PHYSICS

BOOKS - CAREER POINT

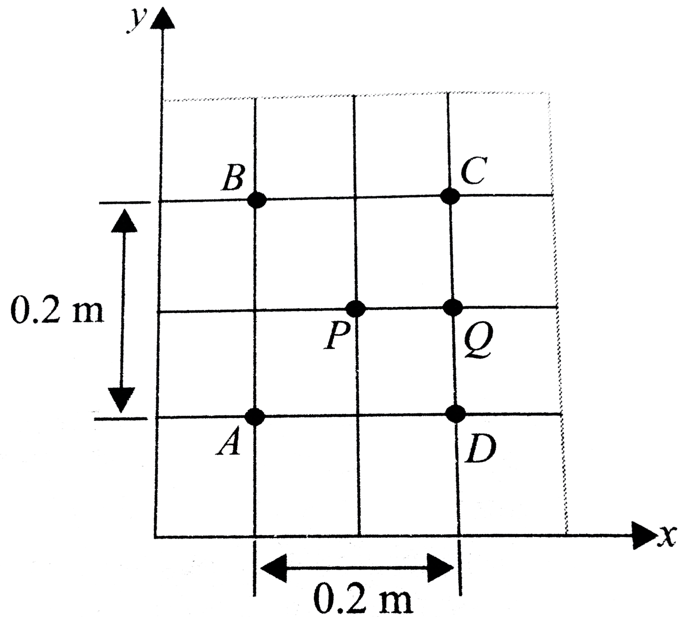
REVISION TEST 2

Physics

1. A, B, C, D, P, and Q are points in a uniform electric field. The potentials at these points are

$V(A) = 2V$. $V(P) = V(B) = V(D) = 5V$,

and $V(C) = 8V$. Find the electric field at P.



A. 10 V m^{-1} along PQ

B. 5 V m^{-1} along PC

C. $15\sqrt{2}$ V m^{-1} along PA

D. 5 V m^{-1} along PA

Answer: C

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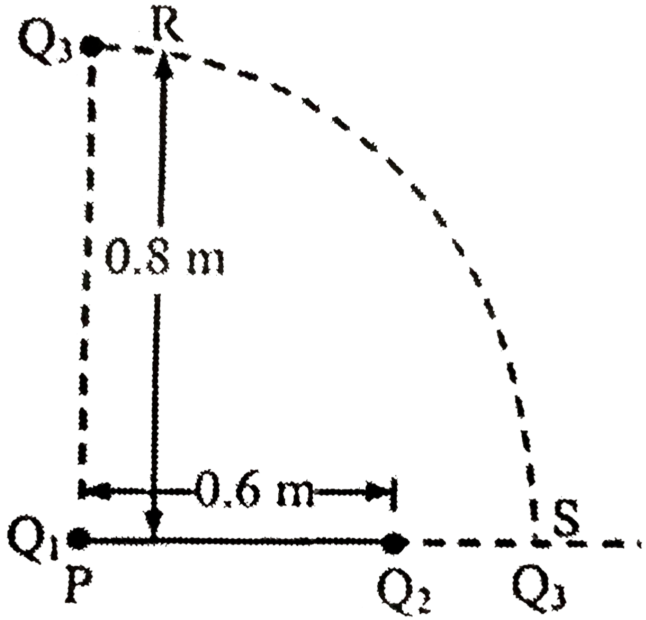
2. Two charges Q_1 and Q_2 coulombs are shown in figure. A third charge Q_3 coulombs is moved from points R to S along a circular path. Change in potential energy of the charge is -



A. $kQ_1Q_2Q_3$

B. $4kQ_1Q_2$

C. $4kQ_2Q_3$

D. $\frac{2}{3}kQ_2Q_3$

Answer: C

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3. A drop of water of mass m falls away from the bottom of charged conducting sphere of radius R, carrying with it a charge q_1 and leaving the sphere a uniformly distributed charge q_2. The kinetic energy of the drop after it has fallen height h is -

A. $\frac{1}{4\pi\xi_0}q_1q_2\left(\frac{h}{R(R+h)}\right)$

B. mgh

C. $\frac{1}{4\pi\xi_0}q_1q_2\left(\frac{h}{R(R+h)}\right)+mgh$

D. $\frac{1}{4\pi\xi_0}\frac{q_1q_2}{h}+mgh$

Answer: C

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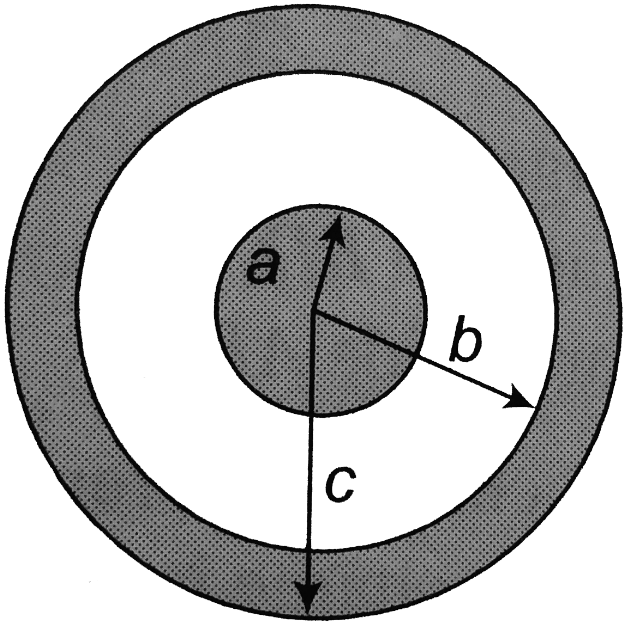
4. A solid conducting sphere of radius a has a net positive charge $2Q$. A conducting spherical shell of inner radius b and outer radius c is concentric with the solid sphere and has a net charge $-Q$. The surface charge density on the inner and outer surfaces of the spherical shell will be



A. $-\frac{2Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$

B. $-\frac{Q}{4\pi b^2}, \frac{Q}{4\pi c^2}$

C. $0, \frac{Q}{4\pi c^2}$

D. None of these

Answer: A

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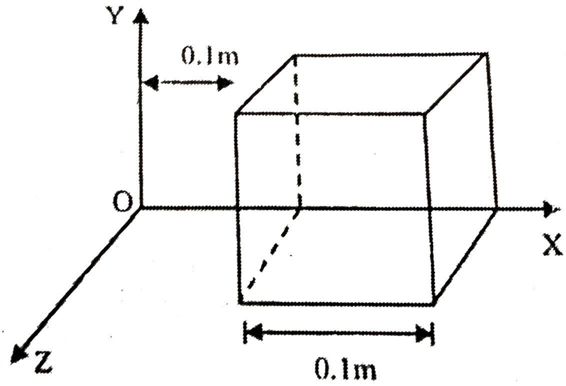
5. Due to a charge inside the cube, the electric field is: E_x = 600x, E_y = 0, E_z = 0. The charge inside the cube is nearly -



A. $600\mu C$

B. $60\mu C$

C. $53\mu C$

D. $6\mu C$

Answer: C

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6. Four charges equal to $-Q$ are placed at the four corners of a square and a charge q is at its centre. If the system is in equilibrium the value of q is

A. $-\frac{Q}{2}(1+2\sqrt{2})$

B. $\frac{Q}{4}(1+2\sqrt{2})$

C. $-\frac{Q}{4}(1+2\sqrt{2})$

D. $\frac{Q}{2}(1+2\sqrt{2})$

Answer: B

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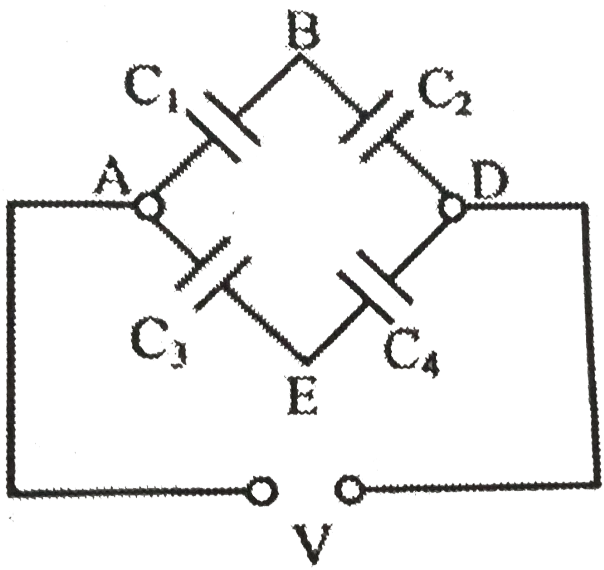
7. Potential difference between the points B and E of the circuit is -



A. $\dfrac{(C_2 - C_1)}{V}$

B. $\dfrac{(C_4 - C_3)}{V}$

C. $\left\{\dfrac{C_2C_3 - C_1C_4}{C_1 + C_2 + C_3 + C_4}\right\}$

D. $\left\{\dfrac{C_1C_4 - C_2C_3}{(C_1 + C_2)(C_3 + C_4)}\right\}$

Answer: D

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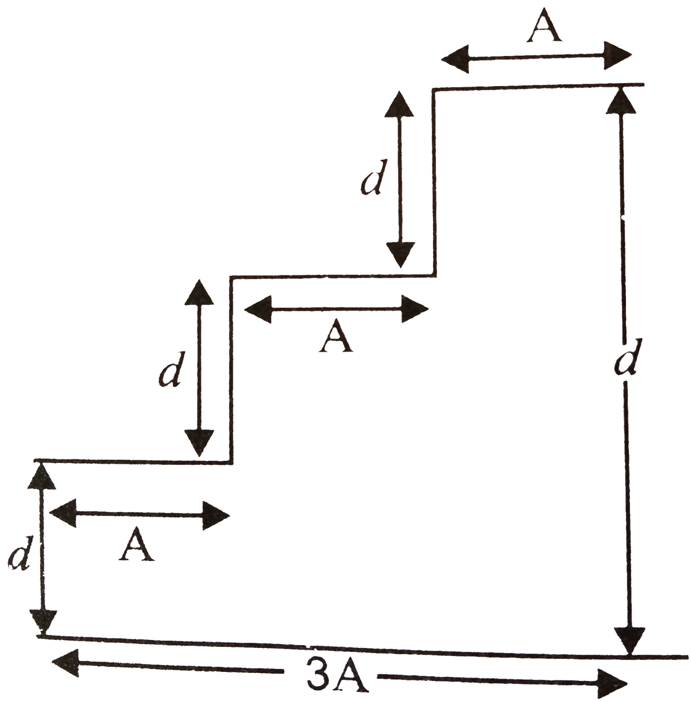
8. The expression for the equivalent capacitance of the system shown in Fig. is (A is the corss-sectional area of one of the planes) :



A. $\varepsilon_0 A / 3d$

B. $\dfrac{3\varepsilon_0 A}{d}$

C. $\varepsilon_0 A / 6d$

D. none of the above

Answer: D

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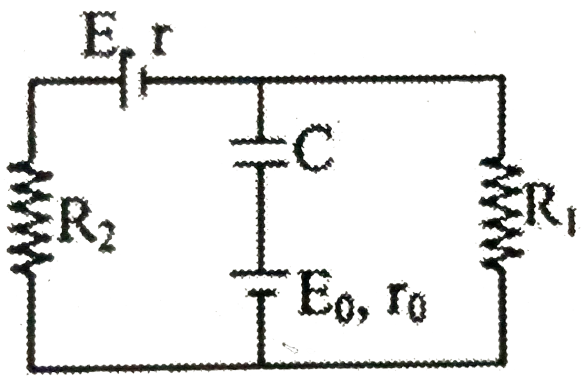
9. In steady state, find energy stored in the capacitor -



A. $\frac{1}{2}C\left[\frac{ER_1}{r+R_1+R_2}\right]^2$

B. $\frac{1}{2}C\left[E_0 + \left(\frac{ER_1}{r + R_1 + R_2}\right). R_1\right]^2$

C. $\frac{1}{2}CE_0^2$

D. none of the above

Answer: B

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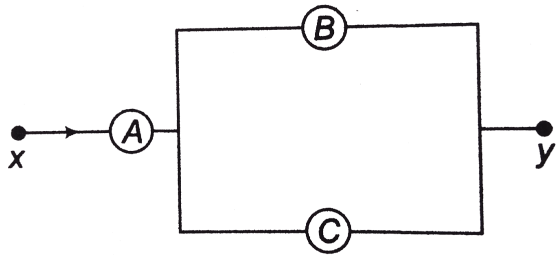
10. A, B and C are voltmeters of resistances $R, 1.5R$ and $3R$ respectively. When some potential difference is applied between x and y the voltmeter readings are V_A, V_B and

V_C,` then



A. $V_A = V_B = V_C$

B. $V_A \neq V_B = V_C$

C. $V_A = V_B \neq V_C$

D. $V_A + V_B = V_C$

Answer: A

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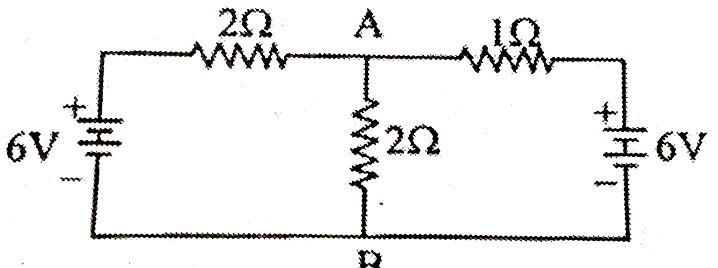
11. The potential difference between the points V and B in the following circuit will be -



A. zero

B. 2 V

C. 3.5 V

D. 4.5 V

Answer: D

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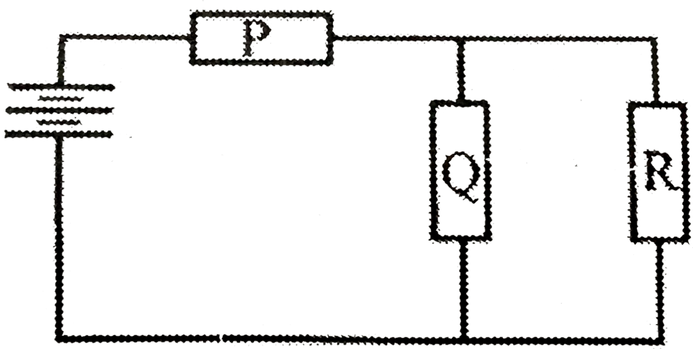
12. The resistance P, Q and R in the circuit have equal resistance.



The battery of negligible resistance, supplies a total power of 12W. What is the power dissipated by heating in resistor R -

A. 2W

B. 4W

C. 3W

D. 6W

Answer: A

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13. A particle of charge per unit mass α is released from origin with a velocity $\vec{v} = v_0 \hat{i}$ uniform magnetic field $\vec{B} = -B_0 \hat{k}$. If the particle passes through $(0, y, 0)$, then y is equal to

A. $-\frac{2v_0}{B_0\alpha}$

B. $\frac{v_0}{B_0\alpha}$

C. $\frac{2v_0}{B_0\alpha}$

D. $-\frac{v_0}{B_0\alpha}$

Answer: C

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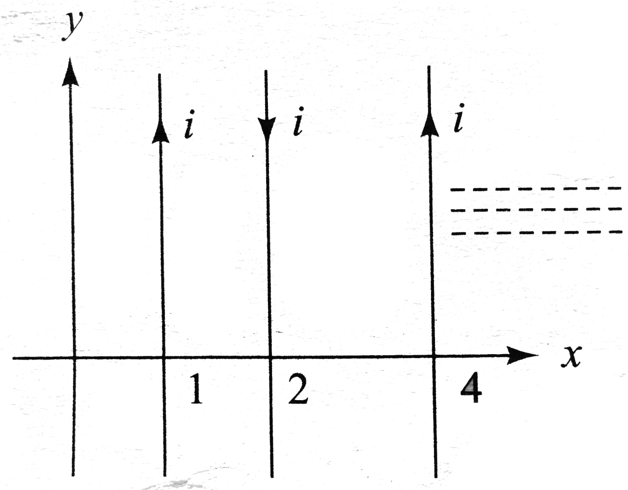
14. Equal currents $i = 1$ A are flowing through the wires parallel to y-axis located at $x = +1m, x = +2m, x = +4m$ and so on...., etc. but in opposite directions as shown in Fig The magnetic field (in tesla) at origin would be



A. $-1.33 \times 10^{-7}\hat{k}$

B. $1.33 \times 10^{-7}\hat{k}$

C. $2.67 \times 10^{-7}\hat{k}$

D. $-2.67 \times 10^{-7}\hat{k}$

Answer: B

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15. A dip circle is so set that the dip needle moves freely in the magnetic meridian. In this position the angle of dip is 39°. Now, the dip circle is rotated so that the plane in which the needle moves makes an angle of 30° with the magnetic meridian. In this position, the needle will dip by an angle -

A. exactly 39°

B. 30°

C. more than 39°

D. less than 39°

Answer: C

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16. A coil having an inductance of $1/\pi$ henry is connected in series with a resistance of 300Ω. If 20 volt from a 200 cycle source are impressed across the combination, the value of the phase angle between the voltage and the current is :

A. $\tan^{-1}\left(\frac{5}{4}\right)$

B. $\tan^{-1}\left(\frac{4}{5}\right)$

C. $\tan^{-1}\left(\frac{3}{4}\right)$

D. $\tan^{-1}\left(\frac{4}{3}\right)$

Answer: D

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17. A transformer with efficiency 80% works at $4kW$ and $100V$. If the secondary voltage is $200V$, then the primary and secondary currents are respectively

A. 40 A,16 A

B. 16 A, 40 A

C. 20 A, 40A

D. 40A, 20A

Answer: A

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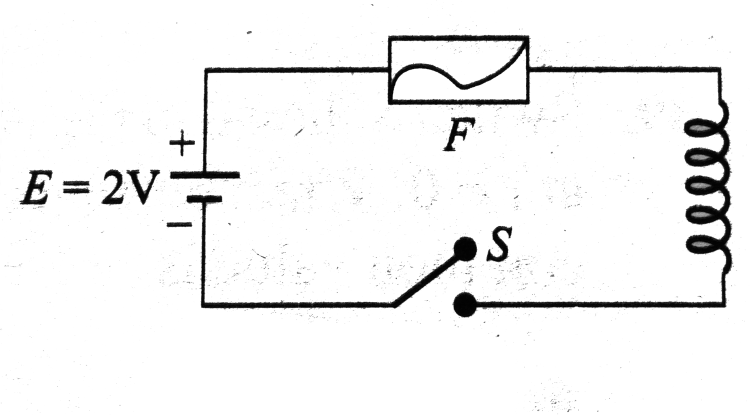
18. In the circuit shown in fig., the cell is ideal. The coil has an inductance of $4H$ and zero resistance. F is a fuse of zero resistance and will blow when the current through it reaches $5A$. The switch is closed at $t = 0$. The fuse will blow



A. after 1s

B. after 2s

C. after 5s

D. after 10s

Answer: D

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19. A square wire of side $3.0cm$ is placed $25cm$ away from a concave mirror of focal length $10cm$. What is the area enclosed by the image of the wire ? The centre of the wire is on the axis of the mirror, with its two sides normal to the axis.

A. 2 cm^2

B. 4 cm^2

C. 8 cm^2

D. 16 cm^2

Answer: B

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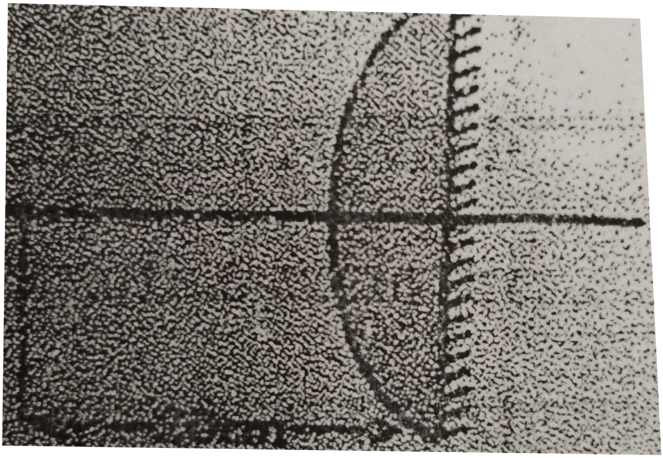
20. A point object is placed at distance of 20 cm from a thin plane - convex lens of focal length 15 cm . The plane surface of the lens is now silvered . The image created by the system is :-



A. 60 cm to the right of the lens

B. 30 cm to the left of the lens

C. 24 cm to the right of the lens

D. 12 cm to the left of the lens

Answer: D

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21. A ray of light is incident at an angle of 60° on one face of a 30° prism . The emergent ray from the prism makes an angle of 30° with the incident ray. The angle of emergence and refractive index of the material of the prism are-

A. $90^{\circ}, \sqrt{3}$

B. $0^{\circ}, \sqrt{3}$

C. $0^{\circ}, \sqrt{2}$

D. 90°, $\sqrt{2}$

Answer: B

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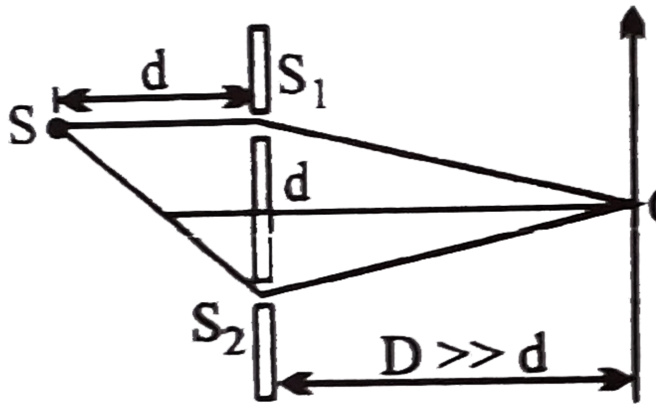
22. To make the central fringe at the center O , mica sheet of refractive index 1.5 is introduced

Choose the corect statement.



A. The thickness of sheet is $2(\sqrt{2}-1)d$ in front of S_1

B. The thickness of sheet is $(\sqrt{2}+1)d$ in front of S_2

C. The thickness of sheet is $(2\sqrt{2}d - 1)$ in front of S_2

D. The thickness of sheet is $(2\sqrt{2} - 1)d$ in front of S_1

Answer: A

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23. Green light of wavelength 5100 Å from a narrow slit is incident on a double slit . If the overall separation of 10 fringes on a screen 200 cm away is 2 cm , find slit separation .

A. 5×10^{-4} m

B. 2.5×10^{-2} m

C. 2.5×10^{-4} m

D. 5×10^{-2} m

Answer: A

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24. A person is not able to see objects farther than 80 cm clearly, while another person is not able to see objects beyond 120 cm, clearly. The powers of the lenses used by them for correct vision are in the ratio -

A. $2:3$

B. $3:2$

C. $1:2$

D. $2:1$

Answer: B

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25. Radiation coming from transition $n=2 \rightarrow n=1$ of hydrogen atoms falls on helium in $n=1$ and $n=2$ state. What are the possible transition of helium ions as they absorb energy from the radiation?

A. n = 1 to n = 2 and n = 2 to n = 3

B. n = 1 to n = 3 and n = 2 to n = 4

C. n = 2 to n = 3 and n = 2 to n = 4

D. n = 1 to n = 2 and n = 2 to n = 4

Answer: C

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26. An electron with speed v and a photon with speed c have the same de-Broglic wavelength. If the kinetic energy and momentum of electron is E_e and P_e and that of photon is E_{ph} and P_{ph} respectively, then correct statement is -

A. $\frac{E_e}{E_{ph}} = \frac{2c}{v}$

B. $\frac{E_e}{E_{ph}} = \frac{v}{2c}$

C. $\frac{P_e}{P_{ph}} = \frac{2c}{v}$

D. $\frac{P_e}{P_{ph}} = \frac{v}{2c}$

Answer: B

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27. A radioactive element X converts into another stable elemnet Y. Half-life of X is $2h$. Initally, only X is present. After time t, the ratio of atoms of X and Y is found to be $1:4$

Then t in hours is .

A. 2

B. 4

C. between 4 and 6

D. 6

Answer: C

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28. If mass of $U^{235} = 235.12142 a.m.u.$, mass of $U^{236} = 236.1205 a\mu$, and mass of neutron $= 1.008665 amu$, then the energy required to remove one neutron from the nucleus of U^{236} is nearly about.

A. zero

B. 6.5 MeV

C. 75 MeV

D. 1 cV

Answer: B

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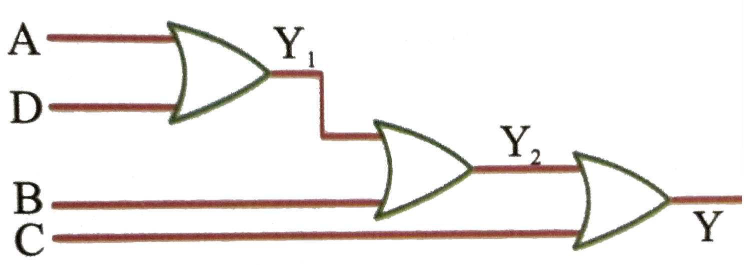
29. The expression of Y in following circuit is



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A. ABCD

B. A + BCD

C. A + B + C + D

D. AB + CD

Answer: C

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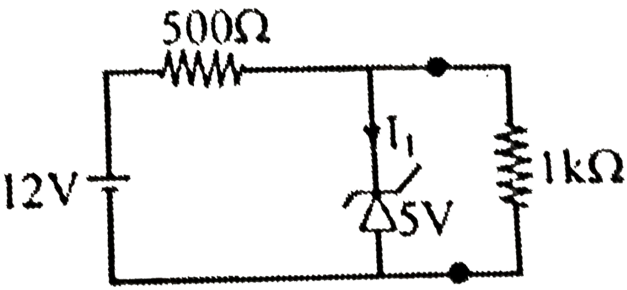
30. The current flowing through the zener diode in figure is -



A. 2 mA

B. 7 mA

C. 9 mA

D. 5 mA

Answer: C

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