PHYSICS

BOOKS - S CHAND PHYSICS (ENGLISH)

SAMPLE QUESTION PAPER-3

Section A

1. There is an error of 2% in the measurement of side of a cube. The percentage error in the calclation of its volume will be :

A. 1%

B. 2%

C. 3%

D. `6%

Answer: D

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2. If $\left|\vec{A} \times \vec{B}\right| = \vec{A} . \vec{B}$ then the angle between $\vec{A}$ and $\vec{B}$ is :

A. 0

B. $\frac{\pi}{4}$

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

D. π

Answer: B

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3. A force of 50 N acts on a body for 10 s. What will be the change in momentum of the body ?

A. 200 N.s

B. 400 N.s

C. 500 N.s

D. 1000 N.s

Answer: C

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4. When the kinetic energy of a body is increased by there its momentum is increased by:

A. 9 times

B. 3 times

C. $\sqrt{2}$ times

D. $\sqrt{3}$ times

Answer: D

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5. After terminal velocity is reached the acceleration of a body falling through a viscous fluid is:

A. zero

B. equal to g

C. less than g

D. more than g

Answer: A

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6. Answer the question briefly and the point:

Friction is a non-conservative force. Why?

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7. Answer the question briefly and the point:

What is the phase difference between a node and its nearest antinode in a stationary wave?

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8. Answer the question briefly and the point:

Which type of motion of the molecules is responsible for the internal energy of a monoatomic gas?

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9. Answer the question briefly and the point:

What are the properties of an ideal liquid ?

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10. Answer the question briefly and the point:

What is the angle of friction between two surfaces in contact having coefficient of friction $\frac{1}{\sqrt{3}}$?

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11. What is the relation connecting linear velocity and angular velocity ?

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12. Answer the question briefly and the point:

Are all constants dimensionless ?

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Section B

1. A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially with a speed of $15ms^{-1}$. How long does the body take to stop ?

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2. Can you associate vectors with (a) the length of a wire bent into a loop, (b) a plane area, (c) a sphere? Explain.

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3. A jet airplane travelling at the speed of $500kmh^{-1}$ ejects its products of combustion at the speed of $1500kmh^{-1}$ relative to the jet plane. The speed of the products of combustion with respect to an observer on the ground is

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4. Consider a drop of rain water having mass 1g falling from a height of 1km. It hits the ground with a speed of 50m/s. Take g constant with a value of $10m/s^2$. The work done by the(i) gravitational force and the (ii) resisitive force of air is

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5. A raindrop of mass 1.00 g is falling from a height of 1.00 km. It hits the ground with a

speed of $50.0ms^{-1}$ Find the work done by the unknown resistive force $(g = 10ms^2)$.

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6. A man pulls a box on a horizontal floor through a distance of 20 m with a force of 30 N applied along a rope tied to the box and making and angle of 60^o with the horizontal. Calculate the work done.

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7. What is a couple? What is its action?

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8. A steel wire of length 4.7 m and cross-section $3.0 \times 10^2 m^2$ stretches by the same amount as a copper wire of length 3.5 m and cross-section $4.0xx10^2 m^2$ under a given load. What is the ratio of the Young.s modulus of steel to that of copper?

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9. The force required by a man to move his limbs immersed in water is smaller than the force for the some movement in air Why?

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10. Three bars of equal lengths and equal areas of cross-section are connected in series. Their thermal conductivities are in the ratio of 2:4:3. If the open ends of the first and last bars are at temperatures $20^{\circ}C$ and $18^{\circ}C$

respectively in the steady state calculate the temperature of both the junctions.

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11. Snow is a better heat-insulator than ice, why?

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12. Force constant of a weightless spring is $16Nm^{-1}$. A body if mass 1 kg suspended from

it is pulled down through 5 cm from its mean position and then released. The maximum kinetic energy of the body will be

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13. The displacement equation of a wave is y = 0.5 sin $\pi(2 + -0.01x)$ where x is in meter and t is in second. Find the frequency, amplitude, speeds and phase difference between two particles situated at a distance of 5 m from each other.

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14. State the necessary conditions for the constructive and the destructive interference.

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Section C

1. What are .beats. ? Explain their production. State the necessary conditions for the production of beats.

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2. The ratio of intensities of two waves is 16:9. What is the ratio of amplitudes? If these two waves produce interference, then find the ratio of maximum and minimum intensities.

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3. Find out the units and dimensions of the constants a and b in the vander waal.s

equation $\left(P+\frac{a}{V^2}\right)(V-b)=RT.$

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4. The force required just to move a body up an inclined plane is double the force required just to prevent the body sliding down. If the coefficient of friction is 0.25, what is the angle of inclination of the plane ?

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5. An artificial satellite resolves in its orbit around the earth without any fuel. But on aeroplane requires fuel to fly at a certain height. Why So ?

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6. The ratio of earth.s orbital angular momentum (about the Sun) to its mass is $4.4 \times 10^{15} m^2 s^{-1}$. Find the area enclosed by earth.s orbit.

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7. State theorem of parallel axes.

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8. The velocity head of a stream of water is equal to 20 cm of mercury column. What is the velocity of flow in the stream ? The relative density of mercury is 13.6. $\left(g = 9.8ms^{-2}\right)$

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9. A cylinder of fixed capacity 44.8 litres contains helium gas at NTP. Find the amount of heat required to raise the temperature of gas by $15.0^{\circ} C$. (Given $R = 8.31 J / molK$).

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Section D

1. State the Law of Malus.

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2. Estimate the average thermal energy of a helium atom at (i) room temperature $27^{\circ}C$ and (ii) the temperature of the surface of the sun (6000K)

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3. What do you mean by capillarity. Derive relation for the rise of liquid in a capillary tube on the basis of balancing force and explain the rise of liquid in a tube of insufficient length.

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4. A big drop is formed by coalescing 1000 small droplets of water. What will be the change in surface energy? What will be the ratio between the total surface energy of the droplets and the surface energy of the big drop.

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5. Define angle of friction, angle of repose and obtain the relation for angle of repose (ie., $\theta_g = \tan^{-1}\mu$).

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6. An automobile is moving on a straight horizontal road with a speed u. If the coefficient of static friction between the tyres and the road is μ_s what is the shortest

distance in which the automobiles can be stopped ?

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