

1. A simple pendulum of length l has a maximum angular displacement θ . The maximum kinetic energy of the bob is :
 (a) $mg l (1 - \cos \theta)$ (b) $0.5 mg l$
 (c) $mg l$ (d) $0.5 mg l$
2. Radius of orbit of satellite of earth is R . Its kinetic energy is proportional to :
 (a) $\frac{1}{R}$ (b) $\frac{1}{\sqrt{R}}$
 (c) R (d) $\frac{1}{R^{3/2}}$
3. The radius R of the soap bubble is doubled under isothermal condition. If T be the surface tension of soap bubble. The work done in doing so is given by :
 (a) $32\pi^2 T$ (b) $24\pi R^2 T$
 (c) $8\pi R^2 T$ (d) $4\pi R^2 T$
4. A body of specific heat $0.2 \text{ kcal/kg}^\circ \text{C}$ is heated through 100°C . The percentage increase in its mass is :
 (a) 9% (b) $9.311^{-11\%}$
 (c) 10% (d) none of these
5. Two similar coils are kept mutually perpendicular such that their centres coincide. At the centre, find the ratio of the magnetic field due to one coil and the resultant magnetic field through both coils, if the same current is flows:
 (a) $1 : \sqrt{2}$ (b) $1 : 2$
 (c) $1 : 2$ (d) $\sqrt{3} : 1$
6. A prism of refractive index $\sqrt{2}$ has a refracting angle of 60° . At what angle a ray must be incident on it, so that it suffers a minimum deviation :
 (a) 45° (b) 60°
 (c) 90° (d) 180°
7. A cone filled with water is revolved in a vertical circle of radius 4 m and the water does not fall down. What must be the maximum period of revolution?
 (a) 2 s (b) 4 s (c) 1 s (d) 6 s
8. A conducting sphere of radius $R = 20 \text{ cm}$ is given a charge $Q = 16 \mu \text{C}$. What is \hat{E} at centre?
 (a) $3.6 \times 10^0 \text{ N/C}$ (b) $1.8 \times 10^6 \text{ N/C}$
 (c) Zero (d) $0.9 \times 10^6 \text{ N/C}$
9. Three circular concentric wires of radii a , $2a$ and $3a$ are carrying current $3I$, $2I$ and I in same manner. The magnetic field at the common centre is :
 (a) $\frac{13\mu_0 I}{6a}$ (c) $\frac{\mu_0 I}{6a}$
 (c) $\frac{\mu_0 I}{a}$ (d) none of these
10. The maximum range of a gun on horizontal terrain is 16 km, if $g = 10 \text{ m/s}^2$. What must be the muzzle velocity of the shell?
 (a) 200 m/s (b) 100 m/s
 (c) 400 m/s (d) 300 m/s
11. The length, breadth and thickness of a block are given by $l = 12 \text{ cm}$, $b = 6 \text{ cm}$ and $t = 2.45 \text{ cm}$. The volume of the block according to the idea of significant figures should be :
 (a) $1 \times 10^2 \text{ cm}^3$ (b) $2 \times 10^2 \text{ cm}^3$
 (c) $1.763 \times 10^2 \text{ cm}^3$ (d) none of these

12. Five particles of mass 2 kg are attached to the rim of a circular disc of radius 0.1 m and negligible mass. Moment of inertia of the system about the axis passing through the centre of the disc and perpendicular to its plane is :

(a) 1 kg m^2 (b) 0.1 kg m^2
(c) 2 kg m^2 (d) 0.2 kg m^2

13. The radius of the convex surface of plano-convex lens is 20 cm and the refractive index of the material of the lens is 1.5. The focal length is:

(a) 30 cm (b) 50 cm
(c) 20 cm (d) 40 cm

14. An ice-cube of density 900 kg/m^3 is floating in water of density 1000 kg/m^3 . The percentage of Volume of ice-cube outside the water is :

(a) 20% (b) 35%
(c) 10% (d) 25%

15. A sphere of diameter 0.2 m and mass 2 kg is rolling on an inclined plane with velocity $v = 0.5 \text{ m/s}$. The kinetic energy of the sphere is :

(a) 0.1 J (b) 0.3 J
(c) 0.5 J (d) 0.42 J

16. An electron moves at right angle to a magnetic field of $5 \times 10^{-2} \text{ T}$ with a speed of $6 \times 10^7 \text{ m/s}$. If the specific charge of the electron is $1.7 \times 10^{11} \text{ C/kg}$. The radius of the circular path will be :

(a) 2.9 cm (b) 3.9 cm
(c) 2.35 cm (d) 2 cm

17. If work function of a metal is 4.2 eV, the cut off wavelength is :

(a) 8000 Å (b) 7000 Å
(c) 1472 Å (d) 2950 Å

18. A particle is executing the motion $x = a \cos(\omega t - \theta)$. $(\omega t - \theta)$. The velocity of the particle is:

(a) $a\omega \sin \theta$ (b) $a\omega$
(c) $a\omega \sin \theta$ (d) none of these

19. A particle is executing two different simple harmonic motions, mutually perpendicular, of different amplitudes and having phase difference of $\frac{\pi}{2}$. The path of the particle will be :

(a) circular (b) straight line

(c) parabolic (d) elliptical

20. Equations of motion in the same direction are given by:

$$y_1 = 2a \sin(\omega t - kx)$$

$$y_2 = 2a \sin(\omega t - kx - \theta)$$

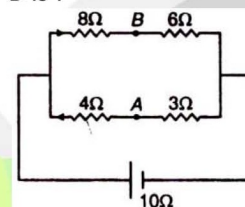
The amplitude of the medium particle will be :

(a) $2a \sin \theta$ (b) $\sqrt{2}a \sin \theta$
(c) $4a \sin \frac{\theta}{2}$ (d) $\sqrt{2}a \sin \frac{\theta}{2}$

21. The work function of sodium is 2.3 eV. The threshold wavelength of sodium will be :

(a) 2900 Å (b) 2500 Å
(c) 5380 Å (d) 1200 Å

22. The potential difference between points A and B is :



(a) $\frac{20}{7} \text{ V}$ (b) $\frac{40}{7} \text{ V}$
(c) $\frac{10}{7} \text{ V}$ (d) zero

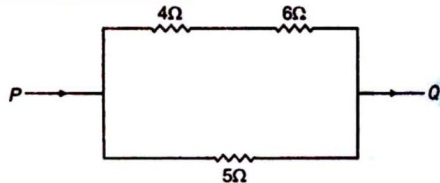
23. The velocity of light emitted by a source S observed by an observer at rest w.r.t S is c. If the observer moves with a speed v towards S, then velocity of light as observed by the observer will be:

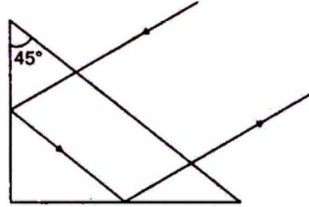
(a) c (b) $\sqrt{1 - v^4/c^2}$
(c) $c + v$ (d) $c - v$

24. A closed argon pipe and an open argon pipe are tuned to the same fundamental frequency. What is the ratio of their lengths?

(a) 1 : 2 (b) 2 : 1
(c) 2 : 3 (d) 4 : 3

25. When a certain current is passed in the circuit as shown in figure, 10 kcal of heat is produced in 5Ω resistance. How much heat is produced in Ω resistance?



- (a) 4 kcal (b) 2 kcal
(c) 5 kcal (d) 3 kcal
26. A steel scale measures the length of a copper wire as 80.0 cm, when both are at 20°C, the calibration temperature for the scale. What would the scale read for the length of the rod when both are at 40°C?
Given: α for steel = 11×10^{-6} per °C and α for Cu = 17×10^{-6} per °C
(a) 80.0096 cm (b) 80.0272 cm
(c) 1 cm (d) 25.2 cm
27. A tank is filled with water upto height H . When hole is made at a distance h below the level of water. What will be the horizontal range of water jet?
(a) $2\sqrt{h(H-h)}$ (b) $4\sqrt{h(H+h)}$
(c) $4\sqrt{h(H+h)}$ (d) $2\sqrt{h(H+h)}$
28. A raft of wood of mass 120 kg floats in water. The weight that can be put on the raft to make it just sink, should be $d^A = 600 \text{ kg/m}^3$:
(a) 80 kg (b) 50 kg
(c) 60 kg (d) 30 kg
29. A particle is kept at rest at the top of a sphere of diameter 42 m. When disturbed slightly, it slides down. At what height h from the bottom, the particle will leave the sphere?
(a) 14 m (b) 28 m
(c) 35 m (d) 7 m
30. If an insulated non-conducting sphere of radius R has charge density p . The electric field at a distance r from the centre of sphere ($r > R$) will
(a) $\frac{pR}{3\epsilon_0}$ (b) $\frac{pR}{\epsilon_0}$
(c) $\frac{pR}{3\epsilon_0}$ (d) $\frac{3pR}{\epsilon_0}$
31. The minimum wavelength of X-ray emitted by X-ray tube is 0.4125\AA . The accelerating voltage is :
(a) 30 kV (b) 50 kV
(c) 80 kV (d) 60 kV
32. A monoatomic gas supplied the heat Q very slowly keeping the pressure constant. The work done by the gas will be :
(a) $\frac{2}{3}Q$ (b) $\frac{3}{5}Q$
(c) $\frac{2}{5}Q$ (d) $\frac{1}{5}Q$
33. A thin lens has focal length f and its aperture has diameter d . It forms an image of intensity I . Now the central part of the aperture upto diameter $d/2$ is blocked up by an opaque paper. The focal length and the image intensity will change to :
(a) $\frac{f}{2}$ and $\frac{I}{2}$ (b) f and $\frac{I}{4}$
(c) $\frac{3f}{4}$ and $\frac{I}{2}$ (d) f and $\frac{3I}{4}$
34. The temperature of the black body increases from T to $2T$. The factor by which the rate of emission will increase, is?
(a) 4 (b) 2
(c) 16 (d) 8
35. A police jeep is chasing with velocity of 45 km/h a thief in a nother jeep moving with velocity 153 km/h. Police fires a bullet with muzzle velocity of 180 m/s. The velocity it will-strike the car of the thief is :
(a) 150 m/s (b) 27 m/s
(c) 450 m/s (d) 250 m/s
36. What should be the minimum value of refractive index of the material of the prism for the reflections to take place as shown in the figure :

(a) 1.7 (b) 1.4
(c) 1.2 (d) 2.7
37. An LC circuit is in the state of resonance. If $C = 0.1 \mu F$ and $L = 0.25 \text{ H}$. Neglecting ohmic resistance of circuit. What is the frequency of oscillations?
(a) 1007 Hz (b) 100 Hz

(c) 109 Hz

(d) 500 Hz

- 38.** A person who can see things most clearly at a distance of 10 cm, requires spectacles to enable to see clearly things at a distance of 30 cm. What should be the focal length of the spectacles?

(a) 15 cm (Concave)

(b) 15 cm (Convex)

(c) 10 cm

(d) Zero

- 39.** The dimensional formula for Young's modulus is:

(a) $[ML^{-1}T^{-2}]$

(b) $[M^0LT^{-2}]$

(c) $[MLT^{-2}]$

(d) $[ML^2T^{-2}]$

- 40.** When temperature of an ideal gas is increased from 27°C to 227°C , its rms speed is changed from 400 m/s to v_s . The v_s is :

(a) 516 m/s

(b) 450 m/s

(c) 310 m/s

(d) 746 m/s

Answer – Key

1. a	2. a	3. a	4. b	5. a	6. a	7. b	8. c	9. a	10. c
11. b	12. b	13. d	14. c	15. d	16. c	17. d	18. b	19. d	20. c
21. c	22. d	23. a	24. a	25. b	26. a	27. a	28. a	29. c	30. c
31. a	32. a	33. d	34. c	35. a	36. b	37. a	38. a	39. a	40. a