PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2014

Physics

1. In cyclotron for a given magnet radius of the semicircle traced by positive ion is directly

proportional to (where v= velocity of positive ion)

A. v^{-2}

B. v^{-1}

C. v

D. v^2

Answer: C

Watch Video Solution

2. A body is moved along a straight line by a machine delivering constant power . The distance moved by the body is time t is proptional to

A. $t^{1/2}$

B. $t^{2/3}$

C. t

D. $t^{3/2}$

Answer: D

Watch Video Solution

Watch video solution

3. In insulators (CB is conduction band and VB is valence band)

A. VB is partially filled with electrons

B. CB is partially filled with electrons

C. CB is empty and VB is filled with electrons

D. CB is filled with electrons and VB is empty

Answer: C

Watch Video Solution

4. An object of radius R and mass M is rolling horizontally without slipping with speed v . It then rolls up the hill to a maximum height $h = \frac{3v^2}{4g}$. The moment of inertia of the object is (g = acceleration due to gravity)

A. $\frac{2}{5}MR^2$

B. $\frac{MR^2}{2}$

C. MR^2

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

Answer: B

Watch Video Solution

5. In a Wheatstone's bridge, three resistances P,Q and R connected in the three arms and the fourth arm is formed by two resistances S_1 and S_2 connected in parallel. The condition for the bridge to be balanced will be

A. $\frac{R(s_1+s_2)}{s_1 s_2}$

B. $\frac{s_1 s_2}{R(s_1+s_2)}$

C. $\frac{Rs_1 s_2}{(s_1+s_2)}$

D. $\frac{(s_1+s_2)}{Rs_1 s_2}$

Answer: A

Watch Video Solution

6. In common base circuit of a transistor , current amplification factor is 0.95. Calculate the emitter current , if base current is 0.2 mA

A. 2 mA

B. 4 m A

C. 6 mA

D. 8 mA

Answer: B

Watch Video Solution

7. The rartio $(\text{in} S1 units)$ of magnetic dipole moment to that of the angular momentum of

an electron of mass mkg and charge e coulomb in Bohr's orbit of hydrogen atom is

A. $\frac{e}{m}$

B. $\frac{m}{e}$

C. $\frac{2m}{e}$

D. $\frac{e}{2m}$

Answer: D

Watch Video Solution

8. Gases excert pressure on the walls of the container , because the gas molecules

A. have finite volume

B. obey Boyle's law

C. possess momentum

D. collide with one another

Answer: C

Watch Video Solution

9. Two coherent sources of intensity ratio α interface . In interference pattern $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} =$

A. $\frac{2\alpha}{1+\alpha}$

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

C. $\frac{2\alpha}{1+\sqrt{\alpha}}$

D. $\frac{1+\alpha}{2\alpha}$

Answer: B

Watch Video Solution

10. Light of wavelength λ_A and λ_B falls on two identical metal plates A and B respectively . The maximum kinetic energy of photoelectrons in K_A and K_B respectively , then which one of the following relations is true ? $(\lambda_A = 2\lambda_B)$

A. $K_A < \frac{K_B}{2}$

B. $2K_A = K_B$

C. $K_A = 2K_B$

D. $K_A > 2K_B$

Answer: A

 Watch Video Solution

11. If, an electron in hydrogen atom jumps from an orbit of lelvel n=3 to an orbit of level n=2, emitted radiation has a freqwuency (R= Rydbertg's contant ,c = velocity of light)

A. $\frac{3R_C}{27}$

B. $\frac{R_C}{25}$

C. $\frac{8R_C}{9}$

D. $\frac{5R_C}{36}$

Answer: D

Watch Video Solution

12. In electromagnetic wave , according to Maxwell , changing electric field gives

A. stationary magnetic field

B. conduction current

C. eddy current

D. displacement current

Answer: D

 Watch Video Solution

13. The de-Broglie wavelength of an electron in 4th orbit is (where, r=radius of 1st orbit)

A. $2\pi r$

B. $4\pi r$

C. $6\pi r$

D. $16\pi r$

Answer: C

Watch Video Solution

14. A string of length L and force constant k is stretched to obtain extension l. It is further stretched to obtain extension l_1. The work done in second streching is

A. $\frac{1}{2}kl_1(2l + l_1)$

B. $\frac{1}{2}Kl_1^2$

C. $\frac{1}{2}K\left(l^2+l_1^2\right)$

D. $\frac{1}{2}K\left(l_1^2+l^2\right)$

Answer: D

Watch Video Solution

15. The equiconvex lens has focal length f. If is cut perpendicular to the principal axis passin through optical centre, then focal length of each half is

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

B. t

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

D. $2t$

Answer: D

Watch Video Solution

16. If $'N'$ is the number of turns in a coil, the value of self inductance varies as

A. N^0

B. N

C. N^2

D. N^{-2}

Answer: B

Watch Video Solution

17. Surface density of charge on a sphere of radius R in terms of electric intensity E at a

distance in free space is

(ε_0 = permittivity of free space)

A. $\varepsilon_0 E\left(\frac{R}{r}\right)^2$

B. $\frac{\varepsilon_0 ER}{r^2}$

C. $\varepsilon_0 E\left(\frac{r}{R}\right)^2$

D. $\frac{\varepsilon_0 Er}{R^2}$

Answer: C

Watch Video Solution

18. A body sliding on a smooth inclined plane requires $4s$ to reach the bottom, starting from rest at the at the top. How much time does it take to cover ont-foruth the distance startion from rest at the top?

A. 1 s

B. 2 s

C. 3 s

D. 4 s

Answer: B

Watch Video Solution

19. In vacum, to travel distance d, light takes time t and in medium to travel distance 5d, it takes time T. The critical angle of the medium is

A. $\sin^{-1}\left(\frac{5T}{t}\right)$

B. $\sin^{-1}\left(\frac{5t}{3T}\right)$

C. $\sin^{-1}\left(\frac{5t}{T}\right)$

D. $\sin^{-1}\left(\frac{3t}{5T}\right)$

Answer: C

Watch Video Solution

20. In electromagnetic spectrum , the frequencies of α - rays , X - rays and ultraviolet rays are denoted by n_1, n_2 and n_3 respectively then

A. $n_1 > n_2 > n_3$

B. $n_1 < n_2 < n_3$

C. $n_1 < n_2 < n_3$

D. $n_1 < n_2 < n_3$

Answer: A

Watch Video Solution

21. In LCR series circuit , an alternating emf e and current i are given by the equations $e = \sin(100t)$ volt .

$i = 100 \sin\left(100t + \frac{\pi}{3}\right)$ mA

The average power dissipated in the circuit will be

A. 100 W

B. 10 W

C. 5 W

D. 2.5 W

Answer: D

Watch Video Solution

22. A block rests on a horizontal table which is executing SHM in the horizontal plane with an amplitude A. What will be the frequency of

oscillation, the block will just start to slip?

Coefficient of friction $= \mu$.

A. $\frac{1}{2\pi}\sqrt{\frac{\mu g}{A}}$

B. $\frac{1}{4\pi}\sqrt{\frac{\mu g}{A}}$

C. $2\pi\sqrt{\frac{A}{\mu g}}$

D. $4\pi\sqrt{\frac{A}{\mu g}}$

Answer: A

 Watch Video Solution

23. A sound wave travelling with a velocity V in a medium A reaches a point on the interface of medium A and medium B. If the velocity in the medium B be $2V$, then the angle

of incidence for total internal reflection of the wave will be greater than:

A. 15°

B. 30°

C. 45°

D. 90°

Answer: B

Watch Video Solution

24. A gas is compressed isothermally . The rms velocity of its molecules

A. increases

B. decreases

C. first increases and then decreases

D. remains the same

Answer: D

Watch Video Solution

25. Two concentric spheres kept in air have radii R and r. They have similar charge and equal surface charge density σ. The electrical potential at their common centre is (where, $\varepsilon_0 =$ permittivity of free space)

A. $\frac{\sigma(R+r)}{\varepsilon_0}$

B. $\frac{\sigma(R-r)}{\varepsilon_0}$

C. $\frac{\sigma(R+r)}{2\varepsilon_0}$

D. $\frac{\sigma(R+r)}{4\varepsilon_0}$

Answer: A

Watch Video Solution

26. The velocity of water in river is 9 km/h of the upper surface . The river is 10 m deep . If the coefficient of viscosity of water is 10^{-2}

poise then the shearing stress between horizontal layers of water is

A. $0.25 \times 10^{-2} N/m^2$

B. $0.25 \times 10^{-3} N/m^2$

C. $0.5 \times 10^{-3} N/m^2$

D. $0.75 \times 10^{-3} N/m^2$

Answer: A

Watch Video Solution

27. A sphere P of mass m moving with velocity u collides head on with another sphere Q of mass m which is at rest . The ratio of final velocity of Q to initial velocity of P is

(e = coefficient of restitution)

A. $\frac{e-1}{2}$

B. $\left[\frac{e+1}{2}\right]^{1/2}$

C. $\frac{e+1}{2}$

D. $\left[\frac{e+1}{2}\right]^{2}$

Answer: C

Watch Video Solution

28. Magnetic induction produced at the centre of a circular loop carrying current is B . The magnetic moment of the loop of radius R is (Me = permeability of tree space)

A. $\frac{BR^3}{2\pi\mu_0}$

B. $\frac{2\pi BR^3}{\mu_0}$

C. $\frac{BR^2}{2\pi\mu_0}$

D. $\frac{2\pi BR^2}{\mu_0}$

Answer: B

Watch Video Solution

29. In air , a charged soap bubble of radius r is in equilibrium having outside and inside pressures being equal . The charge on the drop is (ε_0 = permittivity of free space , T = surface tension of soap solution)

A. $4\pi r^2\sqrt{\frac{2T\varepsilon_0}{t}}$

B. $4\pi r^2\sqrt{\frac{4E\varepsilon_0}{t}}$

C. $4\pi r^2\sqrt{\frac{6T\varepsilon_0}{t}}$

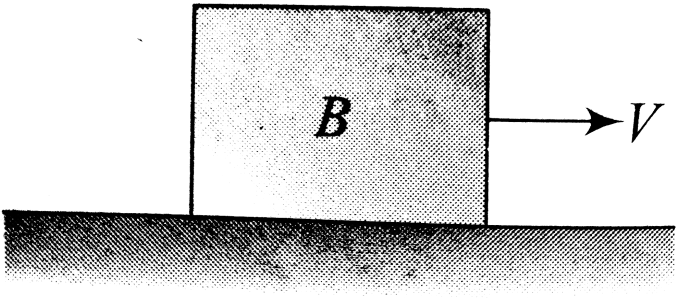
D. $4\pi r^2\sqrt{\frac{8T\varepsilon_0}{t}}$

Answer: D

Watch Video Solution

30. A block B is pushed momentarily along a horizontal surface with an initial velocity v . If mu is the coefficient of sliding friction between B and the surface, block B will come

to rest after a time:



A. $\frac{v}{\mu g}$

B. $\frac{vg}{\mu}$

C. $\frac{v\mu}{g}$

D. $\frac{\mu g}{v}$

Answer: A

Watch Video Solution

31. Two charges of equal magnitude q are placed in air at a distance 2a apart and third charge $-2q$ is placed at mid-point . The potential energy of the system is (ε_0 = permittivity of free space)

A. $-\frac{q^2}{8\pi\varepsilon_0 a}$

B. $-\frac{3q^2}{8\pi\varepsilon_0 a}$

C. $-\frac{5q^2}{8\pi\varepsilon_0 a}$

D. $-\frac{7q^2}{8\pi\varepsilon_0 a}$

Answer: D

Watch Video Solution

32. An electron in potentiometer experiences a force $2.4 \times 10^{-19} N$. The length of potentiometer wire is 6m. The emf of the battery connected across the wire is (electronic charge $= 1.6 \times 10^{-19} C$)

A. 6 V

B. 9 V

C. 12 V

D. 15 V

Answer: B

Watch Video Solution

33. The dimensional formula for Reynold's number is

A. $\left[L^0 M^0 T^0\right]$

B. $\left[L^1 M^1 T^1\right]$

C. $\left[L^{-1}M^{1}T^{1}\right]$

D. $\left[L^{1}M^{1}T^{-1}\right]$

Answer: A

Watch Video Solution

34. Calculate angular velocity of the earth so that acceleration due to gravity at 60° latitude becomes zero (radius of the earth = 6400 km, gravitational acceleration at poles = $10m/s^{2}, \cos 60^{\circ} = 0.5$)

A. 7.8×10^{-2} rad/s

B. 0.5×10^{-3} rad/s

C. 1×10^{-3} rad/s

D. 2.5×10^{-3} rad/s

Answer: D

Watch Video Solution

35. A stationary partical explodes into two partical of a masses m_1 and m_2 which move

in opposite direction with velocities v_1 and v_2 . The ratio of their kinetic energies E_1 / E_2 is

A. $\frac{m_2}{m_1}$

B. $\frac{m_1}{m_2}$

C. $\frac{2m_2}{m_1}$

D. $\frac{2m_1}{m_2}$

Answer: A

Watch Video Solution

36. The moment of inertia of a uniform rod about a perpendicular axis passing through one end is I_1. The same rod is bent into a ring and its moment of inertia about a diameter is I_2. Then I_1 / I_2 is

A. $\frac{4\pi}{3}$

B. $\frac{8\pi^2}{3}$

C. $\frac{5\pi}{3}$

D. $\frac{8\pi^2}{5}$

Answer: B

Watch Video Solution

37. Three identicle particle each of mass $1kg$ are placed with their centres on a straight line. Their centres are marked A, B and C respectively. The distance of centre of mass of the system from A is.

A. $\frac{AB + AC}{2}$

B. $\frac{AB + BC}{2}$

C. $\frac{AC - AB}{3}$

D. $\frac{AB + AC}{3}$

Answer: D

Watch Video Solution

38. The relation between force F and density d is $F = \frac{x}{\sqrt{d}}$.

The dimension of x is

A. $\left[L^{-1/2}M^{3/2}T^{-2}\right]$

B. $\left[L^{-1/2}M^{1/2}T^{-2}\right]$

C. $\left[L^{-1}M^{3/2}T^{-2}\right]$

D. $\left[L^{-1}M^{1/2}T^{-2}\right]$

Answer: A

 Watch Video Solution

39. When a wave travels in a medium, the particle displacement is given by the equation $y = a\sin 2\pi(bt - cx)$, where a, b and c are constants. The maximum particle velocity will be twice the wave velocity. If

A. b = ac

B. $b = \frac{1}{ac}$

C. $c = \pi a$

D. $c = \frac{1}{\pi a}$

Answer: D

Watch Video Solution

40. Electromagnets are made of soft iron because soft iron has

A. high susceptibility and low retentivity

B. low susceptibility and high retentivity

C. low susceptibility and low retentivity

D. high susceptibility and high retentivity

Answer: D

Watch Video Solution

41. The massses of the three wires of copper are in the ratio 1 : 3 : 5. And their lengths are

in th ratio 5 : 3 : 1. the ratio of their electrical resistance is

A. $25:1:125$

B. $1:125:25$

C. $125:1:25$

D. $125:25:1$

Answer:

Watch Video Solution

42. A body of mass m is raised to a height 10 R from the surface of the earth, where R is the radius of the earth. Find the increase in potential energy. (G = universal constant of gravitational, M = mass of the earth and g= acceleration due to gravity)

A. $\frac{GMm}{11R}$

B. $\frac{GMm}{10R}$

C. $\frac{mgR}{11G}$

D. $\frac{10GMm}{11R}$

Answer: D

Watch Video Solution

43. The angle θ between the vector $p = \hat{i} + \hat{j} + \hat{k}$ and unit vector along X-axis is

A. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

B. $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

C. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

D. $\cos^{-1}\left(\frac{1}{2}\right)$

Answer: A

Watch Video Solution

44. A small metal ball of mass m is dropped in a liquid contained in a vessel , attains a terminal velocity v . If a metal ball of same material but of mass 8 m is droped is same liquid then the terminal velocity will be

A. V

B. 2V

C. 4 V

D. 8 V

Answer: C

Watch Video Solution

45. A wooden box of mass $8kg$ slides down an inclined plane of inclination 30° to the horizontal with a constant acceleration of $0.4ms^{-2}$ What is the force of friction between the box and inclined plane ? $\left(g = 10m/s^2\right)$.

A. 12.2 N

B. 24.4 N

C. 36.8 N

D. 48.8 N

Answer: C

Watch Video Solution