PHYSICS

BOOKS - NTA MOCK TESTS

NEET MOCK TEST 06

Physics

1. For an object thrown at 45° to the horizontal, the maximum height H and horizontal range R are related as

A. $R = 16H$

B. $R = 8H$

C. $R = 4H$

D. $R = 2H$

Answer: C

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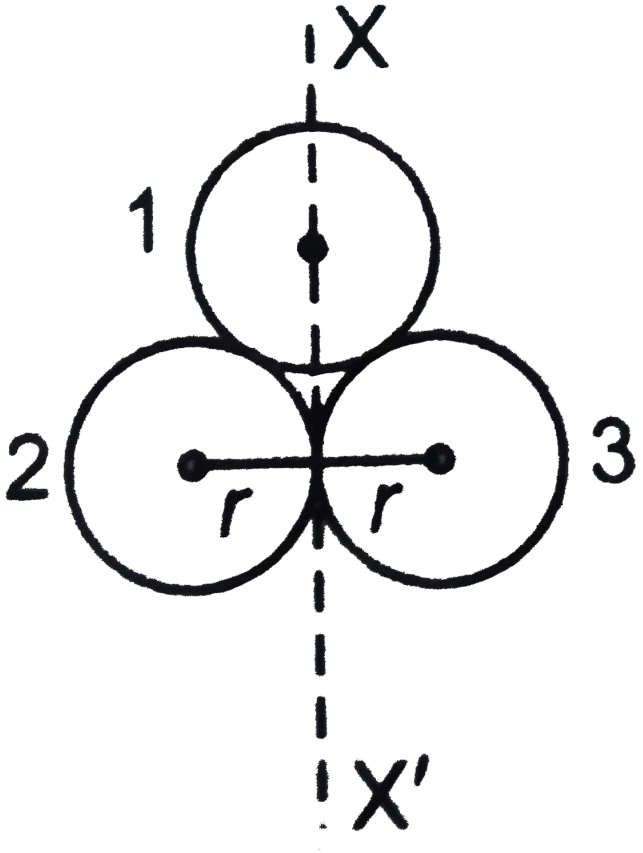
2. Three idential spherical shells each of mass m and radius r are placed as shown in Fig. Consider an axis XX' which is touching the two

shells and passing through diameter of third shell. Moment of Inertia of the system consisting of these three spherical shells about XX' as axis is :



A. $\frac{11}{5}mr^2$

B. $3mr^2$

C. $\frac{16}{5}mr^2$

D. $4mr^2$

Answer: D

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3. Two coils of self-inductance $2mH$ and $8mH$ are placed so close together that the effective flux in one coil is completely linked with the

other. The mutual inductance between these coil is

A. 16 mH

B. 10 mH

C. 6 mH

D. 4 mH

Answer: D

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4. 22 g of carbon dioxide at $27^\circ C$ is mixed in a closed container with 16 g of oxygen at $37^\circ C$. If both gases are considered as ideal gases, then the temperature of the mixture is

A. $24.2^\circ C$

B. $28.5^\circ C$

C. $32^\circ C$

D. $33.5^\circ C$

Answer: C

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5. If the length of rod A is 3.25 $\pm$ 0.01 cm and that of B is 4.19 $\pm$ 0.01 cm then the rod B is longer than rod A by

A. $(0.94 \pm 0.00)cm$

B. $(0.94 \pm 0.01)cm$

C. $(0.94 \pm 0.02)cm$

D. $(0.94 \pm 0.005)cm$

Answer: C

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6. The luminosity of the Rigel star is 17000 times that of the sun. Assume both to be perfectly back bodies. If the surface temperature of the sun 6000 K, then the temperature of the star is around $\left(\text{Take } 17000^{1/4} = 11.4\right)$

A. 68400 K

B. 58400 K

C. 38600 K

D. 32600 K

Answer: A

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7. Two slits S_1 and S_2 illuminated by a white light source give a white central maxima. A transparent sheet of refractive index 1.25 and thickness t_1 is placed in front of S_1. Another transparent sheet of refractive index 1.50 and thickness t_2 is placed in front of S_2. If central

maxima is not effected, then ratio of the thickness of the two sheets will be :

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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8. De - Broglie wavelength of an electron accelerated by a voltage of 50 V is close to $\left(|e| = 1.6 \times 10^{-19} C, m_e = 9.1 \times 10^{-31}\right)$

A. 0.5Å

B. 1.2Å

C. 1.7Å

D. 2.4Å

Answer: C

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9. In P-type semiconductor the majority and minorty charge carriers are respectively

A. proton and electrons

B. electron and protons

C. electrons and holes

D. holes and electrons

Answer: D

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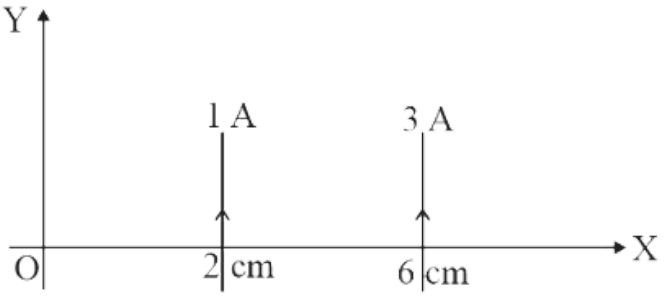
10. Two long parallel conductors are placed at right angles to a metre scale at the $2cm$ and $6cm$ marks, as shown in the figure



They carry currents of $1A$ and $3A$ respectively. They will produce zero magnetic field at the (ignore the earth's magnetic field)

A. 5 cm mark

B. 3 cm mark

C. 1 cm mark

D. 8 cm mark

Answer: B

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11. The amplitude of two waves are in ratio 5 : 2. If all other conditions for the two waves are same, then what is the ratio of their energy densities

A. $5:2$

B. $5:4$

C. $4:5$

D. $25:4$

Answer: D

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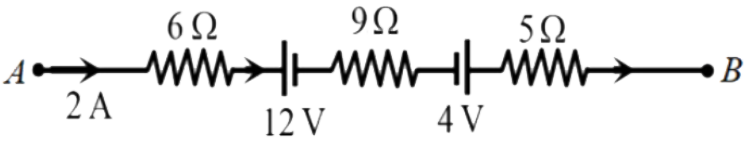
12. The potential difference between A and B in the following figure is



A. 32 V

B. 48 V

C. 24 V

D. 14 V

Answer: B

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13. A particle undergoes uniform circular motion. About which point on the plane of the circle, will the angular momentum of the particle remain conserved?

A. Centre of the circle

B. On the circumference of the circle

C. Inside the circle

D. Outside the circle

Answer: A

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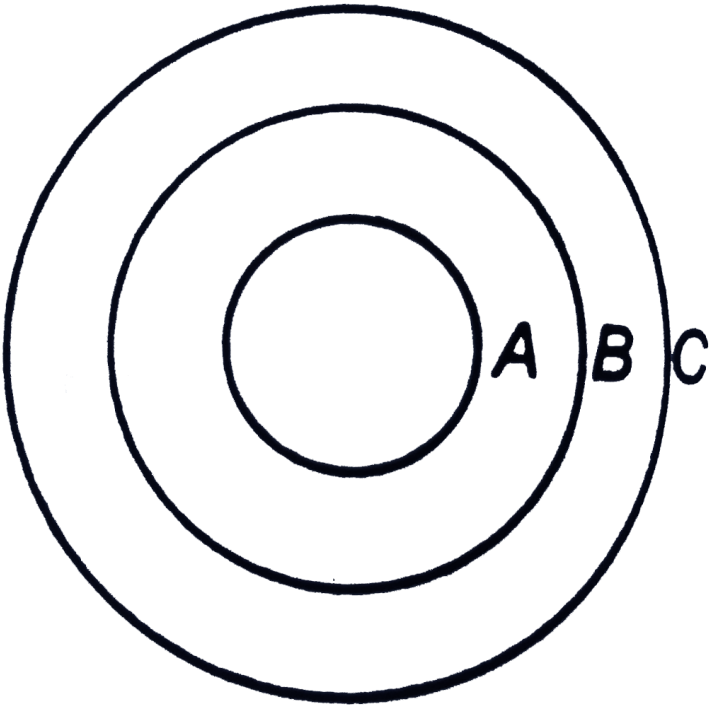
14. Charges Q, $2Q$, and $-Q$ are given to three concentric conducting sphereical shells A, B and C respectively as shown in figure. The ratio of charge on the inner and outer surface

of shell C will be



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

B. $-\frac{3}{4}$

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

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

Answer: D

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15. A container with insulating walls is divided into two equal parts by a partition fitted with a valve. One part is filled with an ideal gas at a pressure P and temperature T, whereas the other part is completely evacuated . If the valve is suddenly opened, the pressure and temperature of the gas will be

A. $\frac{p}{2}, T$

B. $\frac{p}{2}, \frac{T}{2}$

C. p, T

D. $p, \frac{T}{2}$

Answer: A

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16. A man running at a speed of 5 km/h finds that the rain is falling vertically. When the stops running, the finds that the rain is falling

at an angle of 60° with the horizontal. The velocity of rain with respect to running man is

A. $\frac{5}{\sqrt{3}}$ km/h

B. $\frac{5\sqrt{3}}{2}$ km/h

C. $\frac{4\sqrt{3}}{5}$ km/h

D. $5\sqrt{3}$ km/h

Answer: D

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17. The length of a wire of a potentiometer is 100 cm, and the e.m.f. of its standard cell is E volt. It is employed to measure the e.m.f. of a battery whose internal resistance is 0.5Ω. If the balance point is obtained at I = 30 cm from the positive end, the e.m.f. of the battery is . where i is the current in the potentiometer wire.

A. 0.2 E

B. 0.3 E

C. 0.4 E

D. 0.5 E

Answer: B

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18. Uranium- 238 decays to thorium-234 with half-life $5 \times 10^9 yr$. The resulting nucleus is in the excited state and hence further emits γ-rays to come to the ground state. It emits 20γ-rays per second. The emission rate will drop to 5γ-rays per second in

A. $.25 \times 10^9 yr$

B. $10^{10} yr$

C. $10^{-8} yr$

D. $1.25 \times 10^{-9} s$

Answer: B

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19. A circular coil of 100 turns and effective diameter $20cm$ carries a current of $0.5A$. It is to be turned in a magnetic field of $B = 2.0T$

from a position in which the normal to the plane of the coil makes an angle θ equals to zero to one in which θ equals to 180°. The work required in this process is

A. πJ

B. $2\pi J$

C. $4\pi J$

D. $8\pi J$

Answer: B

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20. A mixture consists of two radioactive materials A_1 and A_2 with half-lives of 20 s and 10 s respectively. Initially the mixture has 40 g of A_1 of 160 g of A_2. After what time of amount of the two in the mixture will become equal ?

A. 60 s

B. 80 s

C. 20 s

D. 40s

Answer: D

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21. In Young's double - slit experiment, d = 0.1 mm, D = 20 cm, and $\lambda = 5460\text{Å}$, the angular position for first dark fringe will be

A. 0.08°

B. 0.24°

C. 0.32°

D. 0.16°

Answer: D

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22. Positively charged particles are projected into a magnetic field. If the direction of the magnetic field is along the direction of motion of the charged particles, the particles get

A. Accelerated

B. Decelerated

C. Deflected

D. No change in velocity

Answer: D

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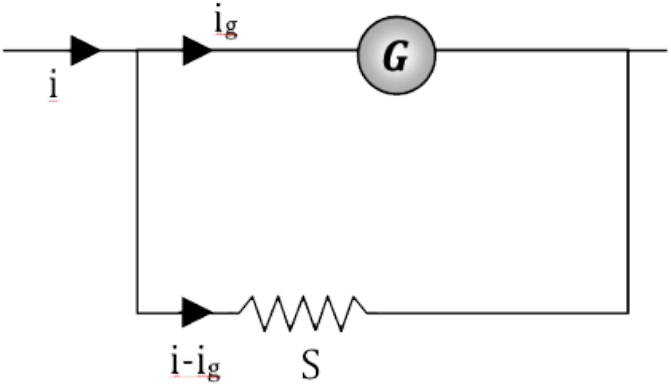
23. To send 10% of the main current through a moving coil galvanometer of resistance 9Ω,

shunt S required is



A. 81Ω

B. 1Ω

C. 10Ω

D. 9Ω

Answer: B

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24. A steel ball strikes a fixed smooth steel plate placed on a horizontal surface atan angle θ with the vertical. If the coefficient of restitution is e, the angle at which the rebound will take place is:

A. θ

B. $\tan^{-1}\left[\frac{\tan\theta}{e}\right]$

C. $e\tan\theta$

D. $\tan^{-1}\left[\frac{e}{\tan\theta}\right]$

Answer: B

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25. A coil of circular cross - section having 1000 turns and $4cm^2$ face area is placed with its axis parallel to a magnetic field which decreases by $10^{-2}\mathrm{Wb\ m^{-2}}$ in 0.01 s. the e.m.f induced in the coil is :

A. 0.4 mV

B. 4 mV

C. 200 mV

D. 400 mV

Answer: D

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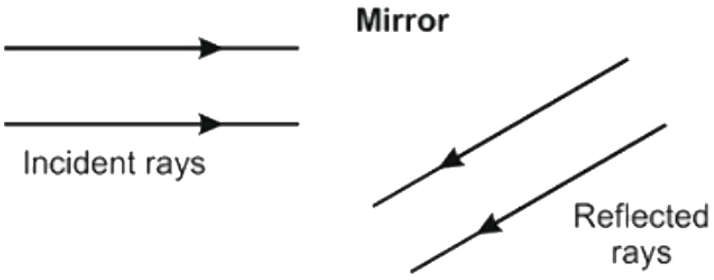
26. The mirror in the below case is



A. Convex

B. Concave

C. Plane

D. None of these

Answer: C

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27. A stone is projected vertically upward to reach maximum height h. The ratio of its

kinetic energy to its potential energy at a height $\frac{4}{5}$h, will be

A. $5:4$

B. $4:5$

C. $1:4$

D. $4:1$

Answer: C

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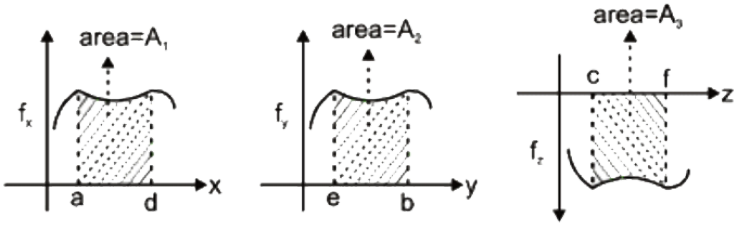
28. A force given by $\overrightarrow{F} = f_x\hat{i} + f_y\hat{j} + f_z\hat{k}$ acts on a particle which moves from (a, b, c) to (d, e, f). The work done by the force F is : (Here A_1, A_2, A_3 are magntitude of area bounded)



A. $A_1 + A_2 + A_3$

B. $A_1 - A_2 - A_3$

C. $-A_1 + A_2 - A_3$

D. $A_1 - A_2 + A_3$

Answer: B

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29. Two identical square rods of metal are welded end to end as shown in figure (i), 20 calories of heat flows through it in 4 minutes. If the rods are welded as shown in figure (ii), the same amount of heat will flow through the rods in

(i)

(ii)

A. 16 min

B. 12 min

C. 1 min

D. 4 min

Answer: C

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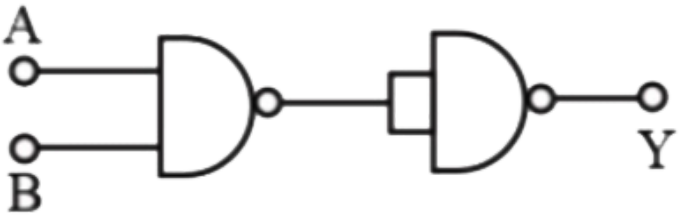
30. Identify the gate and match A, B, Y in the bracket to check.



A. $OR(A = 1, B = 1, Y = 0)$

B. $XOR(A = 1, B = 1, Y = 0)$

C. $NOT(A = 1, B = 1, Y = 0)$

D. $AND(A = 1, B = 1, Y = 1)$

Answer: D

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31. A particle of mass m is projected upwards with velocity $v = \frac{v_e}{2}$, where v_e is the escape velocity then at the maximum height the potential energy of the particle is : (R is radius of earth and M is mass of earth)

A. $\frac{-GMm}{2R}$

B. $\frac{-GMm}{4R}$

C. $\frac{-3GMm}{4R}$

D. $\frac{-2GMm}{3R}$

Answer: C

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32. A particle moves in a circular path of radius $0.5m$ at a speed that uniformly increases. Find the angular acceleration of particle if its speed changes from $2.0m/s$ to $4.0m/s$ in $4.0s$

A. $1\,\mathrm{rad/s}^2$

B. $2\,\mathrm{rad/s}^2$

C. $4\,\mathrm{rad/s}^2$

D. $0\,\mathrm{rad/s}^2$

Answer: A

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33. 1 g of water at $100^\circ C$ is completely converted into steam at $100^\circ C$. 1g of steam occupies a volume of 1650cc. (Neglect the volume of 1g of water at $100^\circ C$). At the pressure of $10^5 N/m^2$, latent heat of steam is 540 cal/g (1 Calorie=4.2 joules). The increase in the internal energy in joules is

A. 2310

B. 2103

C. 1650

D. 2150

Answer: B

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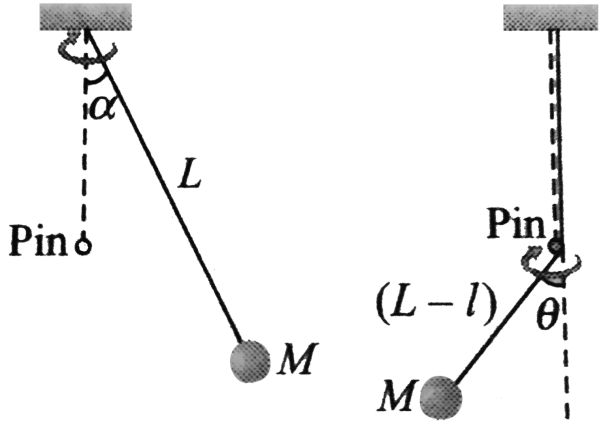
34. A simple pendulum consisting of a mass M attached to a string of length L is released from rest at an angle α. A pin is located at a

distance l below the pivot point. When the pendulum swings down, the string hits the pin as shown in figure. The maximum angle θ which the string makes with the vertical after hitting the pin is



A. $\cos^{-1}\left[\dfrac{L\cos\alpha + l}{L + l}\right]$

B. $\cos^{-1}\left[\dfrac{L\cos\alpha - l}{L - l}\right]$

C. $\cos^{-1}\left[\frac{L\cos\alpha + l}{L - l}\right]$

D. $\cos^{-1}\left[\frac{L\cos\alpha - l}{L + l}\right]$

Answer: B

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35. The ends of a stretched wire of length L are fixed at $x = 0$ and $x = L$. In one experiment, the displacement of the wire is $y_1 = A\sin(\pi/L)\sin\omega t$ and energy is E_1 and in another experiment its displacement is

$y_2 = A\sin(2\pi x / L)\sin 2\omega t$ and energy is E_2.

Then

A. $E_2 = E_1$

B. $E_2 = 2E_1$

C. $E_2 = 4E_1$

D. $E_2 = 16E_1$

Answer: C

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36. $K_{\max}$ (in eV) = 3, and frequency of light (in Hz) $= 1 \times 10^{15}$ for a metal used as a cathode in a photoelectric experiment. The threshold frequency of light for the photoelectric emission from the metal is -

A. 1×10^{14} Hz

B. 1.5×10^{14} Hz

C. 2.1×10^{14} Hz

D. 2.7×10^{14} Hz

Answer: D

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37. A capacitance of $2\mu F$ is required in an electrical circuit across a potential difference of $1.0kV$ A large number of $1\mu F$ capacitors are available which can withstand a potential difference of not more than $300v$.

The minimum number of capacitors required to achieve this is

A. 32

B. 2

C. 16

D. 24

Answer: A

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38. A rocket of mass 4000 kg is set for vertical firing. How much gas must be ejected per second so that the rocket may have initial upwards acceleration of magnitude $19.6m/s^2$? [Exhaust speed of fuel $= 980m/s$]

A. $240 kgs^{-1}$

B. $60 kgs^{-1}$

C. $120 kgs^{-1}$

D. None

Answer: C

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39. 1 mole of a gas with $\gamma = 7/5$ is mixed with 1 mole of a gas with $\gamma = 5/3$, then the value of γ for the resulting mixture is

A. $\frac{7}{5}$

B. $\frac{2}{5}$

C. $\frac{24}{16}$

D. $\frac{12}{7}$

Answer: C

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40. An electromagnetic wave fo frequency 1×10^{14} Hz is propagating along z - axis. The amplitude of the electric field is $4V/m$. If

$\varepsilon_0 = 8.8 \times 10^{-12} C^2 / N - m^2$, then the average energy density of electric field will be

A. $35.2 \times 10^{-12} J / m^3$

B. $35.2 \times 10^{-10} J / m^3$

C. $35.2 \times 10^{-11} J / m^3$

D. $35.2 \times 10^{-13} J / m^3$

Answer: A

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41. The algebraic sum of two co - initial vectors is 16 units. Their vector sum is 8 units and the resultant of the vectors are perpendicular to the smaller vector. Then magnitudes of the two vectors are -

A. 2 unit & 14 unit

B. 4 unit & 12 unit

C. 6 unit 10 unit

D. 8 unit & 8 unit

Answer: C

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42. In a Young's double slit experiment, slits are separated by $0.5mm$ and the screen is placed $150cm$ away. A beam of light consisting of two wavelengths, $650nm$ and $520nm$, is used to obtain interference fringes on the screen. The least distance from the common central maximum to the point where the bright fringes due to both the wavelengths coincide is

A. 15.6 mm

B. 1.56 mm

C. 7.8 mm

D. 9.75 mm

Answer: C

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43. The speed of a ball of radius 2 cm in a viscous liquid is 20 cm/s. Then the speed of ball of radius 1 cm in the same liquid is

A. $5cms^{-1}$

B. $10cms^{-1}$

C. $40cms^{-1}$

D. $80cms^{-1}$

Answer: A

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44. In a pond of water, a flame is held 2 m above the surface of the water. A fish is at depth of 4 m from the water surface.

Refractive index of water is $\frac{4}{3}$. The apparent height of the flame from the eyes of fish is -

A. 5.5 m

B. 6 m

C. $\frac{8}{3}m$

D. $\frac{20}{3}m$

Answer: D

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45. A particle is projected with velocity v_0 along x - axis. The deceleration on the particle is proportional to the square of the distance from the origin i.e. $a = -x^2$. The distance at which particle stops is -

A. $\sqrt{\frac{3v_0}{2}}$

B. $\left(\frac{v_0^2}{3}\right)^{1/3}$

C. $\left(\frac{2v_0^2}{3}\right)^{1/3}$

D. $\left(\frac{3v_0^2}{2}\right)^{1/3}$

Answer: D

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