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PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

AP EAMCET SOLVED PAPER 2018 (23-04-2019,SHIFT -1)

Physics

1. Assertion (A) Energy per unit volume and angular momentum can be added dimensionally. Reason (R) Physical quantities having same dimension can be added or subtracted.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: D

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2. A body is projected vertically upwards with a velocity u from the top of a tower. Time taken by it to reach the ground is n times, then the time taken by it to reach the highest point in its path. Height of the tower is

A. $\frac{\nu^2(n-1)}{2g}$

B. $\frac{\nu^2(n-2)}{g}$

C. $\frac{\nu^2(n-2)}{2g}$

D. $\frac{u^2}{2g}(n+1)$

Answer: C

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3. A body is projected horizontally from the top of a tower of height 180m with a velocity of $20ms^{-2}$. If acceleration due to gravity is

$10ms^{-1}$, then match the following.

10 ms^{-2}, then match the following.

	List I		List II
(A)	Velocity of the body after 1 second (in ms^{-1})	(I)	5
(B)	Horizontal displacement of the body after 1 second (in metres)	(II)	20
(C)	Vertical displacement of the body after 1 second (in metres)	(III)	10
(D)	Vertical velocity of the body after 1 second (in ms^{-1})	(IV)	22.4

A. $\begin{matrix} A & B & C & D \\ IV & II & III & I \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ I & II & III & IV \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ IV & II & I & III \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ II & IV & I & III \end{matrix}$

Answer: C

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4. Two towers A and B, each of height 20m are situated a distance 200m apart. A body thrown horizontally from the top of the tower A with a velocity $20ms^{-1}$ towards the tower B hits the ground at point P and another body thrown horizontally from the top of tower B with a velocity $30ms^{-1}$ towards the tower A hits the ground at point Q. if a car starting from rest from P reaches Q in 10 seconds, then the acceleration of the car is (acceleration due to gravity $= 10ms^{-2}$)

A. $1ms^{-2}$

B. $2ms^{-2}$

C. $3ms^{-2}$

D. $4ms^{-2}$

Answer: B

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5. A particle of mass 4 m explodes into three pieces of masses, m, m and 2 m. The equal masses move along X-axis and Y-axis with

velocities $4ms^{-1}$ and $6ms^{-1}$ respectively. The magnitude of the velocity of the heavier mass is

A. $\sqrt{17}ms^{-1}$

B. $2\sqrt{13}ms^{-1}$

C. $\sqrt{13}ms^{-1}$

D. $\frac{\sqrt{13}}{2}ms^{-1}$

Answer: C

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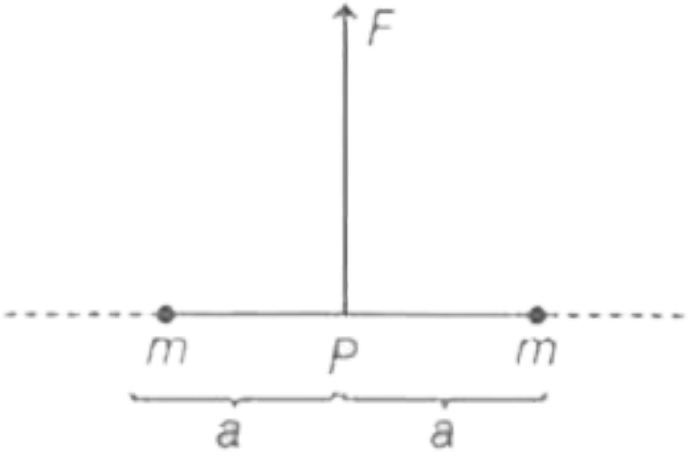
6. As shown in the figure, two particle each of mass m tied at the ends of a light string of length 2a are kept on a frictionless horizontal surface. When the mid-point (P) of the string is pulled vertically upwards with a small but constant force F, the particles move towards each other on the surface. Magnitude of acceleration of each particle, when the

separation between them becomes 2x is



A. $\frac{F}{2m}\frac{a}{\sqrt{a^2-x^2}}$

B. $\frac{F}{2m}\frac{x}{\sqrt{a^2-x^2}}$

C. $\frac{F}{2m}\frac{x}{a}$

D. $\frac{F}{2m}\frac{\sqrt{a^2-x^2}}{x}$

Answer: B

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7. A particle is released from a height H. At a certain height, its kinetic energy is half of its potential energy with reference to the surface of the earth. Height and speed of the particle at that instant are respectively.

A. $\frac{H}{3}, \sqrt{\frac{2gH}{3}}$

B. $\frac{H}{3}, 2\sqrt{\frac{gH}{3}}$

C. $\frac{2H}{3}. \sqrt{2gH}$

D. $\frac{2H}{3}. \sqrt{\frac{2gH}{3}}$

Answer: D

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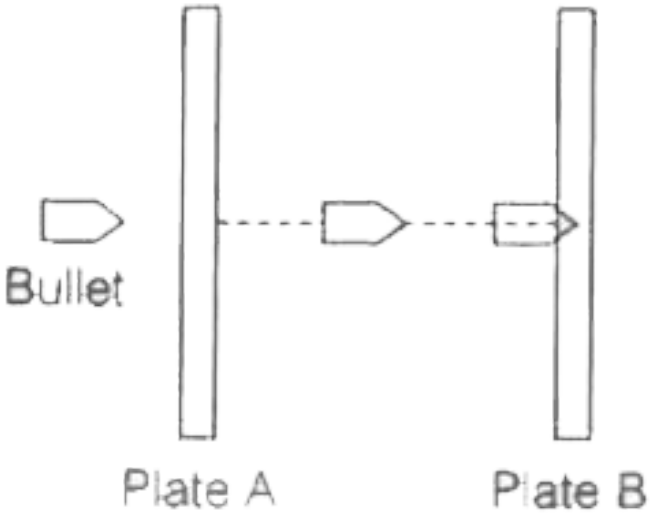
8. A bullet of mass 10g plerces through a plane A of mass 500g and then gets embedded into a second plate B of mass 1.49kg as shown in the figure. Initially, the two plates A and B are at rest and move with same velocity after collision. The percentage loss in the initial kinetic energy of the bullet, when it is between the plates A and B is _____(Neglect any loss of material of the

plates during the collision)



A. 25

B. 56.25

C. 43.75

D. 75

Answer: C

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9. The moment of inertia of a body about a given axis is $12kg.\ m^2$. Initially, the body is at rest. In order to produce a rotational kinetic energy of 15000J, an angular acceleration of $10rads^{-2}$ must be applied about that axis for a duration of

A. 2s

B. 4s

C. 10s

D. 5s

Answer: D

10. A light rope is wound around a hollow cylinder of mass 4kg and radius 40cm. If the rope is pulled with a force of 40N, its angular acceleration is

A. $0.40 rads^{-2}$

B. $0.25 rads^{-2}$

C. $25 rads^{-2}$

D. $40 rads^{-2}$

Answer: C

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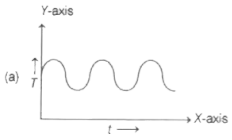
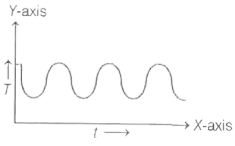
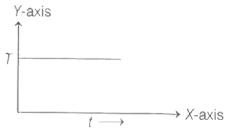
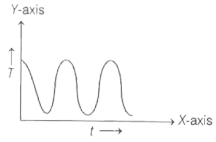
11. In the case of a simple pendulum executing SHM at t= 0, the bob is not at the mean position. The graph drawn between the tension (T) in the string and time (t) is

A. 

B. 

C. 

D. 

Answer: A

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12. An artificial satellite of mass m is moving along anelliptical path around the earth. The area velocity of the satellite is proportional to

A. m

B. m^{-1}

C. m^{0}

D. $m^{1/2}$

Answer: C

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13. A rubber cube of side 5 cm has one face fixed while a tangential force 1800N is applied on its opposite face. If modulus of rigidity of rubber is $2.4 \times 10^6 Nm^{-2}$, then the lateral displacement of the strained face is _____

A. 3mm

B. 5mm

C. 15mm

D. 1.5mm

Answer: C

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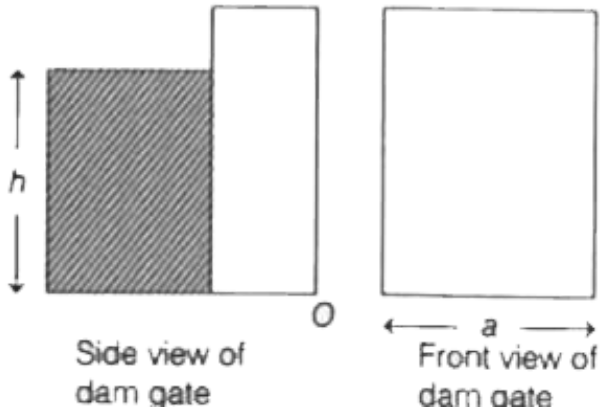
14. Water stands upto height h behind the dam as shown in the figure. The front view of the dam gate is also shown in the adjoining figure. Density of water is ρ and acceleration due to gravity is g. If atmospheric pressure force is also considered, then the point of application of total force acting on the dam due to water

above O is



A. $\frac{h}{rr4r}$

B. $\frac{h}{3}$

C. h

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

Answer: B

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15. The time taken for a calorimeter containing 75g of water at $62^{\circ}C$ to cool to $58^{\circ}C$ is 9 minutes. When the calorimeter contains 105g of water, it takes 12 minutes to cool from $62^{\circ}C$ to $58^{\circ}C$. The water equivalent of the calorimeter is

A. 10g

B. 15 g

C. 20g

D. 30g

Answer: B

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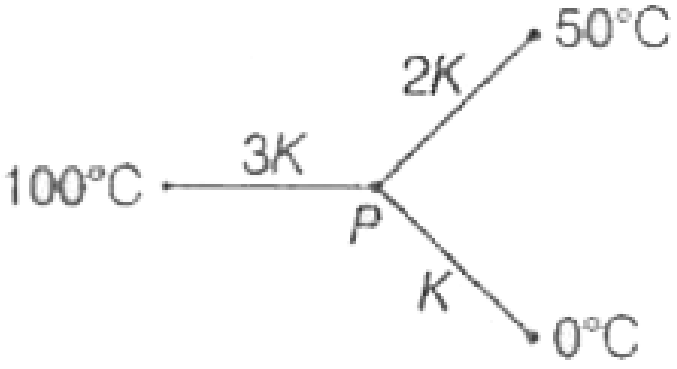
16. Three rods of same dimension have thermal conductivities 3k, 2K and K. They are arranged as shown in the figure below. Then in the steady state the temperature of the junction P is



A. $\frac{200}{3}^{\circ}C$

B. $\frac{100}{3}^{\circ}C$

C. $75^{\circ}C$

D. $\frac{50}{3}^{\circ}C$

Answer: A

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17. Freezing compartment of a refrigerator is at $0^{\circ}C$ and room temperature is $27.3^{\circ}C$. Work

done by the refrigerator to freeze 1g of water at $0^\circ C$ is $\left(L_{\text{ice}} = 80 cal g^{-1}\right)$

A. 336J

B. 33.6J

C. 3.36J

D. 40J

Answer: B

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18. Tyre of a bicycle has volume $2 \times 10^{-3} m^3$. Initially the tube is filled 75% of its volume by air at atmospheric pressure $10^5 Nm^{-2}$. When a rider is on the bicycle, the area of contact of tyre with road is $24 \times 10^{-4} m^2$. The mass of rider with bicycle is 120kg. If a pump delivers a volume $500 cm^3$ of air in each stroke, then the number of strokes required to inflate the tyre is $(g = 10 ms^{-2})$

A. 10

B. 11

C. 21

D. 20

Answer: C

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19. A diamtomic gas consisting of rigid molecules is at a temperature of $87^{\circ}C$. If the moment of inertia is $2.76 \times 10^{-39} gcm^2$, then the rms angular speed of the molecule is (Boltzmann constant $= 1.38 \times 10^{-23} JK^{-1}$)

A. $6 \times 10^{12} rads^{-1}$

B. $3 \times 10^{12} rads^{-1}$

C. $6 \times 10^{13} rads^{-1}$

D. $3 \times 10^{13} rads^{-1}$

Answer: A

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20. If the length of a stretched string is shortened by x% and the tension is increased by 44%. Then the ratio of the final and initial

fundamental frequencies is $2:1$, then the value of x is

A. 20

B. 30

C. 40

D. 60

Answer: C

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21. A small source of sound vibrating at a frequency 500Hz is rotated along a circle of radius $\frac{100}{\pi} cm$ at a constant angular speed of 5 revolutions per second. The minimum and maximum frequency of the sound observed by a listener situation in the plane of the circle is (speed of sound is $332 ms^{-1}$)

A. 338.5 Hz, 6125 Hz

B. 485.4 Hz, 535.6 Hz

C. 435.3Hz, 565.6 Hz

D. 485.4 Hz, 515.5 Hz

Answer: D

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22. A lens forms real and virtual images of an object, when the object is at u_1 and u_2 distance respectively. If the size of the virtual image is double that of the real image, then the focal length of the lens is (take, the magnification of the real image as m)

A. $\left(\frac{u_1 + u_2}{2}\right)m$

B. $\left(\frac{u_1 - u_2}{3}\right)2m$

C. $\left(\frac{u_1 - u_2}{2}\right)3m$

D. $\left(\frac{u_1 + u_2}{3}\right)2m$

Answer: C

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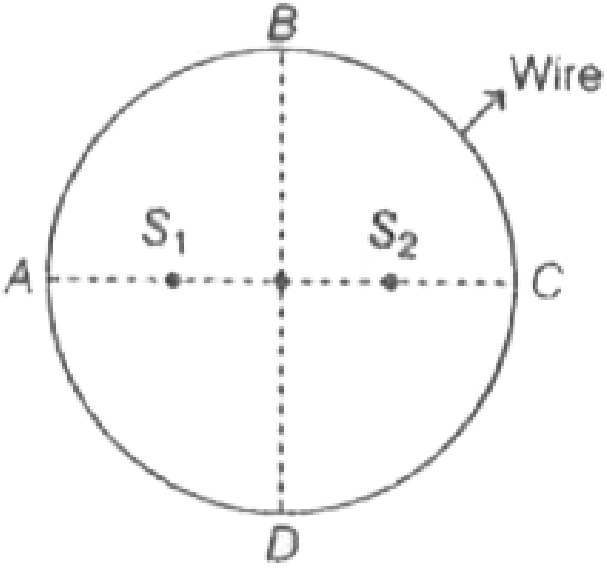
23. Two point source S_1 and S_2 separated by a distanc $10\mu m$ in phase. A circular wire of radius $40\mu m$ is placed around the sources as shown in figure, then (O is the centre of the circle and

$OS_2 = OS_2$)



A. point A and B are dark and points C and D are bright

B. point A and B are bright and point C and D are dark

C. point A and C are dark and points B and D are bright

D. point A and C are bright and points B and D are dark

Answer: C

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24. Two equally charged metal spheres A and B repel each other with a force of $4 \times 10^{-5} N$. Another identical uncharged sphere C is

touched to A and then placed at the mid-point of the line joining the sphere A and B. The net electric force on the sphere C is

A. $4 \times 10^{-5} N$ from C to A

B. 4×10^{-5} N from C to B

C. 8×10^{-5}N from C to A

D. $8 \times 10^{-5} N$ from C to B

Answer: A

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25. Four positive point charges +q are kept at the four corners of a square of side l. The net electric field at the mid-point of any one side of the square is (Take, $\frac{1}{4\pi\varepsilon_0} = k$)

A. $\frac{4kq}{l^2}$

B. $\frac{16kq}{5\sqrt{5}l^2}$

C. $\frac{8kq}{\sqrt{5}l^2}$

D. $\frac{kq}{l^2}$

Answer: B

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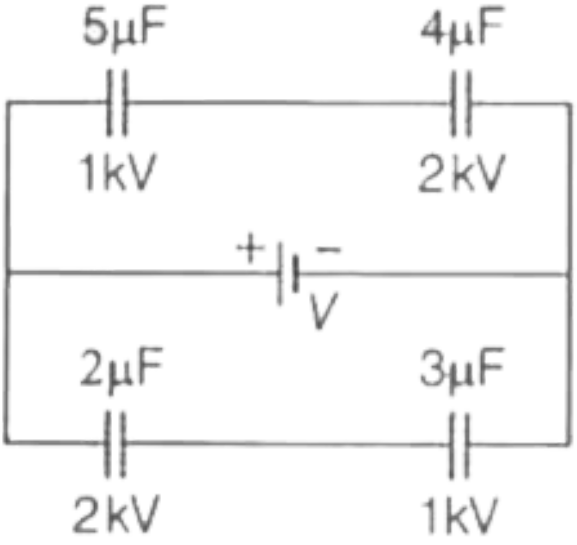
26. Four capacitors marked with capacitances and breakdown voltages are connected as shown in the figure. The maximum emf of the source, so that no capacitor breaks down is



A. 10.5kV

B. 5.25 kV

C. 2.25 kV

D. 1.25 kV

Answer: C

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27. A Van de Graaff generator has a spherical metal shell as an electrode which is at a potential $15 \times 10^6 V$. If the dielectric strength of

the surrounding medium is $5 \times 10^7 Vm^{-1}$, then the diameter of the shell is

A. 30 cm

B. 15 cm

C. 60 cm

D. 120 cm

Answer: C

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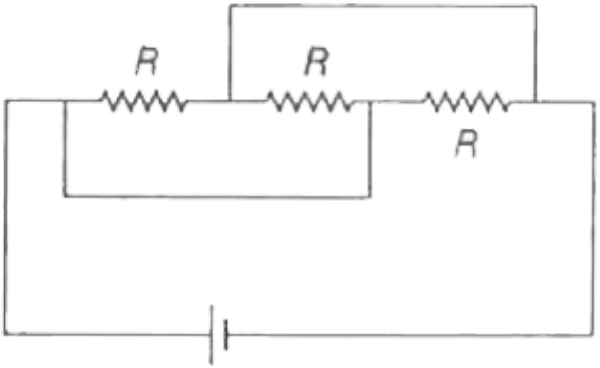
28. A DC source with internal resistance R_0 is connected to three identical resistors each of resistance R as shown in the figure. If the thermal power generated in the circuit is highest, then



A. $R = 2R_0$

B. $R = 3R_0$

C. $R = \frac{R_0}{3}$

D. $R = R_0$

Answer: B

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29. In a potentiometer, a wire of length 10m having resistance 50Ω is used. A battery of 5V and a resistor of 450Ω are connected in series to the wire. If an unknown battery of emf E balances the potentiometer at 450cm, then the value of E is

A. 0.225V

B. 1.25V

C. 2.25 V

D. 0.0225V

Answer: A

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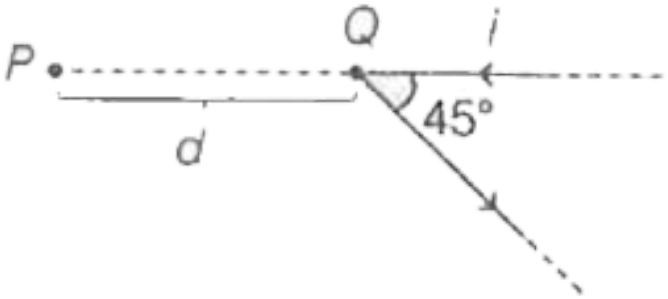
30. A long straight wire carrying electric current i is bent at its mid-point to form an angle of 45° as shown in the figure. Magnetic field at a point

P at a distance d from the point Q of bending is



A. $\frac{\mu_0 i}{4\pi d}\left[\sqrt{2}-1\right]$

B. $\frac{\mu_0 i}{2\pi d}\left[\sqrt{2}-1\right]$

C. $\frac{\mu_0 i}{4\pi d}$

D. $\frac{\mu_0 i}{2\pi d}$

Answer: A

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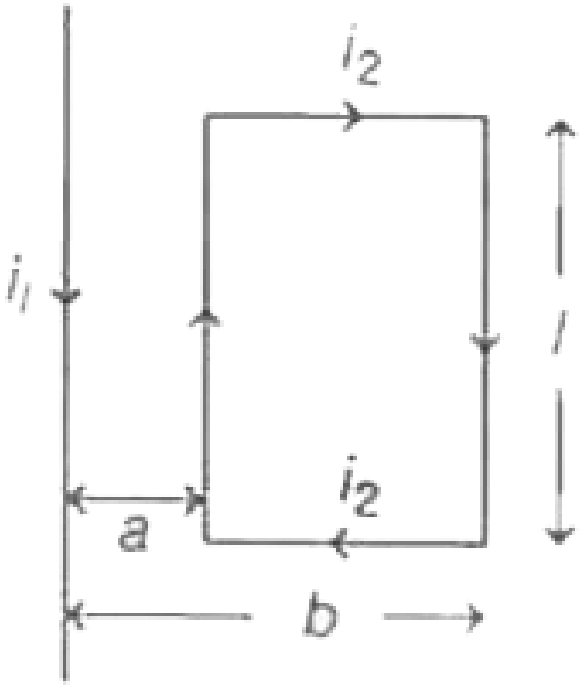
31. A current carrying square loop is placed near a straight infinitely long current carrying wire as shown in the figure. The torque acting on the loop is



A. $\frac{\mu_0}{2\pi}\frac{i_1 i_2 l}{ab}$

B. $\frac{\mu_0}{2\pi}\frac{i_1 i_2 l}{a(a+b)}$

C. $\frac{\mu_0}{2\pi}\frac{i_1 i_2 l(b-a)}{ab}$

D. 0

Answer: D

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32. At a certain place the horizontal component of earth's magnetic field is $\frac{1}{\sqrt{3}}$ times the

vertical component. The angle of dip at that place is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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33. The energies required to set up in a cube of side 10 cm

(i) a uniform electric field of $10^7 Vm^{-1}$ and

(ii) a uniform magnetic field of 0.25 Wbm^{-2} are respectively about

$\left(\mu_0 = 4\pi \times 10^{-7} Hm^{-1}, \varepsilon_0 = 8.9 \times 10^{-12} Fm^{-1}\right)$

A. 0.445J, 25J

B. 4.45J, 2.5J

C. 44.5J, 25J

D. 0.44J, 2.5J

Answer: A

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34. The rms value of emf is given by $E(8\sin\omega t + 6\cos\omega t)$ volt is

A. $5\sqrt{2}V$

B. $7\sqrt{2}V$

C. 10V

D. $10\sqrt{2}V$

Answer: A

35. An electromagnetic radiation has an energy 14.4keV. To which region of the electromagnetic spectrum it belongs?

A. infrared

B. visible

C. Ultraviolet

D. X-ray

Answer: D

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36. An α-particle and a proton are accelerated from rest by the same potential, thenthe ratio of their de-Broglie wavelength is

A. $2\sqrt{2}:1$

B. $1:2\sqrt{2}$

C. $1:2$

D. $2:1$

Answer: B

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37. The difference between the radii of n^{th} and $(n+1)^{th}$ orbits of hydrogen atoms is equal to the radius of $(n-1)^{th}$ orbit of hydrogen. The angular momentum of the electron in the n^{th} orbit is ___ (h is Planck's constant)

A. $\frac{h}{\pi}$

B. $\frac{2h}{\pi}$

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

D. $\frac{4h}{\pi}$

Answer: B

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38. The maximum potential energy due to electrostatic repulsion between two hydrogen nuclei is nearly (radius of the nucleus = 1.1 fermi)

$$\left[\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2}\right]$$

A. 0.65 MeV

B. 2.09 MeV

C. 3.31 MeV

D. 0.92 MeV

Answer: A

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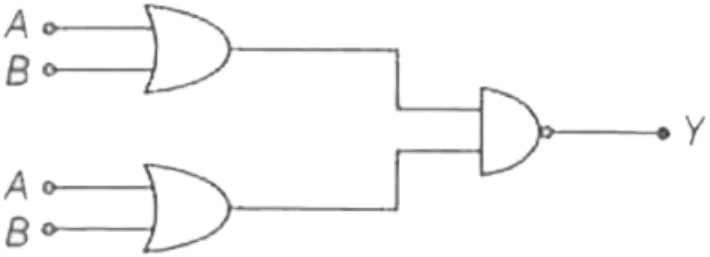
39. For the combination of logic gates shown in the figure, the equivalent logic gate is



A. AND

B. NOT

C. NAND

D. NOR

Answer: D

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40. A TV transmitter has a range of 50km. The height of the TV transmitter is _____ (Radius of the earth, $R_e = 6.4 \times 10^6 m$)

A. 195.3m

B. 186.5m

C. 206m

D. 175m

Answer: A

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