PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SOLVED PAPER 17 (UNSOLVED)

Part I

1. If E and B respectively, represent electric field and magnetics induction field, then the ratio E

and B has the dimensions of

A. angle

B. acceleration

C. velocity

D. displacement

Answer: C

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2. The component of position vector $\vec{r}$ along x - axis will maximum value if

A. $\vec{r}$ is along x-axis

B. $\vec{r}$ makes an angle of 45° with y-axis

C. $\vec{r}$ is along y-axis

D. $\vec{r}$ is -ve along u-axis

Answer: A

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3. A ship of mass 3×10^6 kg initially at rest is pulled by a force $6 \times 10^4 N$ through a distance of 4m. The speed of the ship is (Assume resistivity of water is negligible)

A. 1.5 m/s

B. 20 m/s

C. 0.5 m/s

D. 0.4 m/s

Answer: D

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4. Two equal masses m_1 and m_2 are moving along the same straight line with velocities $5ms^{-1}$ and $-9ms^{-1}$ respectively. If the collision is elastic, then calculate the velocities after the collision of m_1 and m_2, respectively

A. $-9ms^{-1}\text{and}5ms^{-1}$

B. $-4ms^{-1}\text{and}10ms^{-1}$

C. $10ms^{-1}\text{and}0ms^{-1}$

D. $5ms^{-1}\text{and}1ms^{-1}$

Answer: A

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5. An air column in a pipe which is closed at one end, will be in response with the vibrating body of frequency 83 Hz. Then the length of the air column is

A. 1.5m

B. 0.5m

C. 1.0m

D. 2.0m

Answer: C

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6. Moment of force is called .....

A. angular momentum

B. torque

C. couple

D. none

Answer: B

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7. For a planet having mass equal to the Earth but radius is one fourth of radius of the Earth, then escape velocity for this planet will be.....

A. 11.2 km/s

B. 22.4 km/s

C. 3.6 km/s

D. 44.8 km/s

Answer: B

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8. Water in a bucket tied with rope whirled around in a vertical circle of radius 0.5 m. Calculate the minimum velocity at the lowest point so that the water does not spill from it in the course of motion. $\left(g = 10ms^{-1}\right)$

A. $\sqrt{5}ms^{-1}$

B. $5ms^{-1}$

C. $50ms^{-1}$

D. $500ms^{-1}$

Answer: A

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9. The fractional change in volume per unit increase in pressure is called ..... .

A. pressure co-efficient

B. volume co-efficient

C. bulk modulus

D. compressibility

Answer: D

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10. In slipping the rotational motion is .....than the translation motion.

A. constant

B. more

C. zero

D. none of the above

Answer: B

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11. A block of wood is floating on water at $0^{\circ}C$ with a certain volume 'V' above the water level. The temperature of water is slowly raised to

$20^\circ C$. How does the volume 'V' change with the rise in temperature ?

A. remains unchanged

B. decrease continuously

C. decrease till $4^\circ C$ and then increase

D. increase till $4^\circ C$ and then decrease

Answer: D

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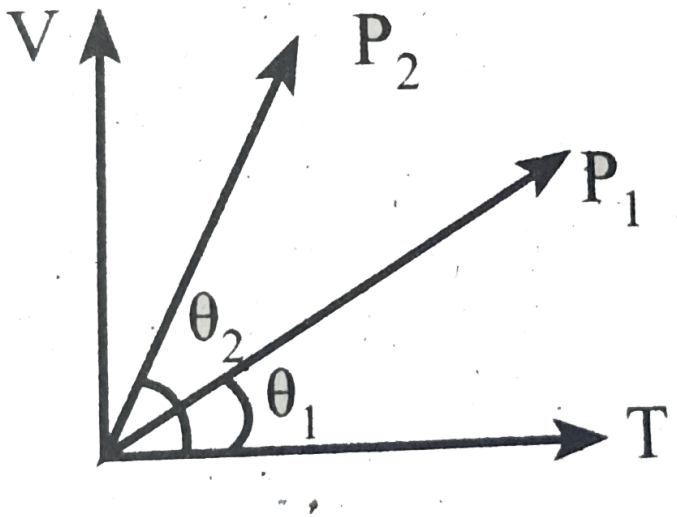
12. In the given (V-T) diagram , what is the relation between $P_1 \text{and} P_2$?



A. $P_2 = P_1$

B. $P_2 = P_1$

C. $P_2 < P_1$

D. cannot be predicted

Answer: C

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13. The damping force on an oscillator is directly proportional to the velocity . The units of the constant of proportionality are

A. $kgms^{-1}$

B. $kgms^{-2}$

C. kgs^{-1}

D. kgs

Answer: C

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14. The velocity of a particle, undergoing SHM is v at the position. If its amplitude is doubled, the velocity at the mean position will be.....

A. 2v

B. 3v

C. $2\sqrt{2}$

D. 4v

Answer: A

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15. Which of the following represents a wave?

A. $(\gamma - vt)^3$

B. x(x+vt)

C. $\frac{1}{x+xt}$

D. sin(x+xt)

Answer: D

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Part Ii

1. What are the limitations of dimensional analysis?

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2. The position vector of a particle is given $\vec{r} = 2t\hat{i} + 3t^2\hat{j} - 5\hat{k}$ calculate the velocity and speed of the particle at any instant 't'.

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3. Under what condion will a car skid on a leveled circular road ?

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4. State conservation of angular momentum.

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5. What are geostationary and polar satellites?

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6. State Newtons Universal law of gravitaion.

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7. Define Poisson's ratio.

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8. Differentiate between isothermal and adiabatic process.

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9. Compute the position of an oscillating particle when its kinetic energy and potential energy are equal.

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Part Iii

1. How can the systematic errors be minimised?

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2. The position of an particle is given by $x = 6t + 2t^3$. Find out whether is motion is uniform or non - uniform.

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3. Two bodies of masses m and 4m are placed at a distance r. Calculate the gravitational potential at a point on the joining them where the gravitational field is zero.

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4. Derive an expression for Radius of gyration.

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5. How do you distinguish between stable and unstable equilibrium?

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6. A cyclist while negotiating a circular path with speed $20ms^{-1}$ is found to bend an angle by 30° with vertical. What is the radius of the circular path? (given,$g = 10ms^{-2}$).

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7. State the laws of simple pendulum.

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8. The acceleration dula to gravity on the surface of moon is $1.7ms^{-2}$. What is the time period of a simple pendulum on the surface of moon if its time period on the surface of earth is 3.5s ?

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Part Iv

1. In a 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, 2.42, 2.71s and 2.80 s`. Calculate

(i) the mean value of the period of oscillation

(ii) the absolute error in eah measurement

(iii) The men absolute error (iv) the relative error (v) the percentage error. Expresss the results in proper form.

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2. Mention the properties of dot product of two vectors.

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3. Derive the kinematic equations of motion for constant acceleration.

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4. Derive the relation between momentum and kinetic energy.

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5. How do you distinguish between stable and unstable equilibrium?

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6. State and prove perpendicular axis theorem.

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

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8. What are processes involves in a Carnot engine?

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9. In an isothermal process

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10. Consider a mixture of 2 mole helium and 4 mole of oxygen. Compute the speed of sound in this gas mixture at 300 K.

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