



# PHYSICS

## BOOKS - CHHAYA PHYSICS (BENGALI ENGLISH)

### QUESTION PAPERS OF WBCHSE -2018

#### Section I

1. If the error in the measurement of the radius of a circular disk is 2% , the error in

determining the area of the disk will be

A. 4 %

B. 2 %

C. 6 %

D. 8 %

**Answer:**



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2. The velocity ( $m. s^{-1}$ ) - time (s) graph of body is a straight line inclined at an angle of  $45^\circ$  with the time axis . The acceleration ( in  $m. s^{-2}$  unit ) of the body is

A. 1

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

C.  $\sqrt{2}$

D.  $\frac{1}{\sqrt{3}}$

**Answer:**



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3. The maximum speed that can be attained by a car, without skidding, on a horizontal circular road of radius  $R$  and coefficient of kinetic friction  $\mu$  is

A.  $\mu Rg$

B.  $Rg\sqrt{\mu}$

C.  $\mu\sqrt{Rg}$

D.  $\sqrt{\mu Rg}$

**Answer:**



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4. The number of joules in 1 Kg .m is

A. 9.8

B. 980

C. 1000

D.  $10^5$

**Answer:**



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5. The displacement of a body of mass 3 Kg under the action of a force is  $s = \frac{t^2}{3}$ . Metre .

The work done in time 2s by the same force ( in j) is

A. 2

B. 3.8

C. 5.2

D. 2.66

**Answer:**



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6. Keeping the mass fixed , if the radius of the earth is halved , the acceleration due to gravity at any place will be

- A. half of the original
- B. one - fourth of the original
- C. double of the original
- D. four time of the original

**Answer:**



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7. The dimension of surface tension is

A.  $MLT^{-2}$

B.  $MLT^{-1}$

C.  $MT^{-2}$

D.  $ML^2T^{-2}$

**Answer:**





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8. The speed of a ball of radius 2 cm in a viscous liquid medium is  $20 \text{ cm} \cdot \text{s}^{-1}$ . The speed of a ball of radius 1 cm in the same liquid will be

A.  $5 \text{ cm} \cdot \text{s}^{-1}$

B.  $10 \text{ cm} \cdot \text{s}^{-1}$

C.  $40 \text{ cm} \cdot \text{s}^{-1}$

D.  $80 \text{ cm} \cdot \text{s}^{-1}$

**Answer:**



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9. When 110 J of heat is supplied to a gaseous system , the internal energy of the system increase by in sl . The amount of external work done ( in J) is

A. 150

B. 70

C. 110

D. 40

**Answer:**



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**10.** The path difference of two particles on a wave corresponding to a phase difference of  $60^\circ$  is

A.  $2\lambda$

B.  $\frac{\lambda}{2}$

C.  $\frac{\lambda}{6}$

D.  $\frac{\lambda}{3}$

**Answer:**



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**11.** a particle executes a simple harmonic motion with frequency  $f$ . The frequency at which the kinetic energy of the particle changes is

A.  $\frac{f}{2}$

B.  $f$

C.  $2f$

D.  $4f$

**Answer:**



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**Section II**

1. what are the significant figures in the result of addition of 9.8 and 15.298 ?



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2. IF  $\vec{A} = 0.4\hat{i} + 0.3\hat{j} + c\hat{k}$  be a unit vector , then what is the value of c ?



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3. which two of the following physical quantities are dimensionally alike ?

A. Surface tension

B. pressure

C. Coefficient of viscosity

D. Coefficient of elasticity .

**Answer:**



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4. when sound enters from air or vice - versa, which physical quantity of the waves remains unchanged ?



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5. Find the angle between the two vectors

$$\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k} \text{ and } \vec{B} = 2\hat{i} + \hat{j} + 4\hat{k} .$$



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6. The distance - time graph of a moving particle is given by  $x = 4t - 6t^2$

(I ) what is the positive maximum speed ?

(ii ) at what time would the speed of the particle be zero ?

( x is in metre and t is in second ) .



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7. A balloon at rest on the ground is rising is rising upward with acceleration  $\frac{g}{8}$  . A stone is

dropped from the balloon when it is at height  $H$  . Show that the time taken by the stone to touch the ground is  $2\sqrt{\frac{H}{g}}$  .



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**8.** A spring having spring constant  $K$  is cut into two parts in the ratio  $1:2$  find the spring constants of the two parts .



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9. Write down the mathematical form of the first law of thermodynamics .Mention the different terms .



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10. Show that the equation  $x = a \sin \omega t + b \cos \omega t$  represents a simple harmonic motion .



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11. Define inertial frame of reference .



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12. A particle moves from a point  $\vec{r}_1 = \hat{i} + 2\hat{j}$  in metre to another point  $\vec{r}_2 = 2\hat{i} + 3\hat{j}$  in newton . Find the work done by the force on the particle in the displacement .



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**13.** Define conservative force . Show that the work done around a closed path in a conservative force field is zero .



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**14.** Define angular momentum  $\left(\vec{L}\right)$  and torque  $\left(\vec{\tau}\right)$  . Show that  $\frac{d\vec{L}}{dt} = \vec{\tau}$  .



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**15.** A uniform solid sphere of mass  $M$  and radius  $R$  rolls down an inclined plane making an angle  $\theta$  with the horizontal without slipping . Show that the acceleration of the sphere is  $\frac{5}{7}\sin\theta$ . [Given : moment of inertia of the sphere is  $\frac{2}{5}MR^2$ ]



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**16.** Define centre of mass . Write down its mathematical form .. Two particles of masses 2

$g$  and  $3g$  are situated at the positions  $(2\text{ cm}, 3\text{ cm})$  and  $(4\text{ cm}, 5\text{ cm})$  respectively. Find the position vector of the centre of mass of the two particles.



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**17.** Define acceleration due to gravity.

Deduce an expression of the acceleration due to gravity at a place on the surface of the earth due to its rotation.



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**18.** What is meant by gravitational potential energy ? Deduce an expression of the total energy of a planet in its orbit .



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**19.** Define degrees of freedom . Write down the principle of equipartition of energy . Find the value of  $\gamma( = C_p / C_v )$  of a diatomic gas .



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**20.** Show that for ideal gas  $C_P - C_v = R$  and

$$\gamma = 1 + \frac{2}{f} , \text{ where } f \text{ is the degrees of}$$

freedom of the molecule .



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