



PHYSICS

BOOKS - S CHAND PHYSICS (ENGLISH)

SAMPLE QUESTION PAPER 5

Section A

1. The angle between the vectors $4\hat{i} + 3\hat{j} - 4\hat{k}$
and $3\hat{i} + 4\hat{j} + 6\hat{k}$ is :

A. 0°

B. 45°

C. 60°

D. 90°

Answer: D



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2. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively

with the same speed. The ratio of their centripetal forces is

A. r_2 / r_1

B. $\sqrt{r_2 / r_1}$

C. $(r_1 / r_2)^2$

D. $(r_2 / r_1)^2$

Answer: A



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3. The dimensional formula for surface tension is

A. $[MLT^{-2}]$

B. $[ML^2T^{-2}]$

C. $[MT^{-2}]$

D. $[MLT^{-1}]$

Answer: C



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4. The energy equivalent to 1 kg of matter is :

A. $9 \times 10^{16} J$

B. 9×10^{16} erg

C. 1 J

D. 100 J

Answer: A



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5. Bernoulli's theorem is based on conservation of

A. Linear momentum

B. energy

C. Mass

D. Angular momentum

Answer: B



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Section A Answer The Following Questions Briefly And To The Point

1. A satellite revolves around earth under the gravitational force exerted upon it the earth.

Does it perform any work ?



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2. Why is it difficult to walk on sand or ice ?



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3. A person left on a frictionless surface wants to get away from it. How can he do so ?



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4. A person standing downward on a tower throws a stone vertically upward with a velocity u and drops another stone downward with same initial velocity. Which stone will strike the earth with a larger velocity ?



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5. A metal disc has a hole in it. Does the size of hole change when the disc is heated ?



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6. Does gravity play any part in any mode of heat transmission ?



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7. A man with a wrist watch on his hand falls from the top of a tower. Does the watch give correct time during the free fall ?



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Section B Answer All Questions

1. Explain the reason of separation of cream from milk.



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2. Is a large brake on a bicycle more effective than a small one ?



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3. What is the value of linear velocity, if

$$\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k} \text{ and } \vec{R} = 5\hat{i} - 6\hat{j} + 6\hat{k}.$$



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4. A car of mass 1000 kg moving with a speed 18kmh^{-1} on a smooth road and colliding with a horizontally mounted spring of spring constant $6.25 \times 10^3 \text{Nm}^{-1}$. The maximum compression of the spring is



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5. A light body and a heavy body have the same kinetic energy which one has a greater momentum ?





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6. What is an isolated system ?



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7. What is Reynold number ?



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8. A steel cable with a radius of 1.5 cm support a chairlift at ski area. If the maximum stress is not to exceed 10^8 N m^{-2} , what is the maximum load the cable can support?



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9. In a test experiment on a model aeroplane in a wind tunnel, the flow speeds on the upper and lower surfaces of the wing are 70 m s^{-1} and 63 m s^{-1} respectively. What is

the lift on the wing if its area is 2.5m^2 ? Take the density of air to be 1.3kgm^{-3}



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10. Why should the lubricant oils be of high viscosity ?



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11. The temperature difference between the ends of a rod of aluminium of length 1.0 m

and area of cross section 5.0 cm^2 is 200°C .

How much heat will flow through the rod in 5

minutes ? The coefficient of thermal

conductivity of aluminium is

$0.2 \text{ kJ s}^{-1} \text{ m}^{-1} \text{ }^\circ \text{C}^{-1}$.



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12. A person goes to post office slowly, purchases postcards and comes back speedily.

Draw time - velocity and time - displacement graphs.



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13. A simple harmonic oscillation is represented by the equation $y = 5 \sin(100\pi t + 0.8)$, when y and t are in metre and second respectively. Write down its amplitude, angular frequency, frequency time period and initial phase.



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[Section C Answer All Questions](#)

1. A body of mass m attached to one end of an ideal spring of force constant k is executing simple harmonic motion. Establish that the time - period of oscillation is $T = 2\pi\sqrt{m/k}$.



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2. The acceleration due to gravity on the surface of moon is $1.7ms^{-2}$. What is the time period of a simple pendulum on the moon if

its time period on the earth is 3.5 s ? (g on earth = $9.8ms^{-2}$)



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3. What do you understand by centripetal acceleration ? Derive formula for the centripetal acceleration of a particle moving on a circular path.



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4. Two vectors \vec{A} and \vec{B} are added. Prove that the magnitude of the resultant vector cannot be greater than $(A + B)$ and smaller than $(A - B)$ or $(B - A)$.



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5. What is meant by gravitational potential ?

Establish the formula for the same.



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6. A cylinder of mass 5 kg and radius 30 cm, and free to rotate about its axis, receives an angular impulse of $3 \text{ kg m}^2 \text{ s}^{-1}$ initially. Followed by a similar impulse after every 4 s. What is the angular speed of the cylinder 30 s after the initial impulse ? The cylinder is at rest initially.



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7. Write down the three equations of rotational motion and explain the meaning of

each symbol.



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8. Calculate the temperature at which the average kinetic energy of a molecule of a gas will be the same as that of an electron accelerated through, 1 volt.

Boltzmann constant $k = 1.4 \times 10^{-23} \text{JK}^{-1}$,

charge of an electron $e = 1.6 \times 10^{-19} \text{C}$.



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9. Estimate the fraction of molecular volume to the actual volume occupied by oxygen gas at NTP. Take the diameter of an oxygen molecule to be 3\AA .



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Section D Answer All Questions

1. Write first law of thermodynamic system and explain isochoric, isothermal and adiabatic process on its basis.



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2. A gas is filled in a cylinder fitted with piston at a constant temperature and pressure.

Explain on the basis of kinetic theory :

(i) The pressure of the gas increases by raising its temperature.

(ii) On pulling the piston out, the pressure of the gas decreases.

The pressure of an ideal gas filled in the bulb of a constant - volume gas thermometer at $7^{\circ}C$ is 60 cm of mercury. What will be the

pressure of the same volume of gas at $147^{\circ}C$

?



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3. What do you understand by torque and moment of inertia ? Obtain the relation between torque and moment of inertia for a rigid body.



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4. Find the torque of a force

$\vec{F} = -3\hat{i} + \hat{j} + 5\hat{k}$ acting at the point

$\vec{R} = 7\hat{i} + 3\hat{j} + \hat{k}$.



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5. If the units of force, energy and velocity are

10 N, 100 J and 5 ms^{-1} respectively. Then

obtain the units of length, mass and time.



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6. Write the limitations of dimensions and obtain the values of a,b and c in the equation

$$T \propto P^a \rho^b E^c$$

where, T is time, P is pressure E is energy and ρ is density.



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