

Physics

(for B.Tech, Integrated B.Tech(H) (Bio-Tech) (Food-Tech), B.Pharma)

General instructions

1. Each section comprises of 15 questions.
2. All questions are compulsory.
3. Each right answer would be awarded 4 marks.
4. There is no negative marking.

1. If pressure P , velocity V and time T are taken as fundamental physical quantities, then the dimensional formula for force is

(A) PV^2T^2

(B) $P^{-1}V^2T^{-2}$

(C) PVT^2

(D) $P^{-1}VT$

2. A particle is projected vertically upwards with a velocity of 20 m/sec. Find the time at which the distance travelled is twice the displacement

(A) $2 + \sqrt{4/3}$ sec.

(B) 1 sec.

(C) $2 + \sqrt{3/4}$

(D) 3 sec

3. A ball moving with a velocity \vec{u}_1 collides elastically with another ball of equal mass, in a onedimensional collision. Which of the following is not possible?

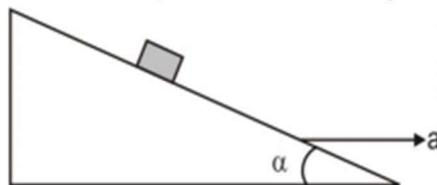
(A) First ball will come to rest

(B) Second ball will move with a velocity \vec{u}_1

(C) Both balls will move with velocity \vec{u}_1 after collision

(D) The first ball will move with a velocity less than \vec{u}_1

4. A block is kept on a frictionless inclined surface with angle of inclination ' α ' as shown in fig. the incline is given an acceleration ' a ' to keep the block stationary. Then a is equal to



(A) $g \tan \alpha$

(B) g

(C) $g \operatorname{cosec} \alpha$

(D) $g / \tan \alpha$.

5. If in a plano-convex lens radius of curvature of convex surface is 10 cm and the focal length of the lens is 30 cm, the refractive index of the material of the lens will be:

(A) 1.5

(B) 1.66

(C) 1.33

(D) 3

6. A lighter body and heavier body both are moving with same momentum and are being applied the same retarding force. Their stopping distances and stopping times are s_1, s_2 and t_1, t_2 respectively.

(A) $s_1 > s_2$

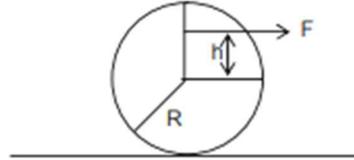
(B) $s_1 < s_2$

(C) $t_1 > t_2$

(D) $t_1 < t_2$

7. A body is gently dropped on a conveyor belt moving 3 m/s. If $\mu = 0.5$ how far will the body move relative to the belt before coming to rest? ($g = 10 \text{ m/s}^2$)
(A) 0.3 m (B) 0.6 m (C) 0.9 m (D) 0.8 m

8. Consider the disc kept on a rough horizontal surface as shown in the diagram. If a horizontal force 'F' has to be applied such that the disc starts pure rolling, what should be the value of 'h'?



(A) R

(B) $R/3$

(C) $R/2$

(D) Body can't start pure rolling for any value of 'h'

9. A particle is moving in a X-Y plane under the action of a force such that its instantaneous momentum $\vec{p} = 3 \cos t \hat{i} + 3 \sin t \hat{j}$. The instantaneous angle between the force and momentum is

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{4}$

(C) π

(D) zero

10. An ideal diatomic gas is expanded so that the amount of heat transferred to the gas is equal to the decrease in its internal energy. The process can be represented by the equation. $TV^n = \text{constant}$ where the value of n is

(A) $n = \frac{7}{5}$

(B) $n = \frac{1}{5}$

(C) $n = \frac{3}{2}$

(D) $n = \frac{3}{5}$

11. If an electron and a proton having same momenta enter perpendicular to a magnetic field, then

(A) the length of curved path of electron and proton will be same

(B) they will move undeflected

(C) the length of curved path of electron is more curved than that of the proton

(D) the length of curved path of proton is more curved than that of the electron

12. In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor, when the energy is stored equally between the electric and magnetic field is

(A) $Q/2$

(B) $Q/\sqrt{2}$

(C) $Q/\sqrt{3}$

(D) $Q/3$

13. Consider telecommunication through optical fibres. Which of the following statements is not correct?

(A) Optical fibres have extremely low transmission loss

- (B) Optical fibres may have homogeneous core with a suitable cladding
- (C) Optical fibres can be graded refractive index
- (D) Optical fibers are subject to electromagnetic interference from outside

14. A car moving with a speed of 50 km/h, can be stopped by brakes after at least 6 m. if the same car is moving at a speed of 100 km/h, the minimum stopping distance is

- (A) 12 m
- (B) 18 m
- (C) 24 m
- (D) 6 m.

15. If two soap bubbles of different radii are connected by a tube,

- (A) air flows from the bigger bubble to the smaller bubble till the sizes become equal
- (B) air flows from bigger bubble to the smaller bubble till the sizes are interchanged
- (C) air flows from the smaller bubble to the bigger
- (D) there is no flow of air.

Answer Key

1. A
2. A
3. D
4. A
5. C
6. B
7. C
8. C
9. A
10. B
11. A
12. B
13. D
14. C
15. C