PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 23

Paper 1 Physics Chemistry

1. Wavefront of a wave has direction with wave motion

A. parallel

B. perpendicular

C. opposite

D. at an angle of θ

Answer: B

Watch Video Solution

2. A partcle rests on the top of a hemisphere of radius R. Find the smallest horizontal velocity that must be imparted to the particle if it is to leave the hemisphere without sliding down :

A. $\sqrt{g}R$

B. $\sqrt{2gR}$

C. $\sqrt{3gR}$

D. $\sqrt{5gR}$

Answer: A

Watch Video Solution

3. Relative permeability of iron is 5500, then its magnetic susceptibility will be

A. $5500XX10^{7}$

B. 5500×10^{-7}

C. 55001

D. 5499

Answer: D

Watch Video Solution

4. The moment of inertia of the body about an axis is 1.2 kg m^2. Initially the body is at rest. In order to produce a rotational kinetic energy of 1500J, an angualr acceleration of 25 $ra\frac{d}{s^2}$ must be applied about the axis for the duration of

A. 4s

B. 2s

C. 8s

D. 10s

Answer: B

Watch Video Solution

Watch Video Solution

5. Let the x-z plane be the boundary between two transparent media. Medium 1 in $z \geq 0$ has a refractive index of $\sqrt{2}$ and medium 2 with $z < 0$ has a refractive index of $\sqrt{3}$. A ray of light in medium 1 given by the vector $\vec{A} = 6\sqrt{3}\hat{i} + 8\sqrt{3}\hat{j} - 10\hat{k}$ is incident on the plane of separation. The angle of refraction in medium 2 is:

A. 45°

B. 60°

C. 75°

D. 30°

Answer: A

Watch Video Solution

6. The breaking strength of a rod of diameter 2cm is $2 \times 10^5 N$. Then that for rod of same material but diameter 4 cm will be

A. $2 \times 10^5 N$

B. $1 \times 10^5 N$

C. $8 \times 10^5 N$

D. $0.5 \times 10^5 N$

Answer: C

Watch Video Solution

7. A metallic rod of Young's modulus $2 \times 10^{11} Nm^2$ undergoes a strain of 0.5% . Then the energy stored per unit volume in the rod will be

A. $2.5 \times 10^6 J/m^3$

B. $5 \times 10^8 J/m^3$

C. $2.5 \times 10^8 J/m^3$

D. $0.5 \times 10^{11} J/m^3$

Answer: A

Watch Video Solution

8. A cyclotron can accelerate

A. β-particles

B. α-particles

C. high-velocity gamma rays

D. high velocity X-rays

Answer: B

Watch Video Solution

9. The work done in increasing the size of a soap film from $10cm \times 6cm$ to $10cm \times 11cm$ is 3×10^{-4} Joule. The surface tension of the film is

A. $1.5 \times 10^{-2} N/m$

B. $3.0 \times 10^{-2} N/m$

C. $6.0 \times 10^{-2} N/m$

D. $11 \times 10^{-2} N/m$

Answer: B

Watch Video Solution

10. A potentiometer having the potential gradient of $2mV/cm$ is used to measure the difference of potential across a resistance of $10ohm$. If a length of $50cm$ of the potentiometer wire is required to get null point, the current passing through the $10ohm$ resistor is (in mA)

A. 1

B. 2

C. 5

D. 10

Answer: D

Watch Video Solution

11. An ammeter gives full deflection when a current of $2amp$. Flows through it. The resistance of ammeter is $12ohms$. If the same ammeter is to be used for measuring a maximum current of $5amp$, then the ammeter must be connected with a resistance of

A. 8Ω in series

B. 18Ω in series

C. 8Ω in parallel

D. 18Ω in parallel

Answer: C

Watch Video Solution

12. Eight dipoles of charges of magnitude e are placed inside a cube. The total electric flux coming out of the cube will be

A. $\frac{8e}{\varepsilon_0}$

B. $\frac{16e}{\varepsilon_0}$

C. $\frac{e}{\varepsilon_0}$

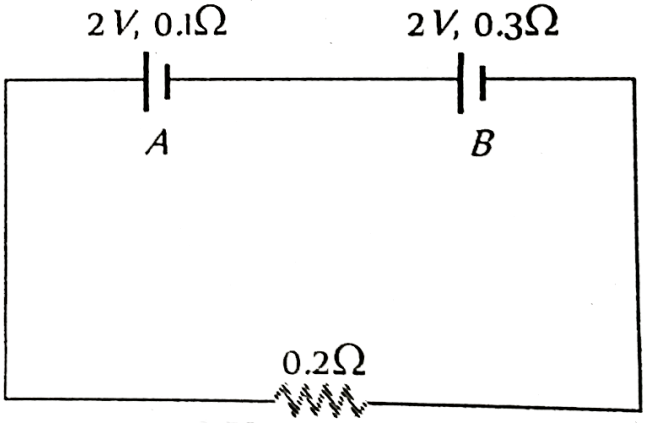
D. zero

Answer: D

Watch Video Solution

13. The internal resistances of two cells shown are 0.1Ω and 0.3Ω. If $R = 0.2\Omega$, its potential difference across the

cell



A. B wil be zero

B. A will be zero

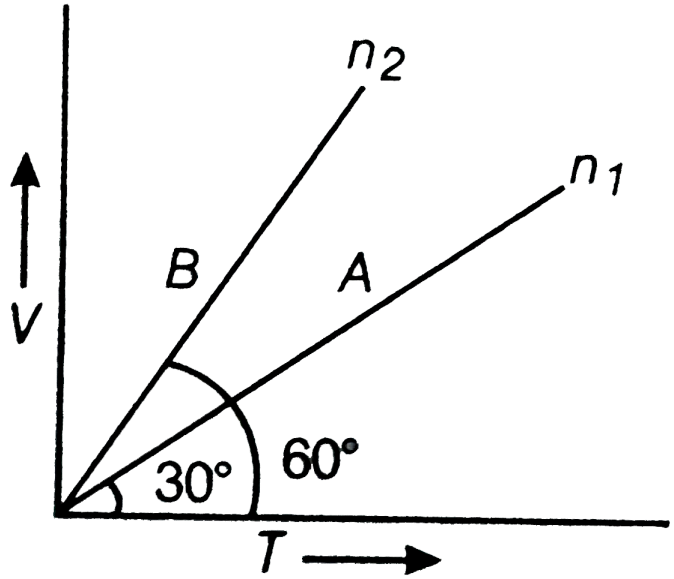
C. A and B be 2V

D. A well be > 2 and B will be $< 2V$

Answer: A

Watch Video Solution

14. Two gases A and B at same pressure contain number of moles n_1 and n_2. Their volume temperature graphs are shown in figure. Then the ratio



A. 1

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

C. $\frac{1}{3}$

D. 3

Answer: C

Watch Video Solution

15. Two bodies are at temperature 27° and $927^\circ C$. The heat energy radiated by them will be in the ratio:

A. $1:4$

B. $1:16$

C. $1:64$

D. $1:256$

Answer: D

Watch Video Solution

16. A metal ball of surface area $200cm^2$ and temperature $527^\circ C$ is surrounded by a vessel at $27^\circ C$. If the emissivity of the metal is 0.4, then the rate of loss of heat from the ball is $\left(\sigma = 5.67 \times 10^{-8} J/m^2 - s - k^4\right)$

A. 108W

B. 168W

C. 185W

D. 192W

Answer: C

Watch Video Solution

17. A convex lens of focal length 30 cm produces 5 times magnified real image of an object. What is the object distance?

A. 36cm

B. 25cm

C. 30cm

D. 150cm

Answer: A

Watch Video Solution

18. An ideal Black-body at room temperature is thrown into a furnace. It is observed that

A. initially it is darkest body and at later time the brightest

B. it is darkest body at all the times

C. it cannot be distinguished at all the times

D. initially it is the darkest body and at later times it pebwollot ertt bssf cannot be distinguished

Answer: D

Watch Video Solution

19. A particle is vibrating simple harmonically with amplitude $'a'$. The displacement of the particle when its energy is half kinetic and half potential is.

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

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

C. $\frac{a}{4}$

D. zero

Answer: B

Watch Video Solution

20. A particle of mass 1 kg is moving in SHM with path length 0.01 m and a frequency of 50 Hz. The maximum force in newton, acting on the particle is

A. $150\pi^2$

B. $200\pi^2$

C. $100\pi^2$

D. $50\pi^2$

Answer: C

Watch Video Solution

21. A body of mass 5 kg is whirled in a vertical circle by a string 1 m long. Calculate velocity at top of the circle for just looping the vertical loop.

A. 3.1m/s

B. 7m/s

C. 9m/s

D. 7.3m/s

Answer: A

Watch Video Solution

22. A wire $\left(Y = 2 \times 10^{11} N/m\right.$ has length 1m and area $1mm^2$. The work required to increase its length by 2mm is

A. 400J

B. 40J

C. 0.4J

D. 0.04J

Answer: C

Watch Video Solution

23. If the surface tension of water is 0.06 Nm, then the capillary rise in a tube of diameter 1mm is $(\theta = 0^\circ)$

A. 1.22cm

B. 2.44cm

C. 3.12cm

D. 3.86cm

Answer: B

Watch Video Solution

24. An open tube is in resonance with string (frequency of vibration of tube is n 0). If tube is dipped in water so that 75% of length of tube is inside water, then the ratio of the frequency of tube to string now will be

A. 1

B. 2

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: B

Watch Video Solution

25. The instantaneous acceleration of a particle executing SHM given by $y = a \sin \omega t$ is

A. $+\omega^2 y$

B. $+\omega y$

C. $-\omega y^2$

D. $-\omega^2 y$

Answer: D

Watch Video Solution

26. The resolving power of a telescope whose lens has a diameter of 1.22 m for a wavelength of 5000Å is

A. 2×10^5

B. 2×10^6

C. 2×10^2

D. 2×10^4

Answer: B

Watch Video Solution

27. Which one of the following is not a fundamental SI unit?

A. Amper

B. Candela

C. Newton

D. Kelvin

Answer: C

Watch Video Solution

28. The speed of sound in air is 320 m/s. The fundamental frequency of an open pipe 50 cm long will be

A. 320Hz

B. 160Hz

C. 640Hz

D. 960Hz

Answer: A

Watch Video Solution

29. When the angle of incidence on a material is 60°, the reflected light is completely polarised. The velocity of the refracted ray inside the materials is (in m//sec^(-1))

A. 3×10^8

B. $\frac{3}{\sqrt{2}} \times 10^8$

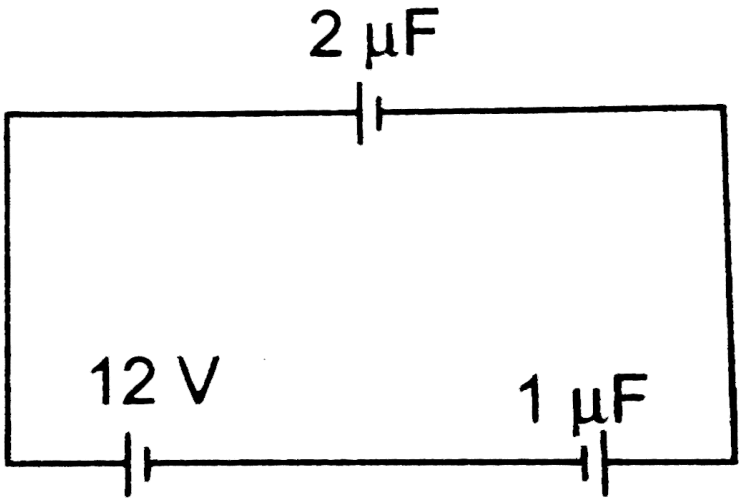
C. $\sqrt{3} \times 10^8$

D. 0.5×10^8

Answer: C

Watch Video Solution

30. In a ircuit shown in figure, the potential difference across the capacitor of $2\mu F$ is



A. 8V

B. 4V

C. 12V

D. 6V

Answer: B

Watch Video Solution

31. Long distance short-wave radio broadcasting uses

A. ground wave

B. ionospheric wave

C. direct wave

D. sky wave

Answer: D

Watch Video Solution

32. The dimensional formula for inductance is

A. $\left[ML^2T^{-2}A^{-2}\right]$

B. $\left[ML^2TA^{-2}\right]$

C. $\left[ML^2T^{-2}A^{-2}\right]$

D. $\left[ML^2T^{-2}A^{-2}\right]$

Answer: D

Watch Video Solution

33. If the pressure at half of the lake is equal to 1/3 pressure at the bottom of the lake, what is the depth of the take?

$\left(\text{assume} g = 10 m / s^2, atm = 1 \times 10^5 \text{ and } \rho = 10^3 kgm^{-3}\right)$

A. 9.6m

B. 7.5m

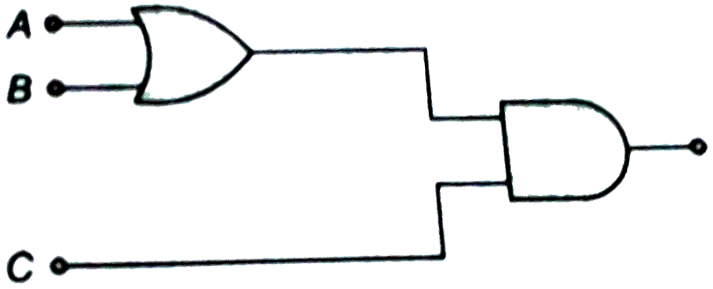
C. 40m

D. 3.2m

Answer: C

Watch Video Solution

34. To get an output 1 from the circuit shown in the figure, the input must be



A. A=0, B=1,C=0

B. A=1,B=0,C=0

C. A=1,B=0,C=1

D. A=1,B=1,C=0

Answer: C

Watch Video Solution

35. The capacitance of an air filled parallel plate capacitor is $10\mu F$. The separation between the plates is doubled and the space between the plates is then filled with wax giving the capacitance a new value of 40×10^{-12} farads. The dielectirc consatnt of wax is

A. 12

B. 10

C. 8

D. 4.2

Answer: C

Watch Video Solution

36. A light wave is incident normally over a slit of width $24 \times 10^{-5} cm$. The angular position of second dark fringe from the central maxima is 30°. What is the wavelength of light?

A. 6000Å

B. 5000Å

C. 3000Å

D. 1500Å

Answer: A

 Watch Video Solution

37. In an induction coil, the coefficient of mutual induction is 4 H. If a current of 5 A in primary coil is cut-off in 1/1500 s, the emf at the terminals of secondary coil will be

A. 10kV

B. 15kV

C. 30kV

D. 60kV

Answer: C

Watch Video Solution

38. Water is flowing through a pipe of constant cross-section. At some point the pipe becomes narrow and the cross-section is halved. The speed of water is

A. reduced to zero

B. decreased by a factor of 2

C. increased by a factor of 2

D. unchanged

Answer: C

39. In a biprism experiment, the wavelenght of monochromatic light is 6000Å. The distance between two virtual images is 6 mm . The number of fringes formed per mm on a screen placed at a distance of 1 m is

A. 5

B. 10

C. 15

D. 20

Answer: B

Watch Video Solution

40. A wheel having moment of inertia $2kgm^2$ about its vertical axis, rotates at the rate of $60r \pm$ about this axis. The torque which can stop the wheel's rotation in one minute would be

A. $\frac{2\pi}{15} N.m$

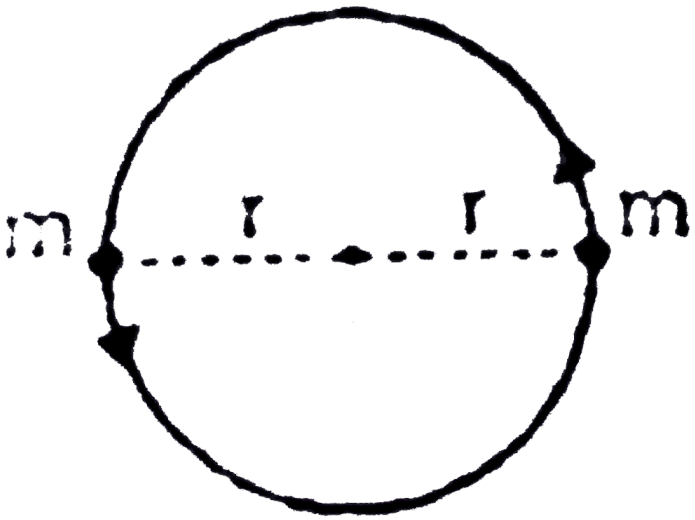
B. $\frac{\pi}{12} N.m$

C. $\frac{\pi}{15} N - m$

D. $\frac{\pi}{18} N - m$

Answer: C

Watch Video Solution



41.

Two particles of equal mass (m) each move in a circle of radius (r) under the action of their mutual gravitational attraction find the speed of each particle.

A. $v = \frac{1}{2R}\sqrt{\frac{1}{Gm}}$

B. $v = \sqrt{\frac{Gm}{2R}}$

C. $v = \frac{1}{2}\sqrt{\frac{Gm}{R}}$

D. $V = \sqrt{\frac{4Gm}{R}}$

Answer: C

Watch Video Solution

42. A force of 1200 N acts on a 0.5 kg steel ball as a result of collision lasting 25 ms. If the force is in a direction opposite to the initial velocity of 14 ms, then the final speed of the steel ball would be

A. $24ms^{-1}$

B. $35ms^{-1}$

C. $12ms^{-1}$

D. $46ms^{-1}$

Answer: D

Watch Video Solution

43. A block of mass 2 kg rests on a horizontal surface. If a horizontal force of 5 N is applied on the block, the frictional force on it is $(\text{take}, u_k = 0.4, \mu_s = 0.5)$

A. 5N

B. 10N

C. 8N

D. zero

Answer: A

Watch Video Solution

44. The photoelectric threshold of a certain metal is $3000A$. If the radiation of $2000A$ is incident on the metal

A. electrons will be emitted

B. positrons will be emitted

C. protons will be emitted

D. electrons will not be emitted

Answer: A

Watch Video Solution

45. If the change in the value of g at a height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)

A. x=h

B. x=2xh

C. $x = \frac{h}{2}$

D. $x = h^2$

Answer: B

Watch Video Solution

46. The component of vector $A = \left(a_x \hat{i} + a_y \hat{k} a_z \hat{k}\right)$ along the direction of (i - j) is

A. $a_x - a_y + a_z$

B. $a_x - a_y$

C. $\left(a_x - a_y\right) / \sqrt{2}$

D. $a_x + a_y + a_z$

Answer: C

Watch Video Solution

47. Ionization energy of an electron present in the second Bohr's orbit of hydrogen is

A. 54.4 ev

B. 13.6 ev

C. 1.5 eV

D. 3.4 ev

Answer: D

Watch Video Solution

48. In a seconds pendulum, mass of bob is 30 gm . If it is replaced by 90 gm mass. Then its time period will

A. 1s

B. 2s

C. 4s

D. 3s

Answer: B

Watch Video Solution

49. A magnetic field of $2 \times 10^{-2} T$ acts at right angles to a coil of area $100 cm^2$ with 50 turns. The average emf induced in the coil is $0.1 V$, when it is removed from the field in time t. The value of t is

A. 10s

B. 0.1s

C. 0.01s

D. 1s

Answer: B

Watch Video Solution

50. The resultant of two vectors $\vec{P}$ and $\vec{Q}$ is $\vec{R}$. If the magnitude of $\vec{Q}$ is doubled, the new resultant vector becomes perpendicular to $\vec{P}$. Then, the magnitude of $\vec{R}$ is equal to

A. P+Q

B. Q

C. P

D. $\frac{P+Q}{2}$

Answer: B

Watch Video Solution