PHYSICS

BOOKS - DC PANDEY PHYSICS (HINGLISH)

SOLVED PAPER 2017

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1. 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. nR

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

C. n^2R

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

Answer: C

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2. 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. increasese by a factor of 4

B. decreases by factor of 2

C. remains the same

D. increases by a factor of 2

Answer: D

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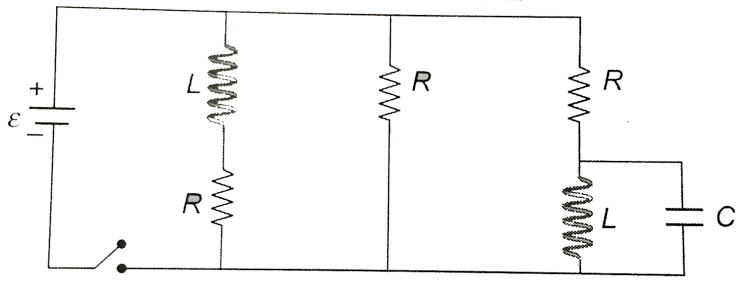
3. Figure shows a circuit that contains three identical resistors with resistance $R = 0.9\Omega$ each, two identical inductors with inductance $L = 2.0mH$ each, and an ideal battery with emf $\varepsilon = 18V$. The current i through the battery just after the switch closed is.....:



A. $2mA$

B. 0.2A

C. 2A

D. 0.A

Answer:

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4. 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. $= 6 \times 10^{5} ms^{-1}$

B. $= 0.6 \times 10^{6} ms^{-1}$

C. $= 61 \times 10^{3} ms^{-1}$

D. $= 0.3 \times 10^{6} ms^{-1}$

Answer: A::B

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

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

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

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

Answer: B

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6. 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. $9.1\mu J$

B. $4.55\mu J$

C. $2.3\mu J$

D. $1.5\mu J$

Answer: A

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7. 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. $32\pi\mu C$

B. $16\mu C$

C. $32\mu C$

D. $16\pi\mu c$

Answer: C

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8. Suppose the charge of a proton and an electron differ slightely. 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. $10^{-20} C$

B. $10^{-23} C$

C. $10^{-37}C$

D. $10^{-47}C$

Answer: C

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

A. 2

B. 1

C. 4

D. 0.5

Answer: C

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

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

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

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

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

Answer: B

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11. 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. 4°

B. 6°

C. 8°

D. 10°

Answer: B

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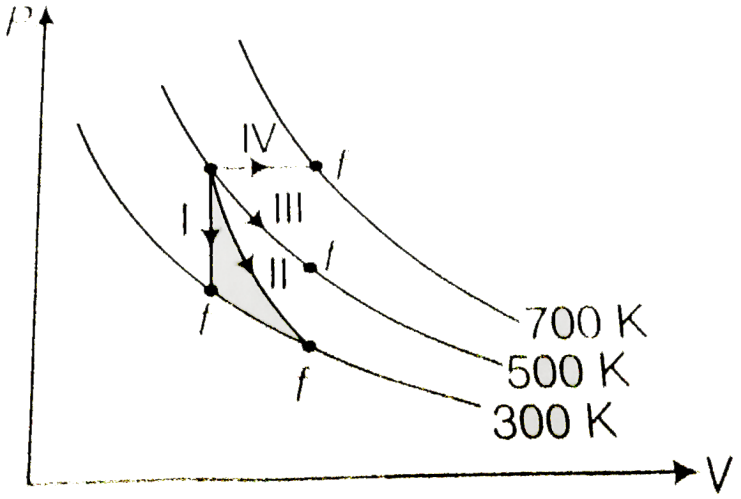
12. Thermodynamic processes are indicated in the following diagram



Match the following :

	Column-I		Column-II
P.	Process I	a.	Adiabatic
Q.	Process II	b.	Isobaric
R.	Process III	c.	Isochoric
S.	Process IV	d.	Isothermal

A. $P \rightarrow a, Q \rightarrow c, R \rightarrow d, S \rightarrow b$

B. $P \to c, Q \to a, R \to d, S \to b$

C. `P rarr c, Q rarr d, R rarr b, S rarr a

D. $P \to d, Q \to b, R \to a, S \to c$

Answer: B

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13. A beam of light from a source L is incident normally on a plane mirror 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 mirror 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. $\frac{y}{2x}$

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

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

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

Answer: A

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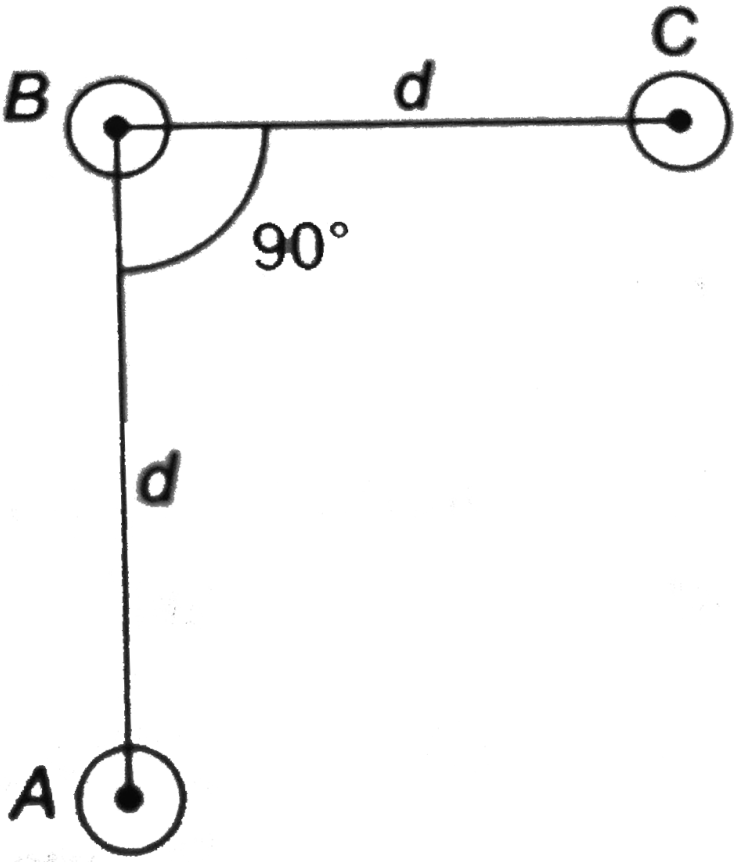
14. An arrangment of three parallel staright wires placed perpendcular to plane of paper carrying same current I along the same direction is shown in figure. Magnitude of force per unit length on the middle wire $'B'$

is given by



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

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

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

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

Answer: D

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15. 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. $8:27$

B. $9:4$

C. $3:2$

D. $16:81$

Answer: C

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

A. cells

B. potential gradients

C. a condition of no current flow through the galvanometer

D. a combination of cells, galvanometer and resistances

Answer: C

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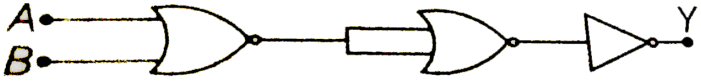
17. The given electrical network is equivalent to



A. AND gate

B. OR gate

C. NOR gate

D. NOT gate

Answer: C

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

A. 200 and 1000

B. 15 and 200

C. 150 and 15000

D. 20 and 2000

Answer: C

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

A. 1.25

B. 1.59

C. 1.69

D. 1.78

Answer: D

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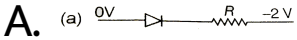
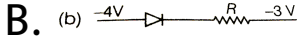
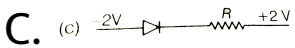
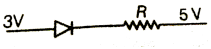
20. Which one of the following represents forward bias diode?

A. 

B. 

C. 

D. (d) 

Answer: A

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21. Two Polaroids P_1 and P_2 are placed with their axis perpendicular to eachother. Unpolarised light I_0 is nicident 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. $\frac{I_0}{2}$

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

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

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

Answer: C

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22. 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. $1.41 \times 10^{-8}T$

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

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

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

Answer: B

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23. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then show that the true angle of dip, θ is given by $\cot^2\theta = \cot^2\theta + \cot^2\theta$.

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

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

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

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

Answer: A

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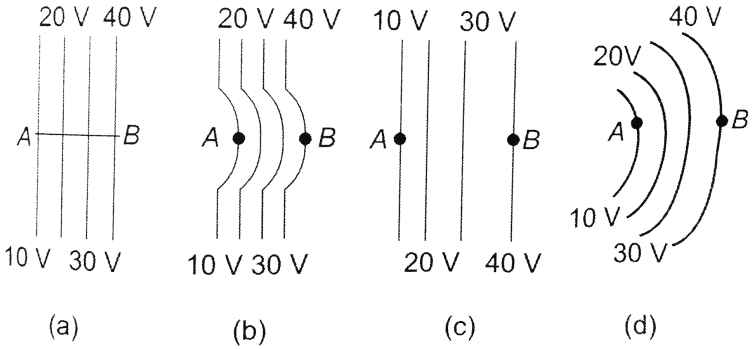
24. The diagram below show regions of equipotential:

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



A. Maximum work is required to move q in figure (iii)

B. In all the four cases, the work done is the same

C. Minimum work is required to move q in figure (i)

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

Answer: B

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1. An interference pattern is observed by Young's double slit experiment.If now the separation between coherent source is halved and the distance of screen from coheren sources is doubled, then now fringe width

A. becomes double

B. becomes ne-fourth

C. remains same

D. becomes four times

Answer: D

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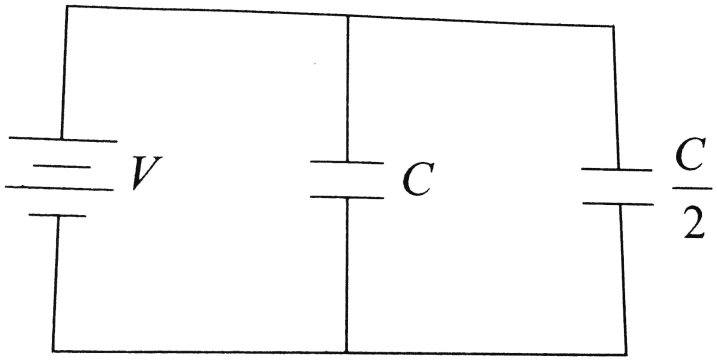
2. Two condensers, one of capacity C and the other of capacity $C/2$ are connected to a V volt battery, as shown.



The work done in charging fully both the condensers is

A. $2CV^2$

B. $\frac{3}{4}cV^2$

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

D. $\frac{1}{4}CV^2$

Answer: B

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3. A sereis R-C circuit is connected to AC voltage source. Consider two cases, (A) when C is without a dielectric medium and (B) when C is filled with dielectric of constant 4. The current I_R through the resistor and voltage V_c across the capacitor are compared in the two cases. Which of the following is/ are true?

A. $I_R^A > I_R^B$

B. $I_R^A < I_R^B$

C. $V_C^A < V_C^B$

D. None of these

Answer: B

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4. A tube of sugar solution 20 cm long is placed between crossed nicols and illuminated with light of wavelength 6×10^{-5} cm If the

optical rotation produced is 13° and the specific rotation is 65° determine the strength of the solution

A. $0.1g/$

B. $0.2g/$

C. $0.9g/$

D. $1.0g/$

Answer: A

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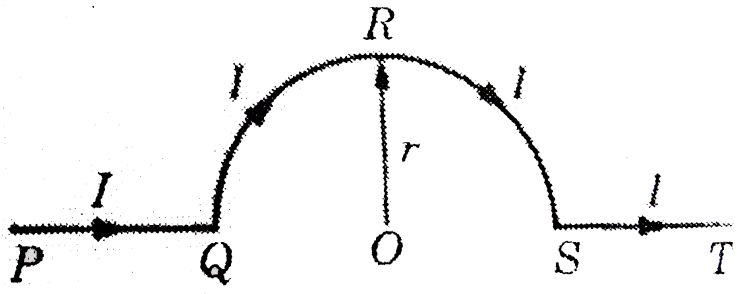
5. A long wire having a semi-circular loop of radius r carries a current I, as shown in Fig. Find the magnetic field due to entire wire.



A. $\frac{\mu_0 I}{4r}$

B. $\frac{\mu_0 I^2}{4r}$

C. $\frac{\mu_0 I}{4r^2}$

D. None of these

Answer: A

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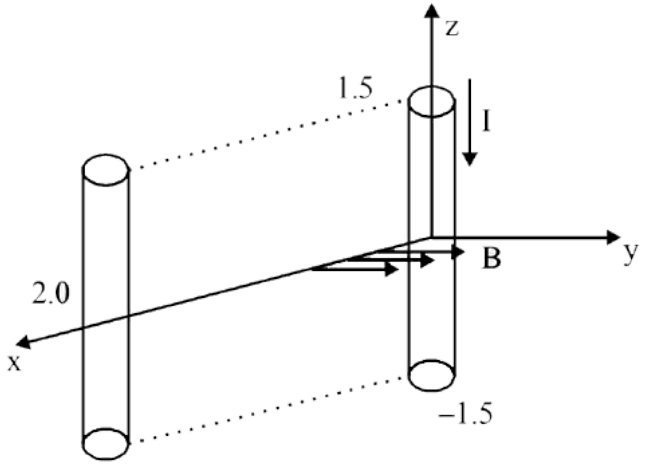
6. A conductor lies along the z-axis at $-1.5 \leq z < 1.5m$ and carries a fixed current of $10.0A$ in $-\hat{a}_z$ direction (see figure). For a field $\vec{B} = 3.0 \times 10^{-4} e^{-0.2x} \hat{a}_y T$, find the power required to move the conductor at constant speed to $x = 2.0m, y = 0m$ in $5 \times 10^{-3} s$. Assume parallel motion along the

$x - a\xi s.$



A. 1.57 W

B. 2.97 W

C. 4.45 W

D. 9.87 W

Answer: B

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7. A lens of refractive index n is put in a liquid of refractive index n'. If focal length of lens in air is f, its focal length in liquid will be.

A. $\frac{-f\mu'(\mu-1)}{\mu-\mu}$

B. $\frac{-f(\mu-\mu)}{\mu(\mu-1)}$

C. $\frac{\mu'(\mu-1)}{f(\mu-\mu)}$

D. $\frac{f(\mu'\mu)}{\mu-\mu'}$

Answer: A

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8. A parallel plate capacitor has an electric field of $10^5 V/m$ between the plates. If the charge on the capacitor plate is $1\mu C$, then force on each capacitor plate is-

A. 0.5N

B. 0.05 N

C. 0.005 N

D. None of these

Answer: B

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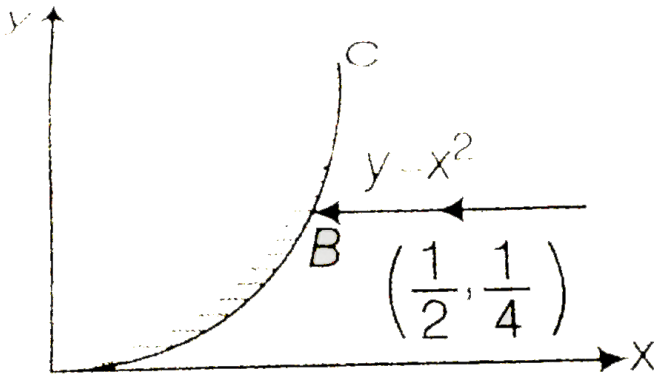
9. In the given figure,the angle of reflection is



A. 30°

B. 60°

C. 45°

D. None of these

Answer: C

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10. The current of transistor in common emitter mode is 49. The change in collector current and emitter current corresponding to the change in the base current by $5.0\mu A$m will be :-

A. $245\mu A, 250\mu A$

B. $240\mu A, 235\mu A$

C. $260\mu A, 255\mu A$

D. None of these

Answer: A

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11. A cylinder conductor AB of non uniform area of cross-section carries a current of 5A. The radius of the conductor at one end A is 0.5

cm.The current density at the other end of the conductor is half of the value at A. The radius of the conductor at the end B is nearly

A. 1.4 cm

B. 0.7 cm

C. 0.6cm

D. None of these

Answer: B

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12. A nuclear explosion is designed to deliver $1MW$ of heat energy, how many fission events must be required in a second to attain this power level. If this explosion is designed with a nuclear fuel consisting of uranium 235 to run a reactor at this power level for one year, then calculate the amount of fuel needed. You can assume that the calculate the amount of energy released per fission event is $200MeV$.

A. 1kg

B. 0.01kg

C. 3.84 kg

D. 0.384 kg

Answer: D

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13. A thin prism P with angle 4° and made from glass of refractive index 1.54 is combined with another thin prism P made from glass of refractive index 1.72 to produce dispersion without deviation The angle of prism P is

A. 4°

B. 5.33

C. 2.6°

D. 3°

Answer: D

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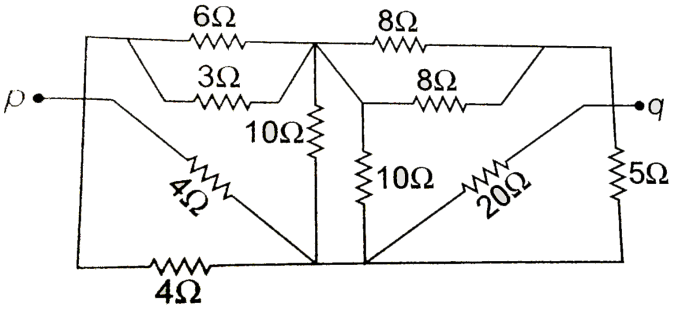
14. The effective resistance between p and q in given figure is



A. 2ω

B. 3ω

C. 5ω

D. 6ω

Answer: B

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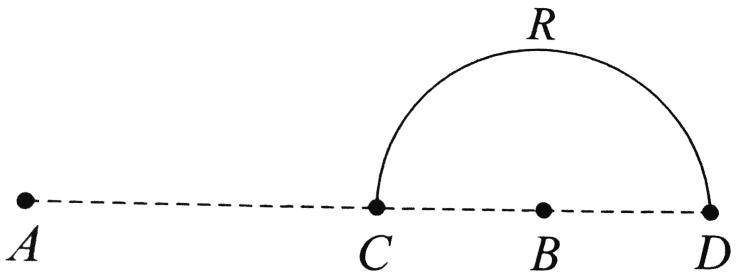
15. Charges $+q$ and $-q$ are placed at points A and B respectively which are a distance $2L$ apart, C is the midpoint between A and B. The work done in moving a charge $+Q$ along the semicircle CRD is



A. $\frac{qQ}{4\pi e_0 L}$

B. $\frac{qQ}{2\pi e_0 L}$

C. $\frac{qQ}{6\pi e_0 L}$

D. $\frac{-qQ}{6\pi e_0 L}$

Answer: D

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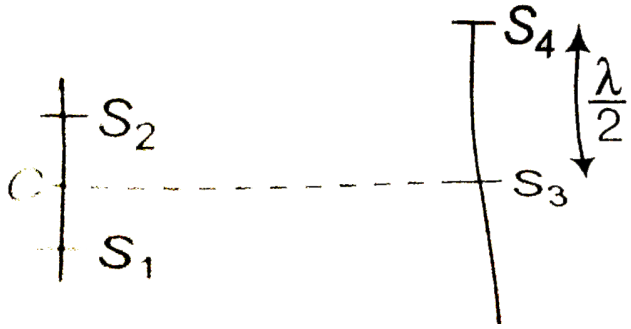
16. In the given figure ,C is middle point of line S_1S_2.A monochromatic light of wavelength γ is incident on slits.The ratio of intensites of

S_3 and S_4 is



A. 0

B. ∞

C. $4:1$

D. $1:4$

Answer: B

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17. A simple telescope, consisting of an objective of focal length 60 cm and a single eye lens of focal length 5 cm is focussed on a distant object in such a way that parallel rays comes out from the eye lens. If the object subtends an angle 2° at the objective, the angular width of the image

A. 10^2

B. 24^2

C. 50^2

D. $\frac{1^\circ}{6}$

Answer: B

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18. A Specimen of silicon is to be made P-type semiconductor for this one atom of lindium, on an average, is doped in $5 \times 10^{22} a \rightarrow m/m^3$ then the number of acceptor atoms per cm^3 will be

A. 2.5×10^{30}

B. 1.0×10^{13}

C. 1.0×10^{15}

D. 2.5×10^{36}

Answer: C

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19. The angle of dip if dip needleoscillating in vertical plane makes 40 oscillations per min in a magnetic meridian and 30 oscillations per

minute in vertical plane at right angle to the magnetic meridian is

A. $\theta = \sin^{-1}(0.5625)$

B. $\theta = \sin^{-1}(0.325)$

C. $\theta = \sin^{-1}(0.425)$

D. $\theta = \sin^{-1}(0.235)$

Answer: A

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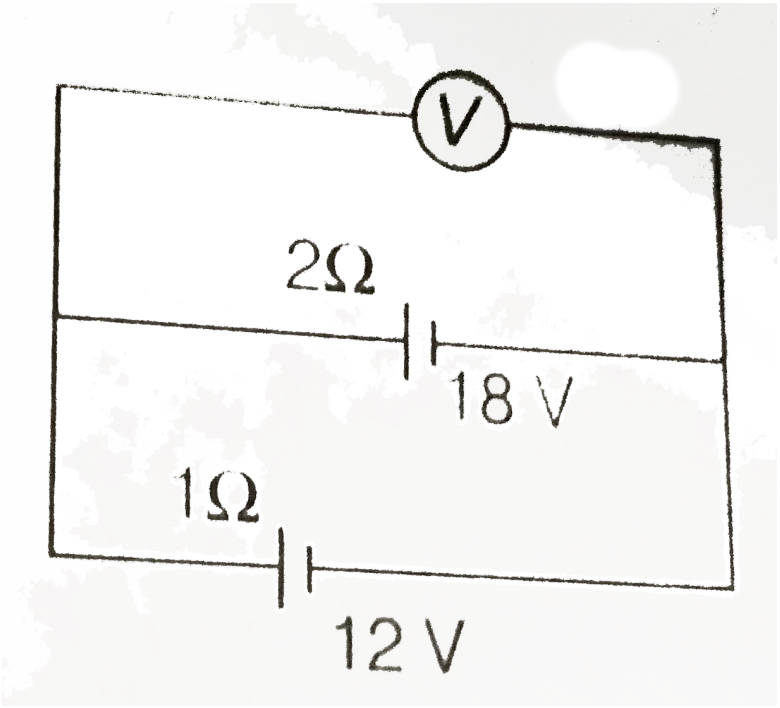
20. Two batteries, one of emf 18V and internal resistance 2Ω and the other of emf 12 and internal resistance 1Ω , are connected as shown. The voltmeter V will record a reading of



A. 14 V

B. 15 V

C. 18 V

D. 30 V

Answer: A

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21. The Young's experiment is performed with the lights of blue $(\lambda = 4360\text{Å})$ and green

colour $\left(\lambda = 5460\text{Å}\right)$. If the distance of the 4th fringe from the centre is x, then

A. $X_{blue} = X_{green}$

B. $X_{blue} > X_{green}$

C. $X_{blue} < X_{green}$

D. X_{blue} / X_{green}

Answer: C

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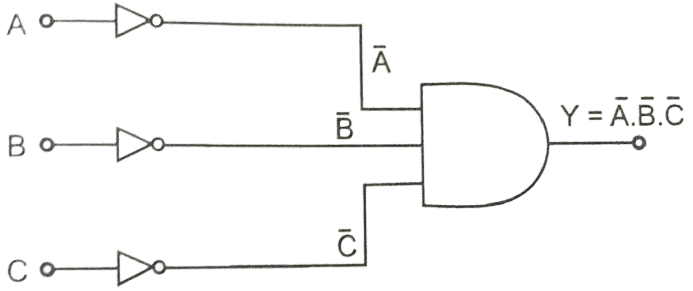
22. Construct a proper combination of 3 NOT and one AND gates in order to get the output of $y = \overline{A}.\overline{B}.\overline{C}$, from three inputs A, B and C.



A. 1

B. 0

C. not predictable

D. None of these

Answer: A

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23. Assertion A beam of charged particles is employed in the treatment of cancer

Reson Charged particles on passing through a material medium lose their energy by causing ionization of the atoms along their path.

A. Both assertin and reason are true and reason is the correct explanation of

assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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24. Assertion In He-Nelaser, population inversion takes place between energy levels of neon atoms.

Reason Helium atoms have a metastable energy level.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of

assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: B

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25. Assertion The average value of alternating emf is 63.39% of the peak value .

Reason The rms value of alternating emf is70.72% of peak value

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: B

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26. Assertion Photoelectric effect can take place only with an electron bound in the atom Reason Electron is a fermion Whereas proton is a boson

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of

assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: C

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27. Assertion: Cyclotron does not accelerate.

Reason: Mass of the electron is very small.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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28. Assertion: The electric field due to dipole on its axis line at a distance r is E. Then electric field due to the same dipole on the equatorial line and at the same distance will be $\frac{E}{2}$

Reason: Electric field due to dipole varies inversely as the square of distance.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: C

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29. Assertion A potentiometer is preferred over that of a voltmeter for measurement of emf of a cell

Reason potentiometer does not draw any current from the cell.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of

assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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30. Assetion The magnetism of magnet is due to the spin motion of electrons

Reason Dipole moment of electron is smaller than that due to orbit motion around nucleus.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: C

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31. Assertion : The mirrorrs used in search lights are parabolic and not concave spherical.
Reason : In a concave spherical mirrorr the image formed is always virtual.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of

assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: C

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32. Assertion : Corpuscular theory fails to explain the velocities of light in air and water.

Reason : According to corpuscular theory, light

should travel faster in denser media than in rarer media.

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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33. Assetion In α-decay atomic number of daughter nucleus reduces by 2 units from the parent nucleus.

Reason An α particle carries four units of mass.

A. Both assertin and reason are true and reason is the correct explanation of

assertion

B. Both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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34. Assertion angle of deviation depends on the angle of prism.

Reason For thin prism =$(\mu - 1)A$

Where =angle of deviation

`mu=refractive index, A=angle of prism

A. Both assertin and reason are true and reason is the correct explanation of assertion

B. Both assertion and reason are true but reason is not the correct explanation of

assertion

C. Assertion is true but reason is flase

D. Both assertion and reason are false

Answer: A

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Solved Papers 2017 Jipmer

1. The turns of solenoid, designed to provide a given magnetic fulx density along its axis, are

wound to fill the space between two concentric cylinder of fixed radii.How should the diameter d of the wire used be chosen so as to minimize the heat dissipated in the winding?

A. Wire should be multiple of 5d

B. Wire should be multiple of $d/3$

C. Wire is independent of d

D. Can 't say

Answer: C

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2. A long straight wire is carrying current I in + z direction .The x-y plane contains a closed circular loop carrying current I_2 and not encircling the straight wire.The force on the loop will be

A. $\mu_0 l_1 l_0 / 2\pi$

B. $\mu_0 l_1 l_0 / 4\pi$

C. zero

D. depends on the distacne of the centre of the loop from the wire

Answer: D

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3. When the radioactive $iso \top e_{88}Ra^{226}$ decays in a series by emission of three aplha (α) and a beta (β) particle, the isotope X which remains undecay is

A. $83^X \hat{} (214)$

B. $84^X \hat{} (218)$

C. $84^X \hat{} (220)$

D. $87^X \hat{} (223)$

Answer: A

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4. N lamps each of resistacne r, are fed by a machine of resistacne R. If light emitted by any lamp is proportional to the square of the heat

produced, prove that the most efficient way of arranging them is to place them in parallel arcs, each containing n lamps, wheren is the integer nearest to

A. $\frac{r}{(NR)^{3/2}}$

B. $\left(N\frac{R}{r}\right)^{1/2}$

C. $(NRr)^{3/2}$

D. $(NRr)^{1/2}$

Answer: B

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5. Radioactiv edecay will occur as follows

$^{220}_{86}Rn \rightarrow {}^{216}_{84}PO + {}^{4}_{2}HeHalfl \quad \text{if} \quad e = 55s$

$^{216}_{84}P \text{ or } arr{}^{212}_{82}Pb + {}^{4}_{2}HeHalfl \quad \text{if} \quad e = 0.66s$

$^{812}_{82}Pb \rightarrow {}^{212}_{82}BL + \gamma^{\circ}(4)eHalfl \quad \text{if} \quad e = 10.6h$

If a certain mass of radon (Rn=220) is allowed to decay in a certain container,then after 5 minutes the element with the greater mass will be

A. radon

B. polonium

C. lead

D. bismuth

Answer: C

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6. White light is used to illuminate the two slits in a Young's double slit experiment. The separation between the slits is b and theh screen is at a distance $d(>>b)$ from the slits At a point on the screen directly in front

of one of the slits, certain wavelengths are missing some of these missing wavelengths are

A. $\frac{b}{d}, \frac{b}{3d}, \frac{b}{5d}$

B. $\frac{b^2}{2d}. \frac{b^2}{4d}, \left(b^2\right), (6d)$

C. $\frac{b^2}{d}. \frac{b^2}{3d}, \left(b^2\right), (5d)$

D. $\frac{b}{2d}, \frac{b}{4d}, \frac{b}{6d}$

Answer: C

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7. A thin symmettrical double convex lens of refractive index $\mu_2 - 1.5$ is placed between a medium of refractiv eindex $\mu_1 = 1.4$ to the left and another medium of refractive index $\mu_3 = 1.6$ to the right.Then the system behaves as

A. a convex lens

B. a concave lens

C. a glass plate

D. a convexo concave lens

Answer: C

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8. The wavelenths $\gamma$of a photon and the de-Broglie wavelength of an electron have the same value.Find the ratio of energy of photon to the kinetic energy of electron in terms of mass m, speed of light and planck constatn

A. $\frac{\gamma mc}{h}$

B. $\frac{hmc}{\gamma}$

C. $\frac{2hmc}{\gamma}$

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

Answer: D

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9. A non-conducting ring of radius $0.5m$ carries a total charge of 1.11×10^{-10}C distributed non-uniformly on its circumference producing an electric field E everywhere is space. The value of the integral

$\int_{l=\infty}^{l=0} -E.\, dI(l = 0$ being centre of the ring)

in volt is

A. $+2$

B. -1

C. `-2

D. $Zero$

Answer: a

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10. A nucleus ${}_{Z}^{A}X$ has mass represented by $m(A, Z)$. If m_p and m_n denote the mass of proton and neutron respectively and BE the blinding energy (in MeV), then

A.

$$BE = [m(A, Z) - Zm_p - (A - Z)m_n]C^2$$

B.

$$BE = \left[Zm_p + (A - Z)m_n - m(A, Z)C^2\right.$$

C. $BE = [Zm_p + Am_n - m(A, Z)]C^2$

D. $BE = m(A, Z) - Zm_p - (A - Z)m_N$

Answer: b

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11. A certain charge Q is divided into two parts q and $Q - q$, wheich are then separated by a cetain distance. What must q be in terms of Q to maximum the electrostatic repulsion between the two charges?

A. Q=2q

B. Q=3q

C. $Q=4q$

D. $Q=4q+c$

Answer: a

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12. A charge particle 'q' is shot towards another charged particle 'Q' which is fixed, with a speed 'v'. It approaches 'Q' upto a closest distance r and then returns. If q were

given a speed of '2v' the closest distances of approach would be

A. r

B. 2r

C. $r/2$

D. $r/4$

Answer: d

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13. A beam of light composed of red and green ray is incident obliquely at a point on the face of rectangular glass slab. When coming out on the opposite parallel face, the red and green ray emerge form

A. two points propagating in two different non-parallel directions

B. two points propagating in two different parallel directions

C. one point propagating in two different directions

D. one point propagating in the same direction.

Answer: b

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14. The plane face of a plano convex lens is silvered.If μbe the refrative index and R, the radius of curvature of curved suraface, then

system will behave like a concave mirror of curvature

A. μR

B. R^2 / μ

C. $R / (\mu - 1)$

D. $(\mu + 1) / (\mu - 1) R$

Answer: c

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15. The maximum number of possible interference maxima for slit-separation equal to twice the wavelength in Young's double-slit experiment is

A. infinite

B. five

C. three

D. zero

Answer: b

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16. An isotropoic point source of light is suspeneded h metre vericlaly above the centre of circular table of radius r metre.Then the ratio of illumenances at the centre to that at the edge of the table is

A. $1+\left(\frac{r^2}{h^2}\right)$

B. $1+\left(\frac{h^2}{r^2}\right)$

C. $\left\{1+\frac{r^2}{h^2}\right\}^{3/2}$

D. $\left\{1+\frac{r^2}{h^2}\right\}^{3/2}$

Answer: c

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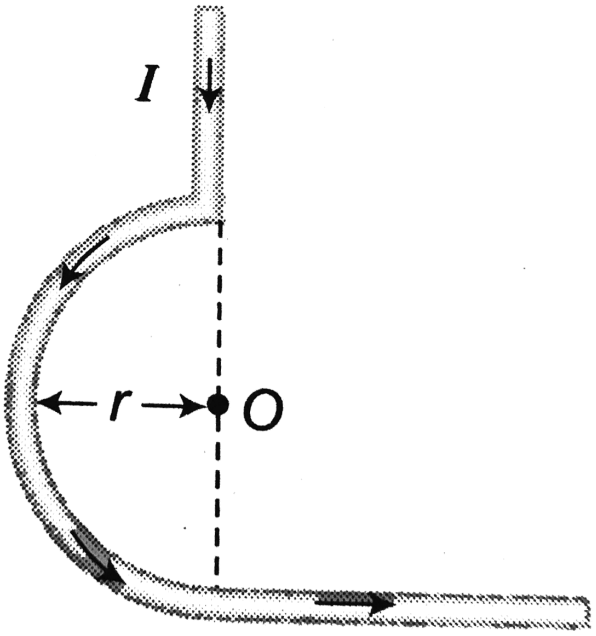
17. In the figure, what is the magnetic field at the point O?



A. $\frac{\mu_0 l}{4\pi r}$

B. $\frac{\mu_0 l}{4r} + \frac{\mu_0 l}{2\pi r}$

C. $\frac{\mu_0 l}{4r} + \frac{\mu_0 l}{4\pi r}$

D. $\frac{\mu_0 l}{4r} - \frac{\mu_0 l}{4\pi r}$

Answer: c

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18. The half - line period a radioactive element X is same as the mean life time of another

radioactive element Y. Initially both of them have the same number of atoms. Then:

A. X and Y have the same decay rate initially

B. X andY decay at the same rate always

C. Y will decay at a faster rate than X

D. X will decay at a faster rate than Y

Answer: c

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19. A source emits electromagnetic waves of wavelength $3m$. One beam reaches the observer directly and other after reflection from a watersurface, travelling $1.5m$ extra distance and with intensity reduced to $1/4$ as compared to intensity due to the direct beam alone. The resultant intensity will be :

A. $(1/4)fold3$

B. $(3/4)fold$

C. $(5/54)fold$

D. $(9/4)fold$

Answer: d

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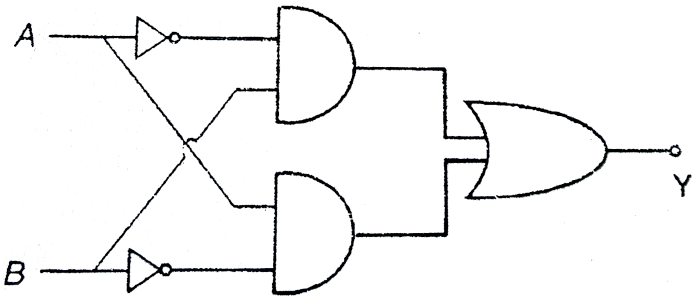
20.



The following circuit represents:

A. OR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: b

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21. Two identical conductiing balls A and B have positive charges q_{12} and q_2 respectively. But $q_1 \neq q_2$. The balls are brought together so that they touchj each each other and then kept in their original positions .The force between them is

A. less than that before the balls touched

B. greater than that before the balls touched

C. Same as that before the balls touched

D. zero

Answer: b

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22. A positively charged ball hangs from a long silk thread. Electric filed at a certain point (at the same horizontal level of ball) due to this charge is E. Let us put a positive test charge q_0 at this point and measure F/q_0 on this charges. then E

A. $> F/q_0$

B. $= F/q$

C. $< F/q_0$

D. cannot be estimated

Answer: a

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23. Capacitor C_1 of the capacitance $1\mu F$ and another capacitor C_2 of capacitance $2\mu F$ are separately charged fully by a common battery.The two capacitors are then separately allowed to discharge through equal resistors at time $t = 0$.

A. the current in each of the two discharging circuits is zero at t=0

B. the currents in the two dischrging circuits at t=0 are equal but non-zero

C. the currents in the two discharging circuits at t=0

D. Capacitor C_1 loses 40% of initial charge

Answer: b

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24. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected along the direction of the fields with a certain velocity then

A. it will turn towards left of direction of motion

B. it will turn towards right of directin of motion

C. its velocity will increase

D. its velocity will decrease

Answer: d

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25. To reduce the range of voltmeter, its resistance need to be reduced.A voltmeter has resistance R_0 and range V. Which of the following resistance when connectyed in parallel will convert it into a voltmeter of range `V//n?

A. nR_0

B. $(n+1)r_0$

C. $(n-1)R$

D. `None of these

Answer: d

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26. The mass of a proton is 1847 times that of an electron A electron and a proton are injected into a unifrom electric field at right

angle to the direction of the field with the same initial K.E.

A. the electron trajectory will be les lcurved than the proton trajectory.

B. both the trajectories will be straight

C. the proton trajectory will be less curved than the electron trajectroy

D. both the trajectories will be equally curved

Answer: d

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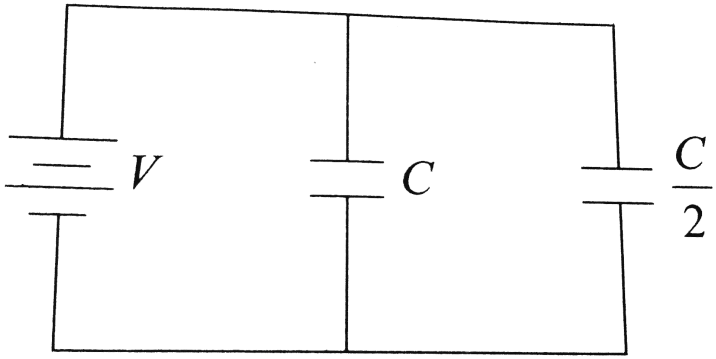
27. Two condensers, one of capacity C and the other of capacity $C/2$ are connected to a V volt battery, as shown.



The work done in charging fully both the condensers is

A. CV^2

B. $\frac{1}{4}CV^2$

C. $\frac{3}{4}CV^2$

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

Answer: c

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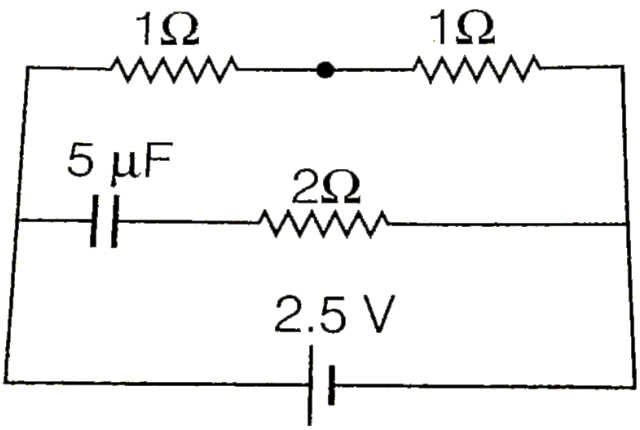
28. A capacitor of capacitaance $5\mu F$ is connected as shown in the figure.The internal resistane of the cvell is 0.5ω The amount of

charge on the cap[acitor plates is



A. $80\mu C$

B. $40\mu C$

C. $20\mu C$

D. $10\mu C$

Answer: d

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29. A photo cell is illuminated by a small bright source placed 1m away When the same source of light is placed 2m away, the electrons emitted by photo cathode

A. carry one quarter of their previous energy

B. carry one quarter of their previous momenta

C. are half as numerous

D. are one quarter as numerous

Answer: d

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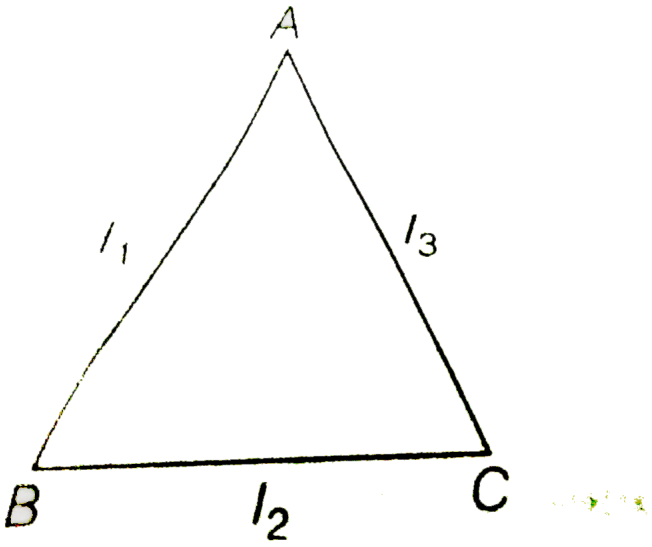
30. ABC is right angled triangular plane of uniform thickness The sides are such that AB gt BC as sshown in figure I_1, I_2, I_3 are moments of inertia about AB, BC and AC, respectively.Then which of the following

relations is correct?



A. $l_1 = I_2 = l_3$

B. $l_2 > l_1 > l_3$

C. $l_3 < l_2 < l_1$

D. $l_3 > l_1 > l_2$

Answer: b

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31. The potential of an atom is given by $V = V_0 \log_e(r/r_0)$ where r_0 is a constant and r is the radius of the orbit Assumming Bohr's model to be applicable, which variation of r_n with n is possible (n being proncipal quantum number)?

A. $r_n \infty n$

B. $r_n 1/\infty n$

C. $r_n \infty n^2$

D. $r_n 1/n^2$

Answer: a

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32. You are given resistacne wire of length 50 cm and a battery of negligible resistacne In which of the folowing cases is larges amount of heat generated?

A. When the wire is connected to the battery directly

B. When the wire is divided into two parts and both the parts are connected to the battery oin parallel

C. When the wire is divided into four parts and all the four parts are connected to the battery in parallel

D. When only hjalf of the wire is connected to the battery

Answer: c

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