PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 41

Physics

1. A moving positron and electron both with kinetic energy 1 Me V annihilate with each other and emits two gamma photons. If the rest mass energy of an electron is 0.51 MeV, the wavelength of each photon is ?

A. 5.1×10^{-3} Å

B. 10.2×10^{-3} Å

C. 8.2×10^{-3} Å

D. 6.2×10^{-3} Å

Answer: C

Watch Video Solution

2. In Li^{++} , electron in first Bohr orbit is excited to a level by a radiation of wavelength λ When the ion gets deexcited to the ground state in all possible ways (including intermediate emissions), a total of six spectral lines are observed. What is the value of λ (Given :

$h = 6.63 \times 10^{-34} Js, c = 3 \times 10^{8} ms^{-1}$)

A. 10.8 nm

B. 9.4 nm

C. 11.4 nm

D. 12.3 nm

Answer: A

Watch Video Solution

3. A mass ‘m’ moves with a velocity ‘v’ and collides inelastically with another identical mass at rest. After collision the 1st mass moves with velocity $\frac{v}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. Find the speed of the 2^{nd} mass after collision :

A. $\frac{2}{\sqrt{3}}v$

B. $\frac{v}{\sqrt{3}}$

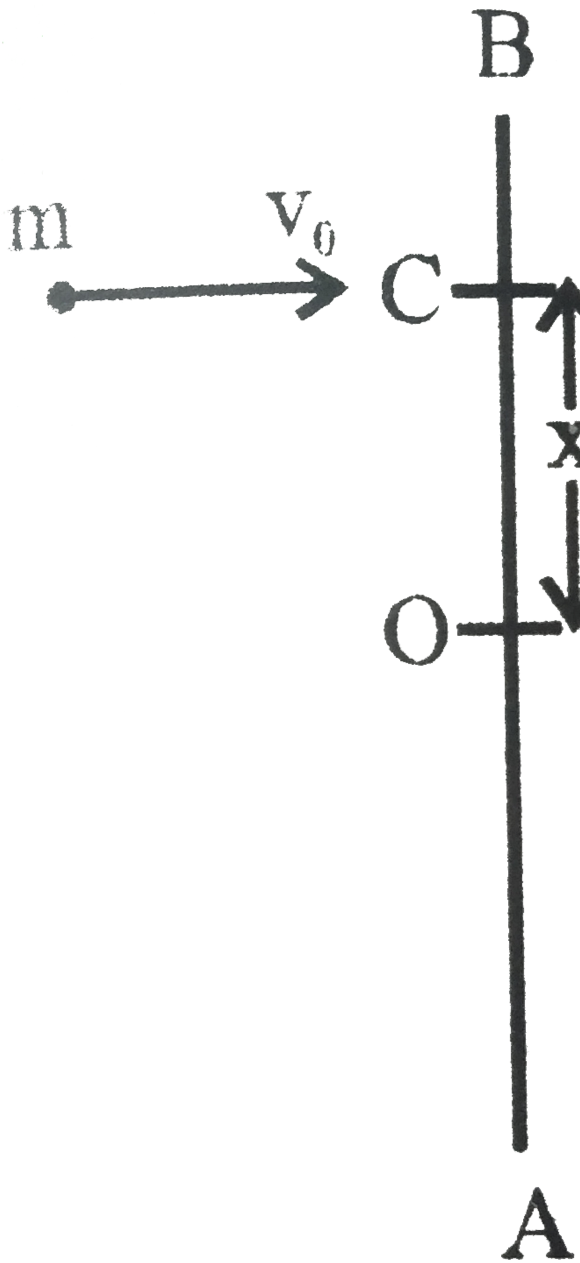
C. v

D. $\sqrt{3v}$

Answer: A

Watch Video Solution

4. A uniform rod AB of length L and mass M is lying on a smooth table. A small particle if mass m strike the rod with velocity v_0 at point C at a distance comes to rest after collision. Then find the value of x, so that point A of the rod remains stationary just after collision.



A. 6

B. 4

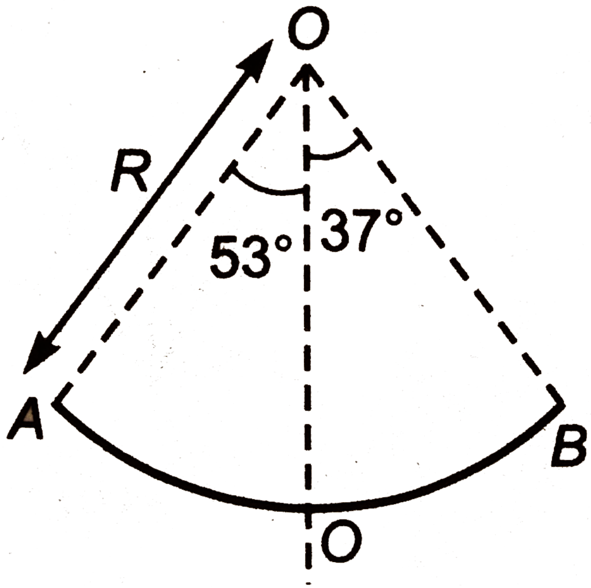
C. 12

D. 8

Answer: A

Watch Video Solution

5. A section of fixed smooth circular track of radius R in vertical plane is shown in the figure. A block is released from position A and leaves the track at B The radius of curvature of its trajectory just after it leaves the track B



is ?

A. R

B. R/4

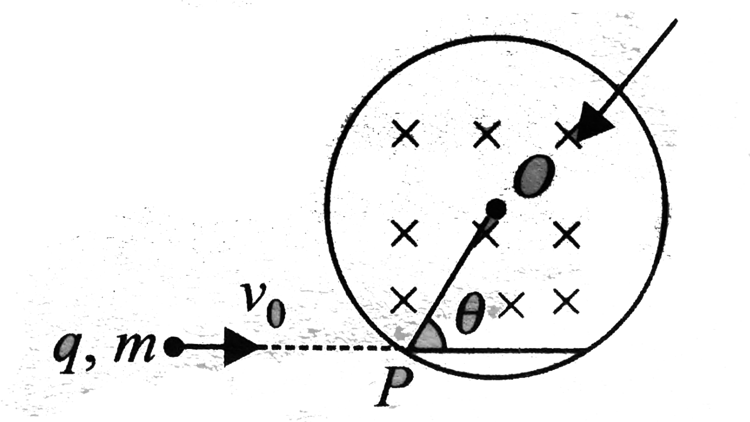
C. R/2

D. none

Answer: C

Watch Video Solution

6. A particle of charge q and mass m is projected with a velocity v_0 toward a circular region having uniform magnetic field B perpendicular and into the plane of paper from point P as shown in Fig. 1.136. R is the radius and O is the center of the circular region. If the line OP makes an angle θ with the direction of v_0 then the value of v_0 so that particle passes through O is



A. $\dfrac{qBR}{m\sin\theta}$

B. $\dfrac{qBR}{2m\sin\theta}$

C. $\dfrac{2qBR}{m\sin\theta}$

D. $\dfrac{3qBR}{2m\sin\theta}$

Answer: B

Watch Video Solution

7. The resistance of a wire at $20^\circ C$ is 20Ω and at $500^\circ C$ is 60Ω. At which temperature its resistance will be 25Ω?

A. $160^\circ C$

B. $250^\circ C$

C. $100^\circ C$

D. $80^\circ C$

Answer: D

Watch Video Solution

8. The ratio of the resistances of a conductor at a temperature of $15^{\circ} C$ to its resistance at a temperature of $37.5^{\circ} C$ is $4:5$. The temperature coefficient of resistance of the conductor is

A. $\frac{1}{25}.^{\circ} C^{-1}$

B. $\frac{1}{50}.^{\circ} C^{-1}$

C. $\frac{1}{80}.^{\circ} C^{-1}$

D. $\frac{1}{75}.^{\circ}C^{-1}$

Answer: D

Watch Video Solution

9. A power transmission line feeds input power at 2300 V a step down transformer with its primary windings having 4000 turns. The output power is delivered at 230 V by the transformer. If the current in the primary of the transformer is 5A and its efficiency is 90%

, the output current would be :

A. 35 A

B. 25 A

C. 50 A

D. 45 A

Answer: D

Watch Video Solution

10. A coil of inductanece $5H$ is joined to a cell of emf $6V$ through a resistance 10Ω at time t=0. The emf across the coil at time $t = \ln\sqrt{2}$ s is:

A. 3 V

B. 1.5 V

C. 0.75 V

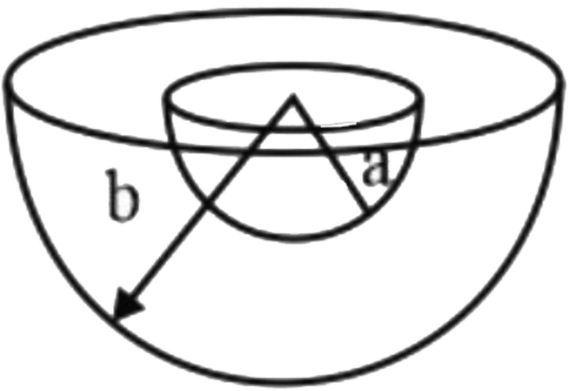
D. 4.5 V

Answer: A

Watch Video Solution

Watch Video Solution

11. A uniform charged hemisphere of radius b and charge density ρ has a hemispherical cavity of radius $a\left(a=\frac{b}{2}\right)$ cut from its centre. If the potential at the centre of the cavity is $\frac{n\rho b^2}{16\in_0}$ then n = ?



A. 3

B. 4

C. 5

D. 6

Answer: A

Watch Video Solution

12. A charge 'Q' is distributed over two concentric hollow spheres of radii 'r' and 'R' (gtr) such that the surface densities are equal.

Find the potential at the common centre.

A. $\frac{1}{4\pi\varepsilon_0}\frac{Q(R+r)}{R^2+r^2}$

B. $\frac{1}{4\pi\varepsilon_0}\frac{Q(R-r)}{R^2+r^2}$

C. $\frac{1}{4\pi\varepsilon_0}\frac{Q(R+r)^2}{R^2+r^2}$

D. $\frac{1}{4\pi\varepsilon_0}\frac{Q(R+r)^2}{R^2+2r^2}$

Answer: A

Watch Video Solution

13. A battery of emf 12 V and internal resistance 2Ω is connected in series with a tangent galvanometer of resistance 4Ω . The deflection is 60° when the plane of the coil is along the magnetic meridian . To get a deflection of 30°, the resistance to be connected in series with the tangent galvanometer is

A. 12Ω

B. 20Ω

C. 10Ω

D. 5Ω

Answer: A

Watch Video Solution

14. A projectile of mass m is fired from the surface of the earth at an angle $\alpha = 60^\circ$ from the vertical. The initial speed v_0 is equal to $\sqrt{\frac{GM_e}{R_e}}$. How high does the projectile rise ? Neglect air resistance and the earth's rotation.

A. 2

B. 4

C. 6

D. 8

Answer: A

Watch Video Solution

15. A satellite of mass m is launched vertically upwards with an initial speed $\sqrt{\frac{GM}{®}}$ from the surface of the earth. After it reaches height R (R = radius of the earth), it ejects a rocket of mass $\frac{m}{10}$ in a direction opposite to the initial direction of the satellite, so that subsequently the satellite escapes to infinity. The minimum kinetic energy of the rocket at ejection needed is (G is the gravitational constant, M is the mass of the earth):

A. $\frac{m}{20}\left(u^2+\frac{113}{200}\frac{GM}{R}\right)$

B. $5m\left(u^2-\frac{119}{200}\frac{GM}{R}\right)$

C. $\frac{3m}{20}\left(u+\sqrt{\frac{5GM}{6R}}\right)^2$

D. $\frac{m}{20}\left(u-\sqrt{\frac{2GM}{3R}}\right)^2$

Answer: B

Watch Video Solution

16. The intensity of radiation emitted by the sun has its maximum value at a wavelength of 510 nm and that emitted by the North star has the maximum value at 350 nm. If these stars behave like black bodies, then the ratio of the surface temperatures of the sun and the north star is

A. 1.46

B. 0.69

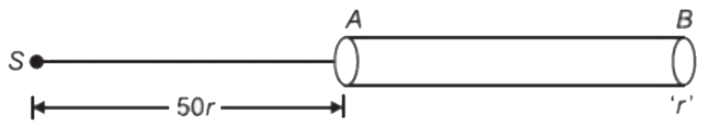
C. 1.21

D. 0.83

Answer: B

Watch Video Solution

17. A cylindrical rod of length l and cross - sectional radius r is placed at a distance of 50 r from a infrared point source S of power 1.25 kw as shown in the figure. The lateral surface of the rod is perfectly insulated from the surroundings . If the cross - section A absorbs 80 % of the incident energy and the temperature difference between the ends of the rod is constant , then the rate of heat flow through the rod in steady state is



A. 0.2 J/s

B. 0.125 J/s

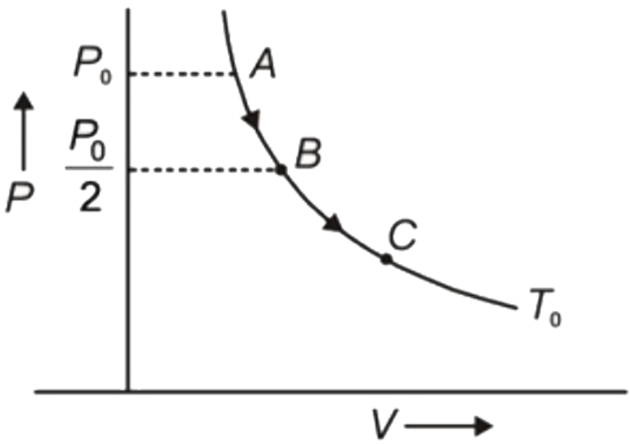
C. 0.1 J/S

D. 0.25 J/s

Answer: C

Watch Video Solution

18. The state of an ideal gas changed as shown, at constant temperature T_0 If heat supplied to the gas in process $B \to C$ is thrice of work done by gas in $A \rightarrow B$, then the pressure of gas in state C is $\frac{P_0}{2n}$. Find the value of n.



A. 8

B. 9

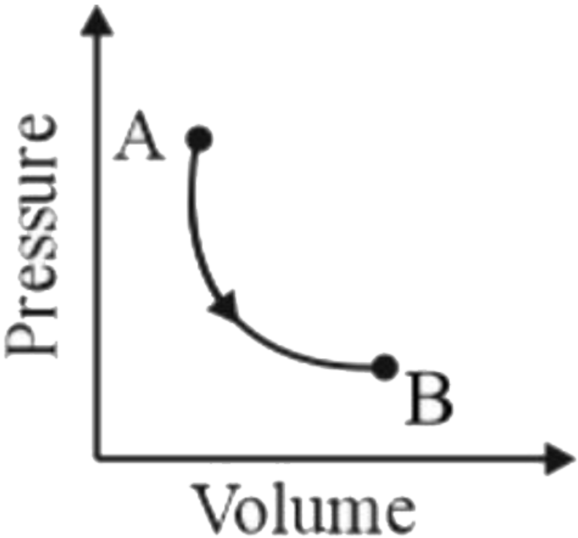
C. 7

D. 6

Answer: A

Watch Video Solution

19. The pressure and volume of an ideal gas are related as $p\alpha\frac{1}{v^2}$ for process $A \rightarrow B$ as shown in figure . The pressure and volume at A are $3p_0$ and v_0 respectively and pressure B is p_0 the work done in the process $A \rightarrow B$ is found to be $\left[x-\sqrt{3}\right]p_0v_0$ find



A. 3

B. 6

C. 4

D. 5

Answer: A

Watch Video Solution

20. A cylindrical wire of radius R has current density varying with distance r form its axis as $J(x) = J_0\left(1 - \frac{r^2}{R^2}\right)$. The total current through the wire is

A. $\frac{\pi J_0 R^2}{2}$

B. $\frac{2\pi J_0 R^2}{3}$

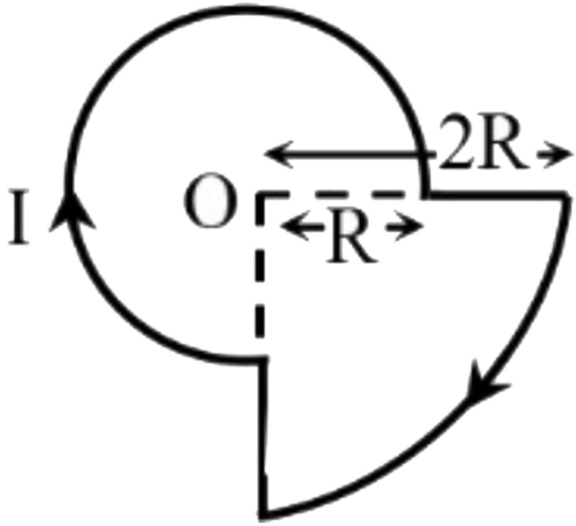
C. $\frac{4\pi J_0 R^2}{3}$

D. none of these

Answer: A

Watch Video Solution

21. A current I is flowing through the loop , as shown in the figure . The magnetic field at centre O is



A. $\dfrac{7\mu_0 I}{16R}$ $\otimes$

B. $\dfrac{7\mu_0 I}{16R}$ $\odot$

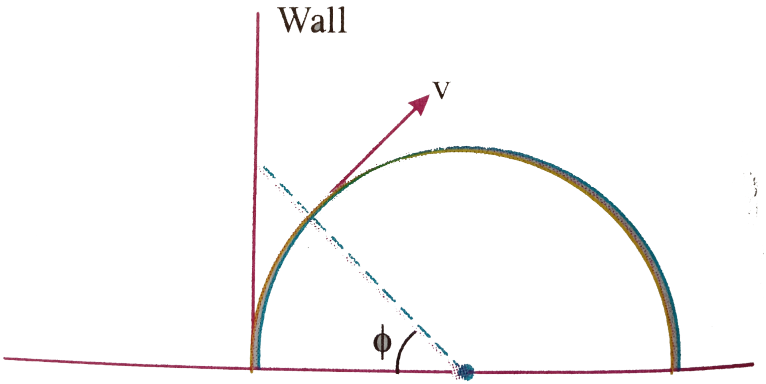
C. $\dfrac{5\mu_0 I}{16R}$ $\otimes$

D. $\dfrac{5\mu_0 I}{16R}$ $\odot$

Answer: A

Watch Video Solution

22. On a particle moving on a circular path with constant speed v, light is thrown from a projectors placed at the centre of the circular path. The shadow of the particle is formed on the wall. The velocity of shadow up the wall is



A. $v \sec^2 \phi$

B. $v \cos^2 \phi$

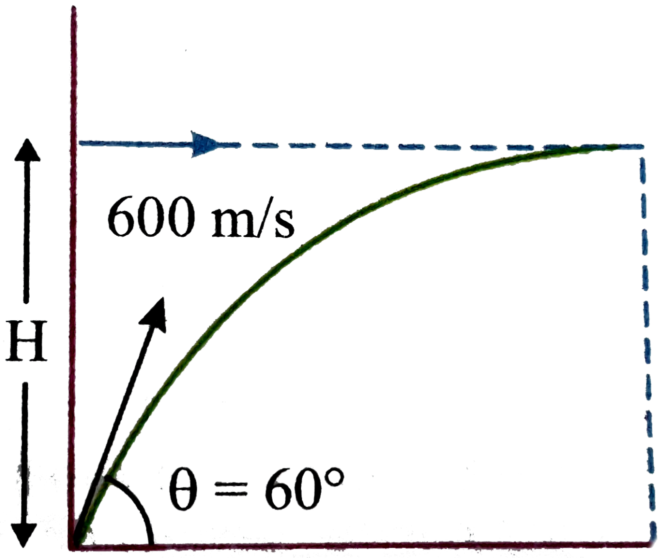
C. $v \cos \phi$

D. none of these

Answer: A

Watch Video Solution

23. A fighter plane enters inside the enemy territory, at time $t = 0$, with velocity $v_o = 250 m / s$ a moves horizontally with constant acceleration $a = 20 m / s^2$ (see figure) An enemy tank at the border, spot the plane and fire shots at an angle $\theta = 60^2$ with the horizontal and with velocity $u = 600 m / s$ .At what altitude H of the plane it can be hit by the shot?



A. $1500\sqrt{3}m$

B. 125 m

C. 1400 m

D. 2473 m

Answer: D

Watch Video Solution

24.

Three blocks are connected as shown in the figure. Valculate the minimum force required to move the body with constant velocity. The coefficient of friction at all surfaces is 0.25.

A. 12mg /4

B. 13mg/4

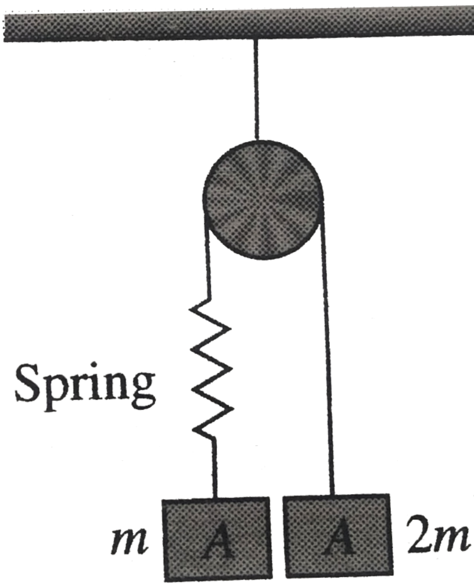
C. 3 mg

D. None

Answer: B

Watch Video Solution

25. Two blocks A and B of masses m and 2m, respectively , are held at rest such that the spring is in natural length. Find out the acceleration of both the blocks just after relese.



A. $g\downarrow, g\downarrow$

B. $\frac{g}{3}\downarrow, \frac{g}{3}\uparrow$

C. 0,0

D. $g\downarrow, 0$

Answer: A

Watch Video Solution

26. A radioactive nucleus (initial mass number A and atomic number Z) emits 3α-particles and 2 positrons. The ratio of number of neutrons to that of protons in the final nucleus will be

A. $\dfrac{A - Z - 4}{Z - 2}$

B. $\dfrac{A - Z - 8}{Z - 4}$

C. $\frac{A-Z-4}{Z-8}$

D. $\frac{A-Z-12}{Z-4}$

Answer: C

Watch Video Solution

27. Ne nucleus , the after absorbing energy , decays into two α particle and an unknown nucleus . The unknown nucleus is

A. Nitrogen

B. Carbon

C. Boron

D. Oxygen

Answer: B

Watch Video Solution

28. An ideal spring supports a disc of mass M. A body of mass m is released from a certain height from where it falls to hit M. The two masses stick together at the moment they touch and move together from then on . The oscillations reach to a height a above the original level of the disc and depth b blow. it

The constant of the force of the spring is

A. $\frac{2mg}{b-a}$

B. $\dfrac{mg}{b-a}$

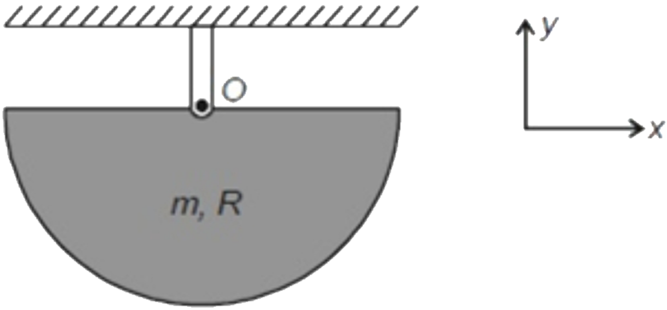
C. $\dfrac{2mg}{a-b}$

D. $\dfrac{mg}{2(a-b)}$

Answer: C

Watch Video Solution

29. Time period for small oscillations in vertical x - y plane of uniform semi - circular disk of mass m and radius R , about horizontal axis through point O, is equal to



A. $2\pi\sqrt{\dfrac{\pi R}{8g}}$

B. $2\pi\sqrt{\dfrac{3\pi R}{8g}}$

C. $2\pi\sqrt{\dfrac{4\pi R}{8g}}$

D. $2\pi\sqrt{\dfrac{\pi R}{g}}$

Answer: B

Watch Video Solution

30. The kinetic energy of the most energetic photoelectrons emitted from a metal surface is doubled when the wavelength of the incident radiation is reduced from λ_1 to λ_2 The work function of the metal is

A. $\frac{hc}{\lambda_1\lambda_2}(2\lambda_2-\lambda_1)$

B. $\frac{2hc}{\lambda_1\lambda_2}(2\lambda_2-\lambda_1)$

C. $\frac{2hc}{\lambda_1\lambda_2}(\lambda_2+\lambda_1)$

D. $\frac{2hc}{\lambda_1\lambda_2}(\lambda_2-\lambda_1)$

Answer: A

Watch Video Solution

31. When ultraviolet light is incident on a photocell, its stopping potential is V_0 and the maximum kinetic energy of the photoelectrons is $K_{\max}$. When X-rays are incident on the same cell, then:

A. V_0 and $K_{\max}$ both increase.

B. V_0 and $K_{\max}$ both decrease.

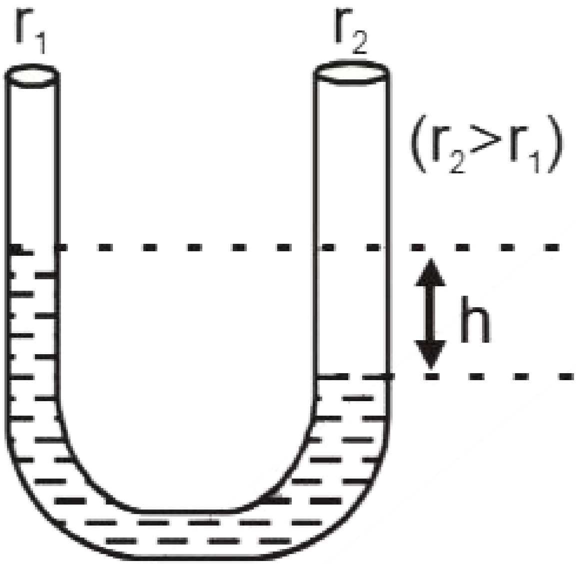
C. V_0 increases but $K_{\max}$ remains the same.

D. $K_{\max}$ increases by V_0 remains the same.

Answer: A

Watch Video Solution

32. In a U-tube the radii of two columns are respectively r_1 and r_2 and if a liquid of density d filled in it has level difference of h then the surface tension of the liquid is -



A. $\dfrac{\rho g h r_1 r_2}{2(r_2 - r_1)}$

B. $h\rho g(r_2 - r_1)$

C. $\dfrac{h\rho g(r_2 - r_1)}{2}$

D. $\dfrac{h\rho g}{2(r_2 - r_1)}$

Answer: A

Watch Video Solution

33. An open glass tube is immersed in mercury in such a way that a length of 8 cm extends above the mercury level. The open end of the tube is then closed and sealed and the tube is raised vertically up by additional 46 cm. what will be length of the air column above mercury in the above now ?

(Atmospheric pressure = 76 cm of Hg)

A. 38 Cm

B. 6 Cm

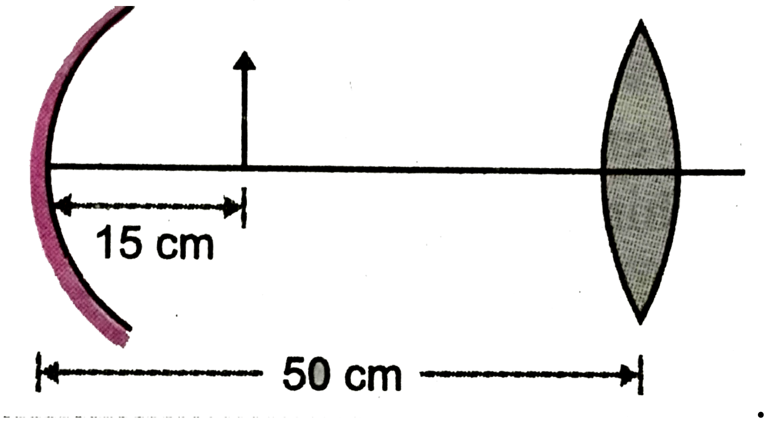
C. 16 Cm

D. 22 Cm

Answer: C

Watch Video Solution

34. Consider a concave mirror and a convex lens (refractive index 1.5) of focal length $10cm$ each separated by a distance of $50cm$ in air (refractive index = 1) as shown in the Fig. An object is placed at a distance of $15 cm$ from the mirror. Its erect image formed by this combination has magnification M_1. When this set up is kept in a medium of refractive index $7/6$, the magnification becomes M_2. The magnitude $\left(\frac{M_2}{M_1}\right)$ is :



A. 7

B. 5

C. 3

D. 6

Answer: A

Watch Video Solution

35. A circular beam of light of diameter $d = 2cm$ falls on a plane refractive of glass. The angle of incidence is 60° and refractive index of glass is $\mu = 3/2$. The diameter of the refracted beam is

A. 3

B. 6

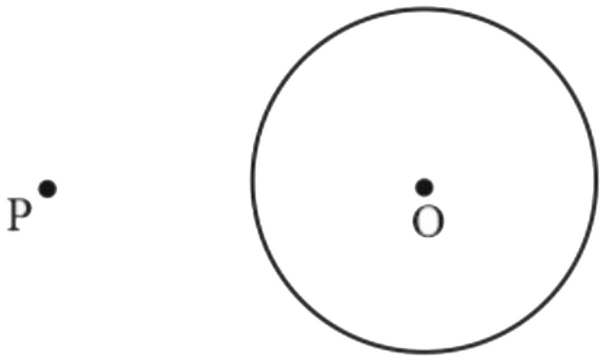
C. 5

D. 8

Answer: A

Watch Video Solution

36. Consider a particle , moving in a circle with constant speed . P is a point outside the circle , in the same plane . Then , the angular momentum of the particle about the point P is



A. Never zero

B. Zero at exactly two points

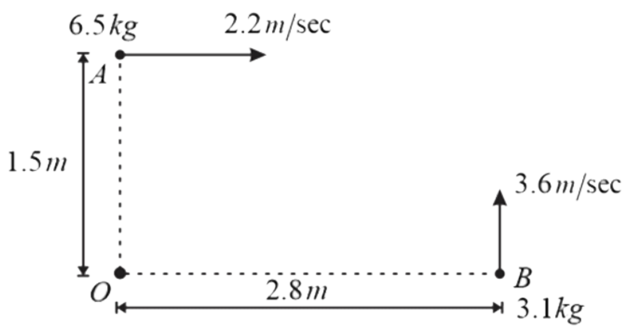
C. Zero at exactly three points

D. Zero at exactly four points

Answer: B

Watch Video Solution

37. Two particles A and B are moving , as shown in the figure .



Their total angular momentum about the point O is

A. $9.8kg. m^2. s^{-1}$

B. Zero

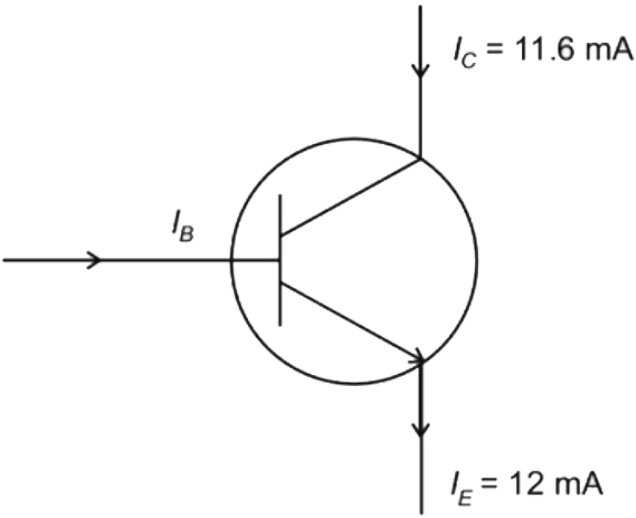
C. $52.7kg. m^2. s^{-1}$

D. $37.9kg. m^2. s^{-1}$

Answer: A

Watch Video Solution

38. The value of transistor parameters , β and α respectively, for the given figure is .



A. 49,0.98

B. 32,0.64

C. 29,0.97

D. 45,0.90

Answer: C

Watch Video Solution

39. For a transistor , the correct statement is

A. Collector current increases with increase in emitter current

B. Collector current decreases with increase in emitter current

C. Collector current increases with decrease in emitter current

D. Collector current decreases with decrease in emitter current

Answer: A

Watch Video Solution

40. Temperature of 100 gm water is changed from $0^\circ C$ to $3^\circ C$. In this process , heat supplied to water will be (specified heat of water $1 cal g^{-1} . ^{\circ} C^{-1}$)

A. Equal to 300 cal

B. Greater than 300 cal

C. Less than 300 cal

D. Data is insufficient

Answer: C

Watch Video Solution

41. If the velocity of light c, gravitational constant G and Planck's constant h be taken as fundamental units the dimension of mass in the new system will be-

A. $c^{1/2}G^{1/2}h^{1/2}$

B. $c^{1/2}G^{1/2}h^{-1/2}$

C. $c^{1/2}G^{1/2}h^{1/2}$

D. $c^{-1/2}G^{1/2}h^{1/2}$

Answer: C

Watch Video Solution

Watch Video Solution

42. A thin slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a flat glass plate with the curved surface downwards. Monochromatic light is incident normally from the top. The observed interference fringes from the combination do not follow on of the following statements.

A. The fringes are straight and parallel to the length of the piece.

B. The line of contact of the cylindrical glass piece and the glass plate appears dark.

C. The fringe spacing increases as we go outwards .

D. The fringes are formed due to the interference of light rays reflected from the curved surface of the cylindrical piece and the top surface of the glass plate.

Answer: C

Watch Video Solution

43. In the Young's double slit experiment, the intensities at two points P_1 and P_2 on the screen are respectively I_1 and I_2 If P_1 is located at the centre of a bright fringe and P_2 is located at a distance equal to a quarter of fringe width from P_1 then $\frac{I_1}{I_2}$ is

A. 2

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

C. 4

D. 16

Answer: A

Watch Video Solution

44. A simple wave motion represented by $y = 5\left(\sin 4\pi t + \sqrt{3}\cos 4\pi t\right)$. Its amplitude is

A. 5 units

B. $5\sqrt{3}$ units

C. $10\sqrt{3}$ units

D. 10 units

Answer: D

Watch Video Solution

45. The end correction of a resonance column is 1 cm. If the shortest length resonating with the tunning fork is 10 cm, the next resonating length should be :

A. 32 cm

B. 40 cm

C. 28 cm

D. 36 cm

Answer: A

Watch Video Solution