PHYSICS

BOOKS - CP SINGH PHYSICS (HINGLISH)

NEET PREVIOUS YEAR

Paper

1. The electric field in a certain region is acting radially outwards and is given by $E = Ar$. A

charge contained in a sphere of radius $'a'$ centred at the origin of the field, will given by

A. $A\varepsilon_0 a^2$

B. $4\pi\varepsilon_0 A a^2$

C. $\varepsilon_0 A a^3$

D. $4\pi\varepsilon_0 A a^3$

Answer: D

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2. A parallel plate air capacitor of capacitance C is connected to a cell of $emFV$ and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect ?

A. The energy stored in the capacitor decreases K times

B. The chance in energy stored is $\frac{1}{2}CV^2\left(\frac{1}{K}-1\right)$

C. The change on the capacitor is not conserved

D. The potential difference between the plates decreases K times

Answer: C

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3. Across a metallic conductor of non-uniform cross-section a constant potential difference is applied. The quantity

A. Current

B. Drift velocity

C. electric field

D. current density

Answer: A

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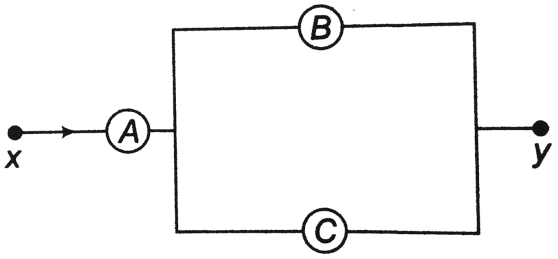
4. A, B and C are voltmeters of resistances $R, 1.5R$ and $3R$ respectively. When some potential difference is applied between x and

y the voltmeter readings are V_A, V_B and V_C,` then



A. $V_A \neq V_B = V_C$

B. $V_A = V_B \neq V_C$

C. $V_A \neq V_B \neq V_C$

D. $V_A = V_B = V_C$

Answer: D

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5. A potentiometer wire has length $4m$ and resistance 8Ω. The resistance that must be connected in series with the wire and an accumulator of e.m.f. $2V$, so as the get a potential gradient $1mV$ per cm` on the wire is

A. 40Ω

B. 44Ω

C. 48Ω

D. 32Ω

Answer: D

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6. An electron moving in a circular orbit of radius r makes n rotation per secound. The magnetic field produced at the centre has magnitude

A. zero

B. $\frac{\mu_0 n^2 e}{r}$

C. $\frac{\mu_0 n e}{2r}$

D. $\frac{\mu_0 ne}{2\pi r}$

Answer: C

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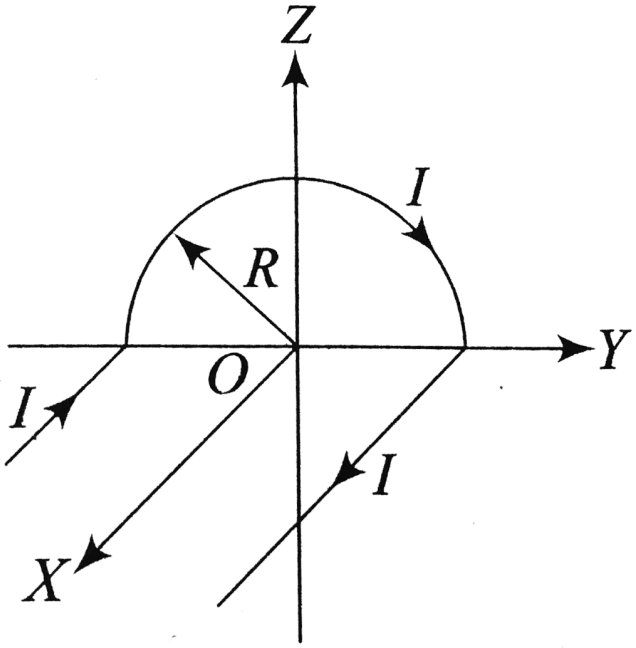
7. A wire carrying current I has the shape as shown in the adjoining figure. Linear parts of the wire are very long and parallel to X-axis while semicicular portion of radius R is lying

in $Y - Z$ plane. Magnetic field at point O is



A. $\vec{B} = -\frac{\mu_0}{4\pi}\frac{I}{R}\left(\mu\hat{i} \times 2\hat{k}\right)$

B. $\vec{B} = -\frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} + 2\hat{k}\right)$

C. $\vec{B} = \frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} - 2\hat{k}\right)$

D. $\vec{B} = -\frac{\mu_0}{4\pi}\frac{I}{R}\left(\pi\hat{i} + 2\hat{k}\right)$

Answer: B

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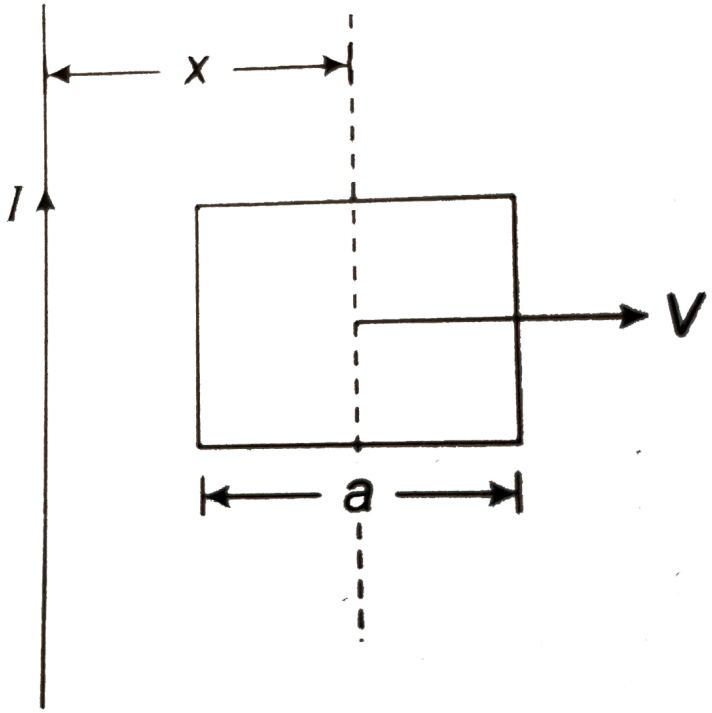
8. A conducting square frame of side $'a'$ and a long straight wire carrying current I are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity $'V'$. The emf induced in the

frame will be proportional to



A. $\frac{1}{(2x-a)^2}$

B. $\frac{1}{(2x+a)^2}$

C. $\frac{1}{(2x-a)(2x+a)}$

D. $\frac{1}{x^2}$

Answer: C

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9. A resistance R draws power P when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedence of the circuit becomes Z, the power drawn will be

A. $P\sqrt{\frac{R}{Z}}$

B. $P\left(\frac{R}{Z}\right)$

C. P

D. $P\left(\frac{R}{Z}\right)^2$

Answer: D

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10. A radiation of energy E falls normally on a perfctly refelecting surface . The momentum transferred to the surface is

A. $\frac{2E}{C}$

B. $\frac{2E}{C^2}$

C. $\frac{E}{C^2}$

D. $\frac{E}{C}$

Answer: A

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11. When a certain metallic surface is illuminated with monochromatic light of wavelength λ, the stopping potential for

photoelectric current is $3V_0$ and when the same surface is illuminated with light of wavelength 2λ, the stopping potential is V_0. The threshold wavelength of this surface for photoelectrice effect is

A. 4λ

B. $\frac{\lambda}{4}$

C. $\frac{\lambda}{6}$

D. 6λ

Answer: A

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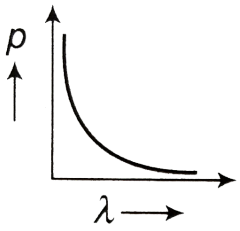
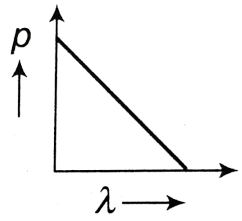
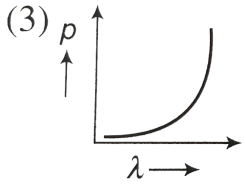
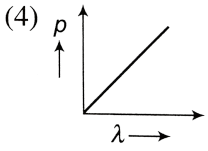
12. Which of the following figure represents the variation of particle momentum and the associated de - Broglie wavelength ?

A. 

B. 

C. 

D. 

Answer: A

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13. Consider $3rd$ orbit of He^+ (Helium) using nonrelativistic approach the speed of electron in this orbit will be (given $K = 9 \times 10^9$ constant $Z = 2$ and h (Planck's constant) $= 6.6 \times 10^{-34} Js$.)

A. $1.46 \times 10^6 m/s$

B. $0.73 \times 10^6 m/s$

C. 3.0×10^8

D. $2.92 \times 10^6 m/s$

Answer: A

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14. If radius of the ${}_{13}^{27}A1$ nucleus is taken to be R_{A1} then the radius of ${}_{53}^{125}Te$ nucleus is nearly.

A. $\frac{5}{3}R_{Al}$

B. $\frac{3}{5}R_{Al}$

C. $\left(\frac{13}{53}\right)^{1/3}R_{Al}$

D. $\left(\frac{53}{13}\right)^{1/3}R_{Al}$

Answer: A

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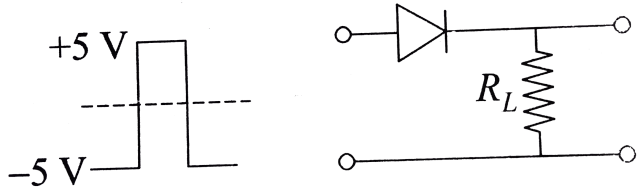
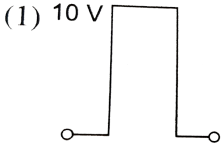
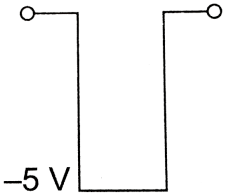
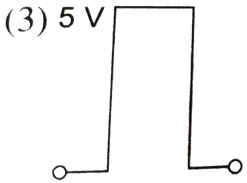
15. If an a $p-n$junction, a square input signal of $10V$ is applied, as shown

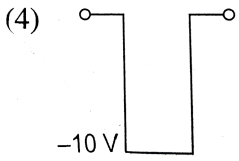


then the output across R_L will be

A. 

B. 

C. 

D. 

Answer: C

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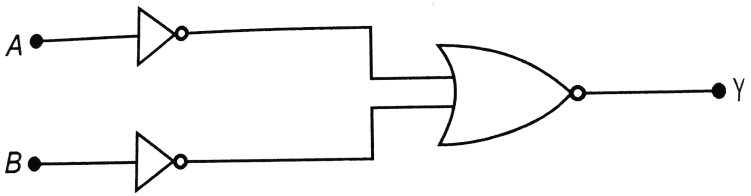
16. Which logic gate is represented by the following combination of logic gates ?



A. $NAND$

B. AND

C. NOR

D. OR

Answer: B

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17. Two identical thin planoconvex glass lenses (refractive index 1.5) each having radius of curvature of $20cm$ are placed with their convex surfaces in contact at the centre. The intervening space is filled with oil of refractive

index 1.7. The focal length of the combination is

A. $-25cm$

B. $-50cm$

C. $50cm$

D. $-20cm$

Answer: C

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18. The refracting angle of a prism is A and refractive index of the material of the prism is $\cos(A/2)$. The angle of minimum deviation is

A. $180^\circ - 2A$

B. $90^\circ - A$

C. $180^\circ + 2A$

D. $180^\circ - 3A$

Answer: A

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19. For a parallel beam of monochromatic light of wavelength $'\lambda'$ differaction is produced by a single slit whose width $'a'$ is of the order as wavelength of the light. If $'D'$ is the distance of the screen from the slit, the width of the central maxima will be

A. $\frac{D\lambda}{a}$

B. $\frac{D\lambda}{a}$

C. $\frac{2Da}{\lambda}$

D. $\frac{2D\lambda}{a}$

Answer: D

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20. In a Young's double slit experiment, the slit separation is $1mm$ and the screen is $1m$ from the slit. For a monochromatic light of wavelength $500nm$, the distance of 3rd minima from the central maxima is

A. $0.1mm$

B. $0.5mm$

C. $0.02mm$

D. $0.2mm$

Answer: D

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21. Two identical charged spheres suspended from a common point by two mass-less strings of length l are initially at a distance d ($d << l$) apart because of their mutual repulsion . The charge begins to leak from

both the spheres at a constant rate. As a result the charge approach each other with a velocity v. Then as a function of distance x between them .

A. $v \propto x^{-1}$

B. $v \propto x^{\frac{1}{2}}$

C. $v \propto x$

D. $v \propto x^{-\frac{1}{2}}$

Answer: D

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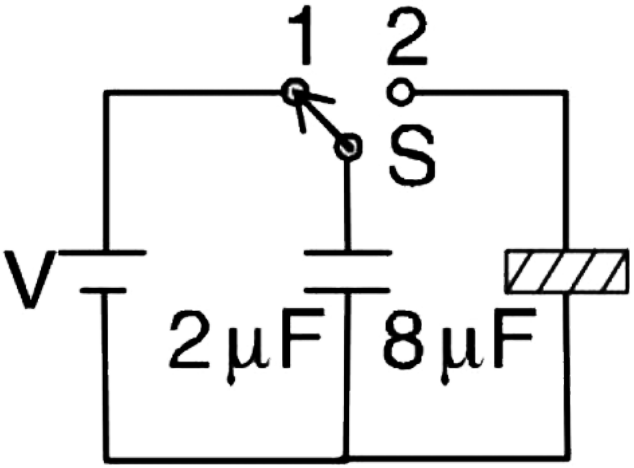
22. A $2\mu F$ capacitor is charged as shown in the figure. The percentage of its stored energy disispated after the switch S is turned to poistion 2 is



A. $80\ \%$

B. $0\ \%$

C. $20\ \%$

D. $75\ \%$

Answer: A

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23. The charge flowing through a resistance R varies with time $tasQ = at - bt^2$. The total heat produced in R is

A. $\frac{a^3R}{6b}$

B. $\frac{a^3R}{3b}$

C. $\frac{a^3R}{2b}$

D. $\frac{a^3R}{b}$

Answer: A

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24. A potentiometer wire is $100cm$ long hand a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite

direction. The balance points are obatined at $50cm$ and $10cm$ from the positive end of the wire in the two cases. The ratio of emfs is:

A. $3:2$

B. $5:1$

C. $5:4$

D. $3:4$

Answer: A

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25. A long staright wire of radius a carries a steady current I. The curent is unifromly distributed over its cross-section. The ratio of the magnetic fields B and B' , at radial distances $\frac{a}{2}$ and $2a$ respectively from the axis of the wire is:

A. $\frac{1}{4}$

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

C. 1

D. 4

Answer: C

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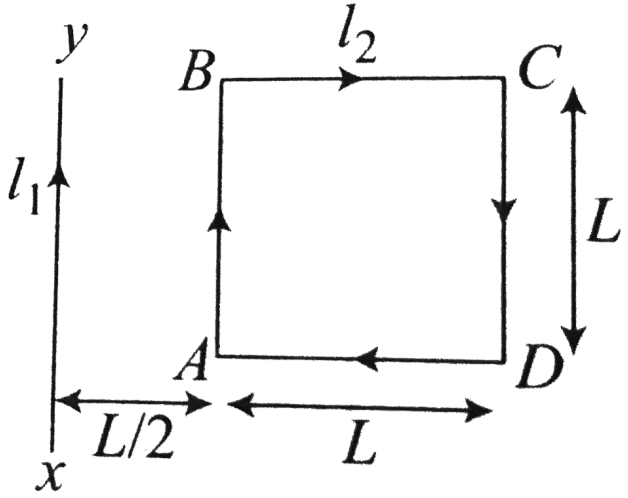
26. A sqaure loop $ABCD$, carrying a current I_2 is placed near and coplanar with a long straight conductor XY, carrying a current I_1 as shwon in Figure. The net force on the loop

will be



A. $\frac{2\mu_0 Ii}{3\pi}$

B. $\frac{\mu_0 Ii}{2\pi}$

C. $\frac{\mu_0 Ii}{2\pi}$

D. $\frac{2\mu_0 IiL}{3\pi}$

Answer: A

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27. A long solenoid has 1000 turns. When a current of $4A$ flows through it, the magnetic flux linked with each turn of the solenoid is $4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. $1H$

B. $4H$

C. $3H$

D. $2H$

Answer: A

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28. The magnetic susceptibility is negative for

A. diamagnetic material only

B. paramagnetic matrial only

C. ferromagnetic material only

D. Paramagnetic and ferromagnetic materials

Answer: A

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29. A small signal voltage $V(t) = V_0 \sin \omega t$ is applied across an ideal capacitor C:

A. Current $I(t)$, lags voltage $V(t)$ by 90°

B. Over a full cycle the capacitor C does not consume any energy from the voltage source

C. Current $I(t)$ is in phase with voltage $V(t)$.

D. Current $I(t)$ leads voltage V(t) by 180°

Answer: B

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30. An inductor $20mH$, a capacitor $50\mu F$ and a resistor $40\Omega$are connected in series across of emf $V = 10\sin 340t$. The power loss in $A.C.$ circuit is

A. $0.89W$

B. $0.51W$

C. $0.67W$

D. $0.76W$

Answer: B

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31. Out of the following options which one can be used produce a propagating electromagnetic wave?

A. A charge moving at constant velocity

B. A stationary charge

C. A chargless particles

D. An accelerating charge

Answer: D

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32. When an $\alpha -$ particle of mass 'm' moving with velocity 'v' bombards on a heavy nucleus of charge 'Ze' its distance of closest approach from the nucleus depends on m as :

A. m

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

C. $\frac{1}{\sqrt{m}}$

D. $\frac{1}{m^2}$

Answer: B

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33. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength surface is :

A. 3λ

B. 4λ

C. 5λ

D. $\frac{5}{2}\lambda$

Answer: A

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34. An electron of mass m and a photon have same energy E. The ratio of de - Broglie wavelengths associated with them is :

A. $\frac{1}{C}\left(\frac{E}{2m}\right)^{\frac{1}{2}}$

B. $\left(\frac{E}{2m}\right)^{\frac{1}{2}}$

C. $C(2mE)^{\frac{1}{3}}$

D. $\frac{1}{xC}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$

Answer: A

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35. Given the value of Rydberg constant is $10^7 m^{-1}$, the waves number of the lest line of

the Balmer series in hydrogen spectrum will be:

A. $0.25 \times 10^4 m^{-1}$

B. $0.5 \times 10^7 m^{-1}$

C. $0.25 \times 10^7 m^{-1}$

D. $2.5 \times 10^7 m^{-1}$

Answer: C

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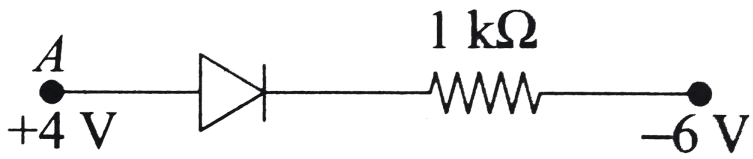
36. Consider the junction diode as ideal. The value of current flowing throgh AB is:



A. oA

B. $10^{-2}A$

C. $10^{-1}A$

D. $10^{-3}A$

Answer: B

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37. A npn transistor is connected in common emitter configuration in a given amplifier. A load resistance of $800\Omega$is connected in the collector circuit and the voltage drop across 0.96 and the input resistance of the circuit is 192Ω, the voltage gain and the power gain of the amplifier will respectively be :

A. $4, 3.84$

B. $3.69, 3.84$

C. $4, 4$

D. $4, 3.69$

Answer: A

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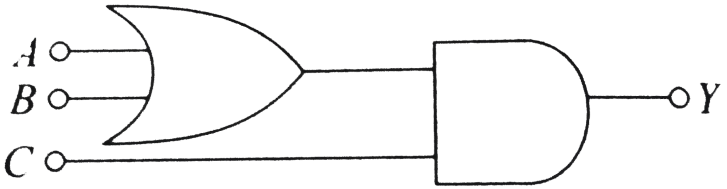
38. To get output 1for the following circuit, the correct choice for the input is :



A. $A = 1, B = 0, C = 1$

B. $A = 0, B = 1, C = 0$

C. $A = 1, B = 0, C = 0$

D. $A = 1, B = 1, C = 0$

Answer: A

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39. The angle of incidence for a ray of light at a refracting surface of a prism is 45°. The angle of prism is 60°. If the ray suffers minimum

deviation through the prism, the angle of minimum deviation and refractive index of the material of the prism respectively, are :

A. $45^\circ, \frac{1}{\sqrt{2}}$

B. $30^\circ, \sqrt{2}$

C. $45^\circ, \sqrt{2}$

D. $30^\circ, \frac{1}{\sqrt{2}}$

Answer: B

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40. An astronomical telesope has objective and eyepiece of focal lengths $40cm$ and $4cm$ respectively. To view an object $200cm$ away from the objective, the lenses must be separated by a distance :

A. $37.3cm$

B. $46.0cm$

C. $50.0cm$

D. $54.0cm$

Answer: D

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41. The maximum intensity in young's double-slit experiment is I_0. Distance between the slit is $d = 5\lambda$, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance $D = 10d$?

A. I_0

B. $\frac{I_0}{4}$

C. $\frac{3}{4}I_0$

D. $\frac{I_0}{2}$

Answer: D

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42. In a diffraction pattern due to a single slit of width a, the first minimum is observed at an angle 30° when light of wavelength 5000 Å is incident on the slit. The first secondary minimum is observed at an angle of

A. $\sin^{-1}\left(\frac{3}{4}\right)$

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

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

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

Answer: A

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43. Suppose the charge of a proton and an electron differ slightly. One of them is $-e$, the other is $(e + \Delta e)$. If the net of electrostatic

force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero. Then Δe is of the order of [Given mass of hydrogen $m_h = 1.67 \times 10^{-27} kg$]

A. $10^{-23} C$

B. $10^{-37} C$

C. $10^{-47} C$

D. $10^{-20} C$

Answer: B

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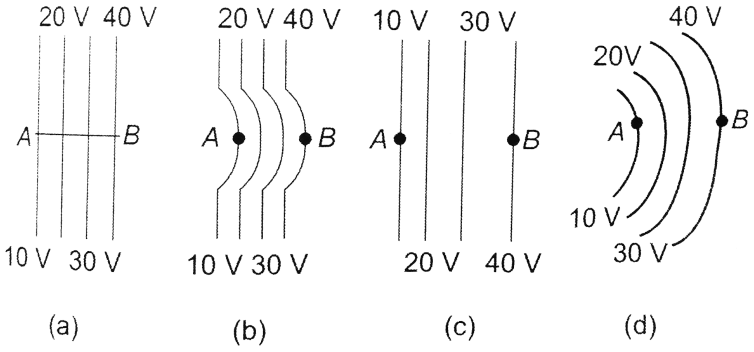
44. The diagram below show regions of equipotential:

A positive chrages is moved from A to B in each diagram.



A. In all the four cases the work done is the same

B. Minimum work is required to move q in figure (a)

C. Maximum work is required to move q in figure (b)

D. Maximum work is required to move q in figure (c)

Answer: A

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45. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system:

A. Decreases by a factor of 2

B. Remains the same

C. Increases by a factor of 2

D. Increases by a factor of 4

Answer: A

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46. The resistance of a wire is 'R' ohm. If it is melted and stretched to n times its origianl length, its new resistance will be

A. $\frac{R}{n}$

B. n^2R

C. $\frac{R}{n^2}$

D. nR

Answer: B

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47. A potentiometer is an accurate and versatile device to make electrical measurements of $E.M.F.$ because the method involves

A. Potential gradients

B. A condition of no current flow through the galvanometer

C. A combination of cells, galvanometer and resistance

D. Cells

Answer: B

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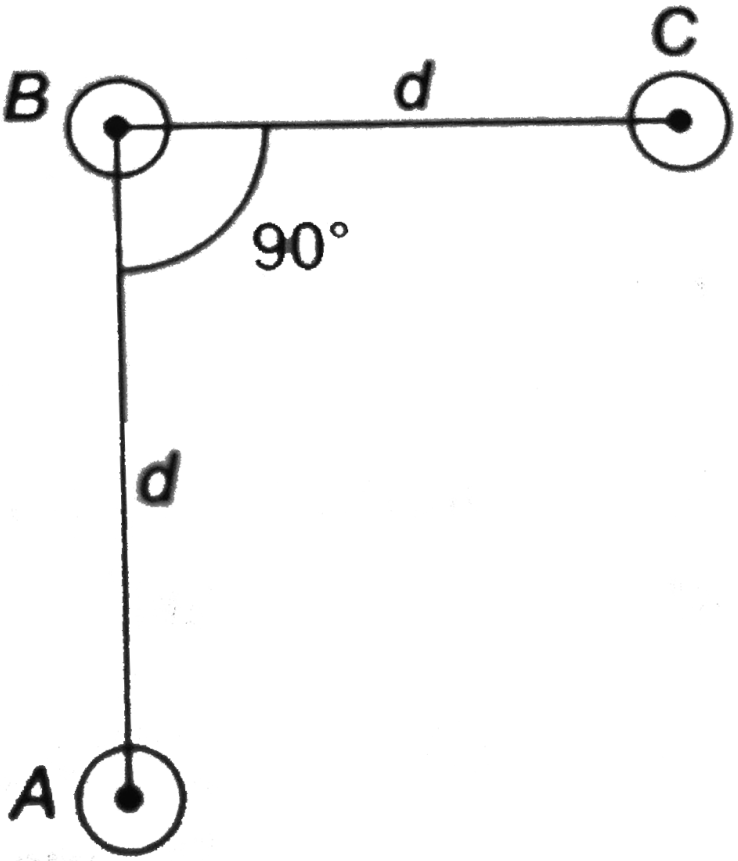
48. An arrangment of three parallel staright wires placed perpendcular to plane of paper carrying same current I along the same direction is shown in figure. Magnitude of

force per unit length on the middle wire $'B'$ is given by



A. $\frac{2\mu_0 i^2}{\pi d}$

B. $\frac{\sqrt{2}\mu_0 i^2}{\pi d}$

C. $\frac{\mu_0 i^2}{\sqrt{2}\pi d}$

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

Answer: C

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49. A 250-turns recantagular coil of length 2.1 cm and width 1.25 cm carries a current of $85\mu A$ and subjected to magnetic field of strength $0.85T$. Work done for rotating the coil by 180° against the torque is

A. $4.55\mu J$

B. $2.3\mu J$

C. $1.15\mu J$

D. $9.1\mu J$

Answer: D

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50. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles

to each other, then the true angle of dip θ is given by

A. $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$

B. $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$

C. $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$

D. $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

Answer: D

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51. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At centre of the solenoid is 100 turns coil of radius 0.01 m placed with its axis coinciding with solenoid axis. The current in the solenoid reduce at a constant rate to 0A from 4 a in 0.05 s . If the resistance of the coil is $10\pi^2\Omega$, the total charge flowing through the coil during this time is

A. $16\mu C$

B. $32\mu C$

C. $16\pi\mu C$

D. $32\pi\mu C$

Answer: B

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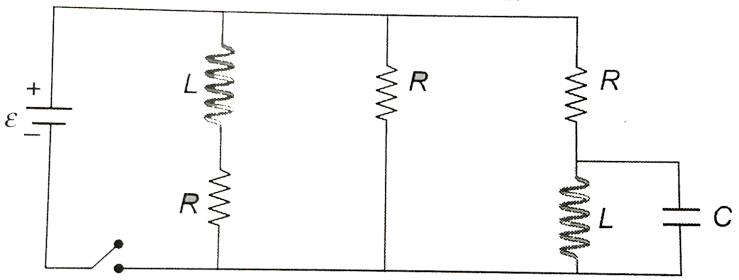
52. Figure shows a circuit that contains three identical resistors with resistance $R = 0.9\Omega$ each, two identical inductors with inductance $L = 2.0mH$ each, and an ideal battery with emf $\varepsilon = 18V$. The current i through the

battery just after the switch closed is.....:



A. $0.2A$

B. $2A$

C. 0 ampere

D. $2mA$

Answer: B

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53. In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms} = 6V/m$. The peak value of the magnetic field is

A. $2.83 \times 10^{-8} T$

B. $0.70 \times 10^{-8} T$

C. $4.23 \times 10^{-8} T$

D. $1.41 \times 10^{-8} T$

Answer: A

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54. The photoelectric threshold wavelength of silver is $3250 \times 10^{-10} m$. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength $2536 \times 10^{-10} m$ is

$(Given h = 4.14 \times 10^{6} ms^{-1} eVs$ and $c = 3 \times 10^{8} ms^{-1})$

A. $\approx 0.6 \times 10^{6} ms^{-1}$

B. $\approx 61 \times 10^{3} ms^{-1}$

C. $\approx 0.3 \times 10^6 ms^{-1}$

D. $\approx 6 \times 10^5 ms^{-1}$

Answer: A::D

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55. The de - Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature $T(\text{kelvin})$ and mass m, is

A. $\frac{h}{\sqrt{3mkT}}$

B. $\frac{2h}{\sqrt{3mkT}}$

C. $\frac{2h}{\sqrt{mkT}}$

D. $\frac{h}{\sqrt{mkT}}$

Answer: A

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56. The ratio of wavelength of the lest line of Balmer series and the last line Lyman series is:

A. 1

B. 4

C. 0.5

D. 2

Answer: B

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57. Radioactive material 'A' has decay constant ’8λ’ and material 'B' has decay constant 'lamda'. Initial they have same number of

nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be $\frac{1}{e}$?

A. $\frac{1}{7\lambda}$

B. $\frac{1}{8\lambda}$

C. $\frac{1}{9\lambda}$

D. $\frac{1}{\lambda}$

Answer: A

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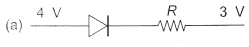
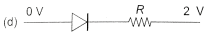
58. Which of the following represents forward biase diode?

A. 

B. 

C. 

D. 

Answer: D

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59. In a common emitter transistor amplifier the audio signal voltage across the collector is $3V$. The resistance of collector is $3k\Omega$. If current gain is 100 and the base resistance is $2k\Omega$, the voltage and power gain of the amlifier is :

A. 15 and 200

B. 150 and 15000

C. 20 and 2000

D. 200 and 1000

Answer: B

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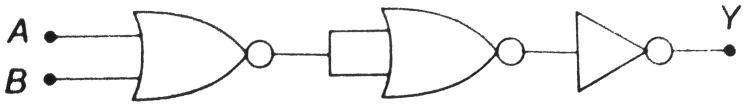
60. The given electrical network is equivalent to:



A. OR gate

B. NOR gate

C. NOT gate

D. AND gate

Answer: B

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61. A beam of light from a source L is incident normally on a plane mirrorr fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirrorr is rotated through a small angle θ, the spot of

the light is found to move through a distance y on the scale. The angle θ is given by :

A. $\frac{y}{x}$

B. $\frac{x}{2y}$

C. $\frac{x}{y}$

D. $\frac{y}{2x}$

Answer: D

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62. A thin prism having refracting angle 10° is made of glass of refracting index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be :

A. 6°

B. 8°

C. 10°

D. 4°

Answer: A

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63. The ratio of resolving power of an optical microscope for two wavelength $\lambda_1 = 4000\text{Å}$ and $\lambda_2 = 6000\text{Å}$ is:

A. $9:4$

B. $3:2$

C. $16:81$

D. $8:27$

Answer: B

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64. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8^{th} bright fringe in the medium lies where 5^{th} dark fringe lies in air. The refractive index of the medium is nearly:

A. 1.59

B. 1.69

C. 1.78

D. 1.25

Answer: C

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65. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarized light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such

that its axis makes an angle 45° with that of P_1. The intensity of transmitted light through P_2 is

A. $\frac{I_0}{4}$

B. $\frac{I_0}{8}$

C. $\frac{I_0}{16}$

D. $\frac{I_0}{2}$

Answer: B

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66. A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\overrightarrow{E}$. Due to the force $q\overrightarrow{E}$, its velocity increases from 0 to $6m/s$ in one second duration. At that instant the direction of field is reversed.

The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively.

A. $1m/s, 3.5m/s$

B. $1.5m/s, 3m/s$

C. $1m/s, 3m/s$

D. $2m/s, 4m/s$

Answer: C

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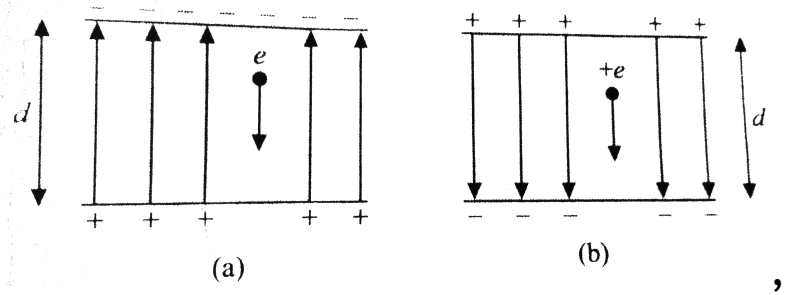
67. An electron (mass m_e)falls through a distance d in a uniform electric field of magnitude E.



,

The direction of the field is reversed keeping its magnitudes unchanged, and a proton(mass m_p) falls through the same distance. If the times taken by the electrons and the protons to fall the distance d is t_{electron} and t_{proton} respectively, then the ratio $t_{\text{electron}} / t_{\text{proton}}$.

A. 10 times greater

B. equal

C. 5 times greater

D. smaller

Answer: D

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68. The electrostatic force between the metal plate of an isolated parallel plate capacitro C having charge Q and area A, is

A. proportional to the square root of the distance between the plates.

B. inversely proportional to the distance between the plates.

C. linearly proportional to the distance between the plates.

D. independent of the distance between the plates

Answer: D

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69. A carbon resistor of $(47 \pm 4.7)k\Omega$ is to be marked with rings of different colours for its identification. The colour code sequence will be

A. Yellow-Green-Violet-Gold

B. Green-Orange-Violet-Gold

C. Yellow-Violet-Orange-Silver

D. Violet-Yellow-Orange-Silver

Answer: C

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70. A set of $'n'$ equal resistor, of value of $'R'$ each are connected in series to a battery of emf $'E'$ and internal resistance $'R'$. The current drawn is I. Now, the $'n'$ resistors are connected in parallel to the same battery. Then the current drawn from battery becomes 10.1. The value of $'n'$ is

A. 20

B. 9

C. 11

D. 10

Answer: D

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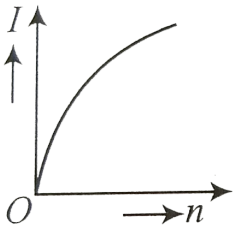
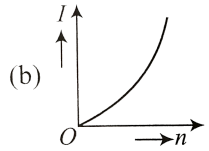
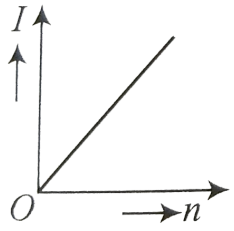
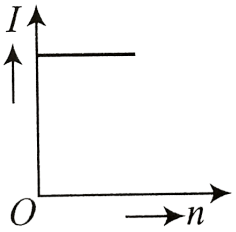
71. A battery consists of a variable number n of identical cells having internal resistance connected in series. The terminals of the battery are short circuited and the current I measured. Which one of the graph below

shows the correct relationship between I and n?

A. 

B. 

C. 

D. 

Answer: D

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72. Current sensitivity of a moving coil galvanometer is 5 div/mA and its voltage senstivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is

A. 250Ω

B. 500Ω

C. 25Ω

D. 40Ω

Answer: A

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73. A metallic rod of mass per unit length $0.5kgm^{-1}$ is lying horizontally on a straght inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current throguh it

when a magnetic field of induction $0.25T$ is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is

A. $14.76A$

B. $11.32A$

C. $5.89A$

D. $7.14A$

Answer: B

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74. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnetic is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains horizontal potential energy. the work required to do this comes from

A. the lattice structure of the material of the rod

B. the induced electric field due to the changing magnetic field

C. the magnetic field

D. the current source

Answer: D

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75. The magnetic potential energy stored in a certain inductor is $25mJ$, when the current in

the inductor is $60mA$. This inductor is of inductance

A. $1.389H$

B. $13.89H$

C. $138.88H$

D. $0.138H$

Answer: B

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76. An inductor $20mH$, a capacitor $100\mu F$ and a resistor 50Ω are connected in series across a source of emf, $V = 10\sin 314t$. The power loss in the circuit is

A. $2.74W$

B. $1.13W$

C. $0.43W$

D. $0.79W$

Answer: D

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77. An EM wave is propagating in a medium whith a velocity $\overrightarrow{v} = v\hat{i}$. The instantaneous oscillating electric field of this of em wave is along $+y$ axis. Then the direction of oscillating magnetic field of the EM wave will be along

A. $-y$ direction

B. $-x$ direction

C. $+z$ direction

D. $-z$ direction

Answer: C

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78. When the light of frequency $2v_0$ (where v_0 is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5v_0$, the

maximum velocity of electrons emitted from the same plate is v_2. the ratio of v_1 to v_2 is

A. $4:1$

B. $2:1$

C. $1:4$

D. $1:2$

Answer: D

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79. An electron of mass m with an initial velocity

$\overrightarrow{v} = v_0 \hat{}$(i) $(v_0 > 0)$ enters an electric field

$\overrightarrow{E} = -E_0 \hat{i}\ (E_0 = cons\tan t > 0)$ at $t = 0$.

If λ_0 is its de - Broglie wavelength initially, then its de - Broglie wavelength at time t is

A. $\lambda_0 t$

B. λ_0

C. $\lambda\left(1 + \frac{eE_0}{mv_0}t\right)$

D. $\frac{\lambda_0}{\left(1 + \frac{eE_0}{mv_0}t\right)}$

Answer: D

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80. The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is

A. $2:-1$

B. $1:-2$

C. $1:-1$

D. $1:1$

Answer: C

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81. For a radioactive material, half-life is 10 minutes. If initially there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is.

A. 30

B. 15

C. 10

D. 20

Answer: B

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82. In a $p-n$ junction diode, change in temperature due to heating

A. does not affect resistance of $p-n$ junction

B. affects the overall $V - I$ characterstics

$p - n$ junction

C. affects only forward resistance

D. affects only reverse resistance

Answer: B

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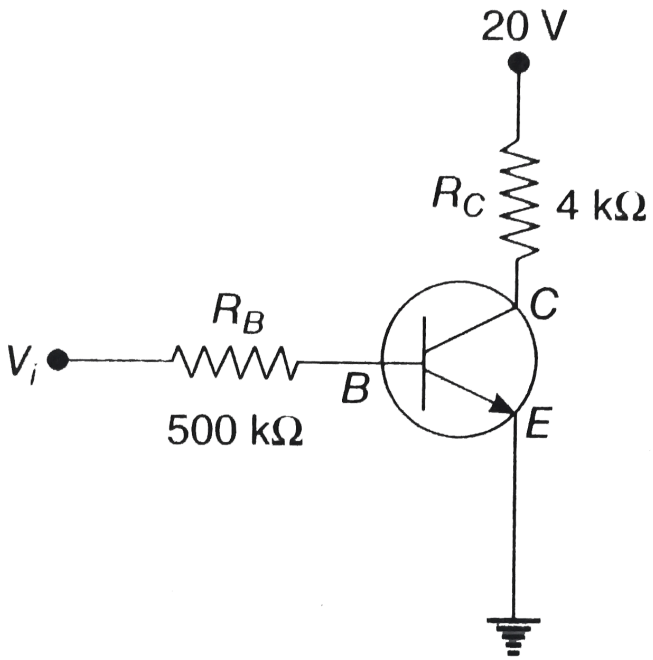
83. In the circuit shown in the figure, the input voltage V_i is $20V$, $V_{BE} = 0$ and $V_{CE} = 0$. The

values of I_B, I_C and β are given by:



A. $I_B = 20\mu A, I_C = 5mA, \beta = 250$

B. $I_B = 40\mu A, I_C = 5mA, \beta = 125$

C. $I_B = 25\mu A, I_C = 5mA, \beta = 200$

D. $I_B = 40\mu A, I_C = 10mA, \beta = 250$

Answer: B

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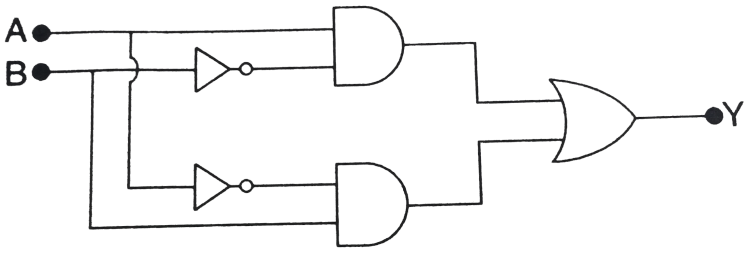
84. In the combination of the following gates the output Y can be written in terms of inputs A and B as:



A. $\overline{A.B} + A.B$

B. $\overline{A + B}$

C. $A.\overline{B} + \overline{A}.B$

D. $\overline{A.B}$

Answer: C

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85. An object is placed at a distance of $40cm$ from a concave mirrorr of focal length $15cm$. If the object is displaced through a distance of

$20cm$ towards the mirrorr, the displacement of the image will be

A. $30cm$ towards the mirror

B. $36cm$ towards the mirror

C. $36cm$ away from the mirror

D. $30cm$ away from the mirror

Answer: C

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86. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

A. 30°

B. zero

C. 45°

D. 60°

Answer: C

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87. An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of

A. large focal length and large diameter

B. small focal length and small diameter

C. larger focal length and small diameter

D. small focal length and large diameter

Answer: A

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88. In young's double slit experiment the separation d between the slits is $2mm$, the wavelength λ of the light used is 5896Å and

distance D between the screen and slits is $100cm$. It is found that the angular width of the fringes is 0.20°. To increases the fringe angular width to 0.21° (with same λ and D) the separtion between the slits needs to be changed to

A. $2.1mm$

B. $1.7mm$

C. $1.9mm$

D. $1.8mm$

Answer: C

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89. Unpolarised light is incident from air on a plane surface of a meterial of refractive index $'\mu'$. At a particular angle of incidence $'I'$, it is found that the reflected and refracted rays are perpendicular to each other.

Which of the following options is correct for this situation?

A. $i = \sin^{-1}\left(\frac{i}{\mu}\right)$

B. $i = \tan^{-1}\left(\frac{i}{\mu}\right)$

C. Reflected light is polarized with its electric vector perpendicular to the plane of incidence

D. Reflected light is polarized with its electric vector parallel to the plane of incidence

Answer: C

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