

A. 1

B. less than 1

C. greater than 1

D. all the three cases

Answer: C

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6. If force acts on a body, whose line of action does not pass through its CG, then the body will experience

A. angular acceleration

B. linear acceleration

C. both (a) and (b)

D. none

Answer: B

7. Which of the following different equations represents a damped harmonic oscillator ?

A. $\dfrac{d^2y}{dt^2} + y = 0$

B. $\dfrac{d^2y}{dt^2} + \gamma\dfrac{dy}{dt} + y = 0$

C. $\dfrac{d^2y}{dt^2} + k^2y = 0$

D. $\dfrac{dy}{dt} + y = 0$

Answer: B

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8. A body is suspended from a spring balance kept in a satellite the reading of the balance is W_1 when the satellite goes in an orbit of

radius R and is W_2 when it goes in an orbit of radius 2R

A. $w_1 = w_2$

B. $w_1 < w_2$

C. $w_1 > w_2$

D. $w_1 \neq w_2$

Answer: A

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9. The graph between volume and temperature in Charles'law is

A. an ellipse

B. a circle

C. straight line

D. a parabola

Answer: C

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10. A boat having length 3 m and breadth 2 m is floating on a lake. It sinks by 1 cm when a man gets on it. The mass of the man is ....

.

A. 60 kg

B. 55kg

C. 65 kg

D. 70 kg

Answer: A

11. If the mass and radius of the Earth are both doubled, then the accelration due to gravity g

A. remains same

B. $\dfrac{g}{2}$

C. $2g$

D. $4g$

Answer: B

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12. A diatomic ideal gas is used in a carnot engine as the working substance. If during the adiabatic expansion part of the cycle, the volume of the gas increases from V to 32 V, the efficiency of the engine is ....

A. 0.0025

B. 0.005

C. 0.0075

D. 0.0099

Answer: C

13. A particle executing SHM crossed points A and B with the same velocity. Having taken 3 s in passing from A to B, it returns to B after another 3s. The time period is :

A. 15s

B. 6s

C. 12s

D. 9s

Answer: C

14. According to Boyle's law, $PV = C$ when the temperature of the gas remains constant. The value of C depends on

   A. temperature of the gas

   B. nature of the gas

   C. quantity of gas

D. both temperature and quantity of the

gas

Answer: D

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15. When sound waves travel from air to water, which of the following remains constant?

A. velocity

B. frequency

C. wavelength

D. all of these

Answer: B

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1. The voltage across a wire is $(100 \pm 5)V$ and the current passing through it is (10 ± 0.2) A. Find the resistance of the wire.

2. If the position vector of the particle is given by $\vec{r} = 3t^2\hat{i} + 5t\hat{j} + 4\hat{k}$. Find the velocity of the particle at t = 3s.

3. Define power and give its unit.

4. Define co-efficient of restitution'?

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5. Define gravitational potential energy.

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6. Define spectific heat capacity and give its unit .

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7. State the first law of thermodynamics.

8. What is meant by aan echo ? Explain.

9. The wavelength of two sine waves are $\lambda_1 = 1m$ and $\lambda_2 = 6$ m . Calculate the

corresponding wave numbers .

Part Iii

1. Write down the factors affecting velocity of

sound in gases.

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2. Explain the similarties and differences of centripetal and centrifugal forces

3. Define the following.

Coefficient of restitution

4. Write a note on work done by a variable force.

5. Explain Wien's law and why our eyes are sensitive only to visible rays?

6. What is Reynold's number ? Give its significance.

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7. Why two holes are made to empty an oil tin ?

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8. What are the limitations of the first law of thermodynamics?

9. A particle executing a SHM has maximum acceleration at a distance of 0.5 cm from its mean position is $2cm/s^2$. What will be its velocity when it is at a distance of 1 cm from its mean position.

1. Write the rules of "Rounding off" with example.

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2. Derive the expression for centripetal acceleration.

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3. Briefly explain the origin of friction show that in an inclined plane angle of friction is equal to angle of repose

4. Explain with graphs the difference between work done by a constant force and by a variable force.

5. Give any two salient features of static Friction and Kinetic Friction.

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6. Define escape speed? .

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7. Given the expression for Mayer's relation .

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8. Calculate the amplitude, angular frequency, frequency, time period and initial phase for the simple harmonic oscillation given below:

(a) $y = 0.3\sin(40\pi t + 1.1)$ (b) $y = 2\cos(\pi t)$

(c) $y = 3\sin(2\pi t - 1.5)$

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9. Write shorts notes on the oscillations of liquid column in U-tube.

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10. Describe Newton's formula for velocity of sound waves in air.

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