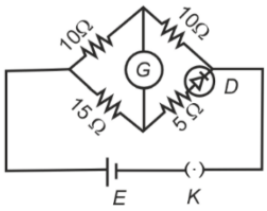
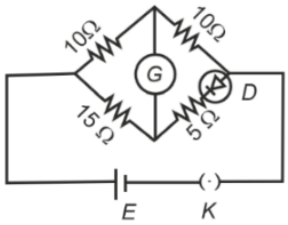
NEET 2024 Paper

1. Choose the correct circuit which can achieve the bridge balance.

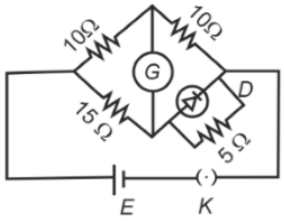
(A)



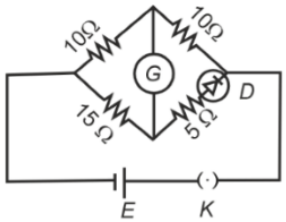
(B)



(C)



(D)



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Correct Option: A

Solution:

In option (1),

$$\frac{10}{15} = \frac{10}{5 + R_D}$$

The diode can conduct and have resistance $R_D = 10\Omega$ because diode have dynamic resistance. In that case bridge will be balanced.

2. Match List-I with List-II.

	List-I (Material)		**List-II (Susceptibility (χ))**
A.	Diamagnetic	I.	$\chi = 0$
B.	Ferromagnetic	II.	$0 > \chi \geq -1$
C.	Paramagnetic	III.	$\chi \gg 1$
D.	Non-magnetic	IV.	$0 < \chi < \varepsilon$ (a small positive number)

Choose the correct answer from the options given bel

(A) A-II, B-III, C-IV, D-I (B) A-II, B-I, C-III, D-

(C) A-III, B-II, C-I, D-IV (D) A-IV, B-III, C-II, I

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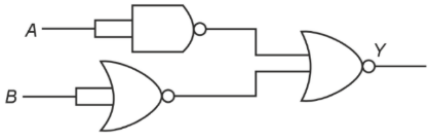
Correct Option: A

Solution:

(Material)		**(Susceptibility (χ))**
Diamagnetic	(II)	$0 > \chi \geq -1$
Ferromagnetic	(III)	$\chi \gg 1$
Paramagnetic	(IV)	$0 < \chi < \varepsilon$
Non-magnetic	(I)	$\chi = 0$

3. The output (γ) of the given logic gate is similar to th put of an/a



(A) NAND gate (B) NOR gate (C) OR gate (D) ANI

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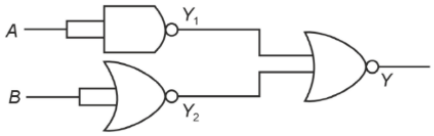
Correct Option: D

Solution:



$$Y_1 = \overline{A \cdot A}$$
$$= \bar{A}$$
$$Y_2 = \overline{B + B}$$
$$= \bar{B}$$
$$Y = \overline{Y_1 + Y_2}$$
$$= \overline{\bar{A} + \bar{B}}$$
$$= \overline{\bar{A} \cdot \bar{B}}$$
$$= A \cdot B \text{ is similar to output of } AND \text{ Gate}$$

4. Match List I with List II.

List I (Spectral Lines of Hydrogen for transitions from)		List II (Wavelengths (nm))	
(A)	$n_2 = 3$ to $n_1 = 2$	(I)	410.2
(B)	$n_2 = 4$ to $n_1 = 2$	(II)	434.1
(C)	$n_2 = 5$ to $n_1 = 2$	(III)	656.3
(D)	$n_2 = 6$ to $n_1 = 2$	(IV)	486.1

Choose the correct answer from the options given below:

(A) A-II, B-I, C-IV, D-III (B) A-III, B-IV, C-II, D-I

(C) A-IV, B-III, C-I, D-II (D) A-I, B-II, C-III, D-IV

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Correct Option: B

Solution:

Energy difference $\Delta E = \frac{hc}{\lambda}$

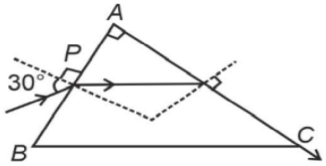
$\therefore \lambda \propto \frac{1}{\Delta E}$

$(\Delta E)_{6-2} > (\Delta E)_{5-2} > (\Delta E)_{4-2} > (\Delta E)_{3-2}$

$\lambda_{6-2} < \lambda_{5-2} < \lambda_{4-2} < \lambda_{3-2}$

A - III, B - IV, C - II, D - I

5. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC . The refractive index of the prism is:



(A) $\frac{\sqrt{5}}{4}$ (B) $\frac{\sqrt{5}}{2}$

(C) $\frac{\sqrt{3}}{4}$ (D) $\frac{\sqrt{3}}{2}$

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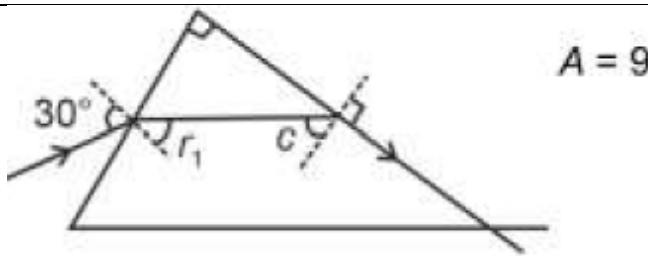
Correct Option: B

Solution:



In prism, $r_1 + c = A$

$r_1 = 90^\circ - c$ .....(1)

$\sin c = \frac{1}{\mu} \Rightarrow \cos c = \frac{\sqrt{\mu^2 - 1}}{\mu}$

$\Rightarrow$ Apply Snell's law, on incidence surface

$1 \cdot \sin 30^\circ = \mu \sin(r_1) \Rightarrow 1 \times \frac{1}{2} = \mu \times \sin(90^\circ - c)$

$\frac{1}{2} = \mu \times \frac{\sqrt{\mu^2 - 1}}{\mu}$

On squaring $\frac{1}{4} = \mu^2 - 1$

$\Rightarrow \mu^2 = \frac{5}{4} \Rightarrow \mu = \frac{\sqrt{5}}{2}$

6. In an ideal transformer, the turns ratio is $\frac{N_P}{N_S} = \frac{1}{2}$. Th $V_S : V_P$ is equal to (the symbols carry their usual ing) :

(A) 1 : 2 (B) 2 : 1 (C) 1 : 1 (D) 1 : 4

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Correct Option: B

Solution:

According to transformer ratio,

$\frac{V_S}{V_P} = \frac{N_S}{N_P} = 2 : 1$

7. A sheet is placed on a horizontal surface in fron strong magnetic pole. A force is needed to:
A. hold the sheet there if it is magnetic.
B. hold the sheet there if it is non-magnetic.
C. move the sheet away from the pole with uniform ity if it is conducting.
D. move the sheet away from the pole with uniform ity if it is both, non-conducting and non-polar.
Choose the correct statement(s) from the options below:

(A) B and D only (B) A and C only

(C) A, C and D only (D) C only

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Correct Option: B

Solution:

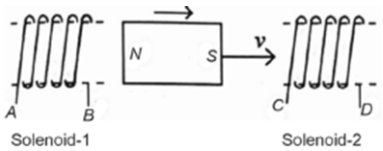
A. A magnetic pole will repel or attract magnetic sheet so force is need.

B. If sheet is non-magnetic, no force needed.

C. If it is conducting, then there will be addy current in sheet, which opposes the motion. So forces is needed move sheet with uniform speed.

D. The non-conducting and non-polar sheet do not interact with magnetic field of magnet.

8.



In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions:

(A) AB and DC (B) BA and CD (C) AB and CD (D) BA and DC

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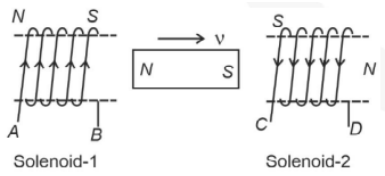
Correct Option: A

Solution:



North of magnet is moving away from solenoid 1 so end B of solenoid 1 is South and as south of magnet is approaching solenoid 2 so end C of solenoid 2 is South.

9. In a vernier callipers, $(N+1)$ divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm , the vernier constant (in cm) is:

(A) $\frac{1}{10\,N}$ (B) $\frac{1}{100(N+1)}$

(C) 100 N (D) $10(N+1)$

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Correct Option: B

Solution:

$V.C = MSD - VSD$

given: $(N+1)\ VSD = N\ MSD$

$VSD = \left(\frac{N}{N+1}\right) MSD$

given : $(N+1)VSD = N\ MSD$

From (1) and (2)

$V.C = (MSD) - \frac{N}{N+1}(MSD)$

$= MSD\left(1 - \frac{N}{N+1}\right) = \frac{MSD}{N+1}$

$= \frac{0.01}{N+1} = \frac{1}{100(N+1)}$

10. A logic circuit provides the output Y as per the foll truth table:

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is :

(A) $A \cdot B + \overline{A}$

(B) $A \cdot \overline{B} + \overline{A}$

(C) $\overline{B}$

(D) B

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Correct Option: C

Solution:

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

According to given truth table, output is independent o value of A

$\therefore$ *Output* $Y = \overline{B}$

11. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-}$

In the nuclear emission stated above, the mass n and atomic number of the product Q respectively, ar

(A) 280, 81 (B) 286, 80 (C) 288, 82 (D) 286,

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Correct Option: D

Solution:

$$^{290}_{82}X \xrightarrow{\alpha} {}^{286}_{80}Y \xrightarrow{e^+} {}^{286}_{79}Z \xrightarrow{\beta^-} {}^{286}_{80}P \xrightarrow{e^-} {}^{286}_{81}Q$$

$A \rightarrow 286$

$Z = 81$

12. If c is the velocity of light in free space, the correct statements about photon among the following are:

A. The energy of a photon is $E = hv$.

B. The velocity of a photon is **c**.

C. The momentum of a photon, $p = \frac{hv}{c}$.

D. In a photon-electron collision, both total energy and total momentum are conserved.

E. Photon possesses positive charge.

Choose the correct answer from the options given below:

(A) A and B only

(B) A, B, C and D only

(C) A, C and D only

(D) A, B, D and E only

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Correct Option: B

Solution:

(A) If c is the velocity of light

so, $E = hv$ (Energy of photon)

(B) Velocity of photon is equal to velocity of light i.e. c.

(C) $\lambda = \frac{h}{p}$

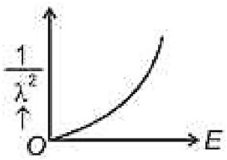
$p = \frac{h}{\lambda}$

$p = \frac{hv}{c}$

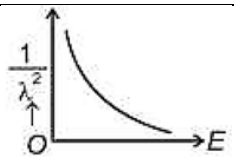
(D) In photon-electron collision both total energy and total momentum are conserved.

13. The graph which shows the variation of $(\frac{1}{\lambda^2})$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle):

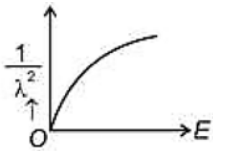
(A)



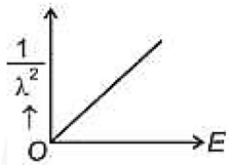
(B)



(C)



(D)



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Correct Option: D

Solution:

de-Broglie wavelength $\lambda = \frac{h}{P} = \frac{h}{mv} = \frac{h}{\sqrt{2mE}}$

where $E = \frac{1}{2}mv^2$

Squaring both sides,

$$\lambda^2 = \frac{h^2}{4m^2E}$$
$$\Rightarrow \frac{1}{\lambda^2} = (constant)E$$

Graph passes through origin with constant

14. Given below are two statements:

Statement I: Atoms are electrically neutral as they tain equal number of positive and negative charges.

Statement II: Atoms of each element are stable an their characteristic spectrum.

In the light of the above statements, choose the mo propriate answer from the options given below.

(A) Both Statement I and Statement II are correct

(B) Both Statement I and Statement II are incorrect

(C) Statement I is correct but Statement II is incorre

(D) Statement I is incorrect but Statement II is corre

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Correct Option: C

Solution:

Statement I is true as atoms are electrically neutral bec they contain equal number of positive and negative charges.

Statement II is wrong as atom of most of the elements are stable and emit characteristic spectrum. But this statement is not true for every atom.

15. If the monochromatic source in Young's double slit experiment is replaced by white light, then

(A) Interference pattern will disappear

(B) There will be a central dark fringe surrounded by a few coloured fringes

(C) There will be a central bright white fringe surrounded by a few coloured fringes

(D) All bright fringes will be of equal width

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Correct Option: C

Solution:

At central point on screen, path difference is zero for all wavelength. So, central bright fringe is white and other fringes depend on wavelength as $\beta = \frac{\lambda D}{d}$.

Therefore, other fringes will be coloured.

16. An unpolarised light beam strikes a glass surface at Brewster's angle. Then

(A) The reflected light will be partially polarised.

(B) The refracted light will be completely polarised.

(C) Both the reflected and refracted light will be completely polarised.

(D) The reflected light will be completely polarised but the refracted light will be partially polarised.

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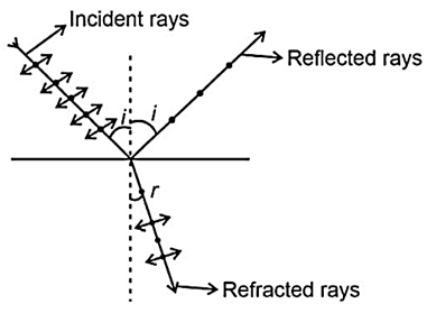
Correct Option: D

Solution:



According to Brewster's law, reflected rays are completely polarized and refracted rays are partially polarized.

17. A small telescope has an objective of focal length 14 and an eye piece of focal length 5.0 cm. The magnif power of telescope for viewing a distant object is:

(A) 34 (B) 28 (C) 17 (D) 32

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Correct Option: B

Solution:

$f_0 = 140$ cm and $f_e = 5$ cm

For distant object,

$m = \frac{f_0}{f_e} = \frac{140}{5} = 28$

18. The property which is not of an electromagnetic wa travelling in free space is that:

(A) They are transverse in nature

(B) The energy density in electric field is equal to e density in magnetic field

(C) They travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

(D) They originate from charges moving with unifo speed

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Correct Option: D

Solution:

The EM waves originate from an accelerating charge. charge moving with uniform velocity produces steady magnetic field.

19. A parallel plate capacitor is charged by connecting i battery through a resistor. If I is the current in the ci then in the gap between the plates:

(A) There is no current

(B) Displacement current of magnitude equal to I fl in the same direction as I

(C) Displacement current of magnitude equal to I fl in a direction opposite to that of I

(D) Displacement current of magnitude greater t flows but can be in any direction

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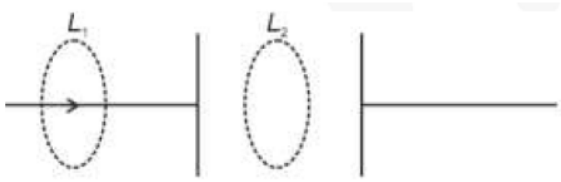
Correct Option: B

Solution:



According to modified Ampere's law

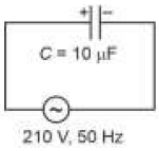
$\oint B.dl = \mu_0 (I_C + I_D)$

For Loop L_1 $I_C \neq 0$ and $I_D = 0$

For Loop L_2 $I_C = 0$ and $I_D \neq 0$

Due to KCL $I_C = I_D$

20. A 10μ F capacitor is connected to a 210 V , 50 Hz source as shown in figure. The peak current in the circuit is nearly ($\pi = 3.14$) :



(A) 0.58 A (B) 0.93 A (C) 1.20 A (D) 0.35 A

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Correct Option: B

Solution:

Capacitive Reactance $X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = \frac{1}{2\times 3.14\times 50\times 10\times 10^{-6}}$

$= \frac{1000}{3.14}$

$V_{rms} = 210$ V

$i_{rms} = \frac{V_{rms}}{X_C} = \frac{210}{X_C}$

Peak current $= \sqrt{2} i_{rms} = \sqrt{2} \times \frac{210}{1000} \times 3.14 = 0.932$

$\simeq 0.93$ A

21. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle 60° with each other. The magnetic moment of this new magnet is:

(A) M (B) $\frac{M}{2}$

(C) $2M$ (D) $\frac{M}{\sqrt{3}}$

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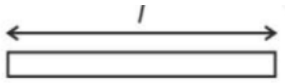
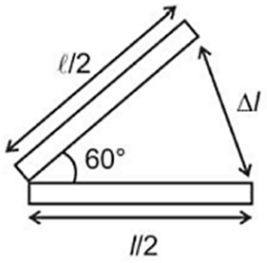
Correct Option: B

Solution:



$M = ml$



$\Delta I = 2 \times \frac{1}{2} \sin 30^\circ$

$= \frac{1}{2}$

$M' = m\frac{l}{2}$

$= \frac{M}{2}$

22. A tightly wound 100 turns coil of radius 10 cm ca current of 7 A. The magnitude of the magnetic field centre of the coil is (Take permeability of free sp $4\pi \times 10^{-7}$ SI units):

(A) 44 mT (B) 4.4 T (C) 4.4 mT (D) 44 T

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Correct Option: C

Solution:

The magnitude of magnetic field due to circular coil of turns is given by

$B_C = \frac{\mu_0 iN}{2R}$

$= \frac{4\pi \times 10^{-7} \times 7 \times 100}{2 \times 0.1}$

$= 4.4 \times 10^{-3} T$

$= 4.4mT$

23. Two heaters A and B have power rating of 1 kW kW, respectively. These two are first connected in and then in parallel to a fixed power source. The ra power outputs for these two cases is:

(A) 1 : 1 (B) 2 : 9 (C) 1 : 2 (D) 2 : 3

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Correct Option: B

Solution:

Power Consumed $= P = \frac{V^2}{R}$

$\frac{P_A}{P_B} = \frac{R_B}{R_A}$

$R_A = 2R_B$

For Series Combination

$P_S = \frac{V^2}{3R_B}$

For Parallel Combination

$P_P = \frac{3V^2}{2R_B}$

$\frac{P_S}{P_P} = \frac{2}{9}$

24. A wire of length 'l' and resistance 100Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

(A) 26Ω (B) 52Ω (C) 55Ω (D) 60Ω

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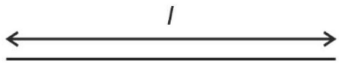
Correct Option: B

Solution:



$R = \frac{\rho l}{A}$

$R' = \frac{\rho l}{10A} = \frac{R}{10}$

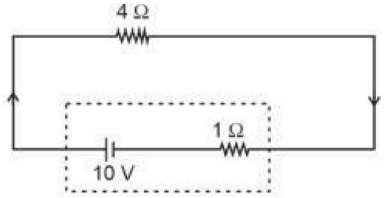
$R_S = 5 \times \frac{R}{10}$ [series]

$R_P = \frac{R}{50}$ [parallel]

$R_{eq} = R_S + R_P$

$= 52\Omega$

25. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1Ω, when connected through an external resistance of 4Ω as shown in the figure is:



(A) 4 V (B) 6 V (C) 8 V (D) 10 V

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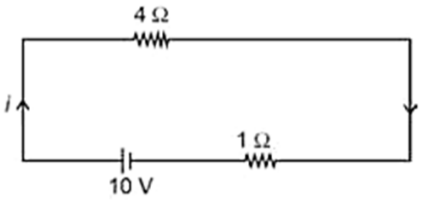
Correct Option: C

Solution:



Current in circuit $i = \frac{10}{4+1} = 2$ A

Terminal voltage $= E - iR$

$= 10 - 2 \times 1 = 8$ V

26. If the plates of a parallel plate capacitor connecte battery are moved close to each other, then

A. the charge stored in it, increases.

B. the energy stored in it, decreases.

C. its capacitance increases.

D. the ratio of charge to its potential remains the sar

E. the product of charge and voltage increases.

Choose the most appropriate answer from the o given below:

(A) A, B and E only

(B) A, C and E only

(C) B, D and E only

(D) A, D and E only

NEET 2

Correct Option: B

Solution:

Given $V' = V =$ Constant

(i) $C' = \frac{\varepsilon_0 A}{d'}, \quad C = \frac{\varepsilon_0 A}{d}$

$d' < d$

$C' > C$

Hence, final capacitance greater than initial capacitanc

(ii) $U' = \frac{1}{2} C' V^2$

$U = \frac{1}{2} C V^2$

$U' > U$

Hence final energy is greater than initial energy

(iii) $\frac{Q'}{V'} = C'$ and $\frac{Q}{V} = C$

$\frac{Q'}{V'} \neq \frac{Q}{V}$

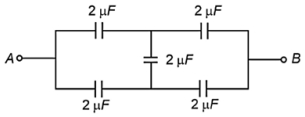
(iv) Product of charge and voltage

$X' = Q'V = C'V^2$

$X = QV = CV^2$

$X' > X$

27. In the following circuit, the equivalent capacitance between terminal A and terminal B is :



(A) 2μF (B) 1μF

(C) 0.5μF (D) 4μF

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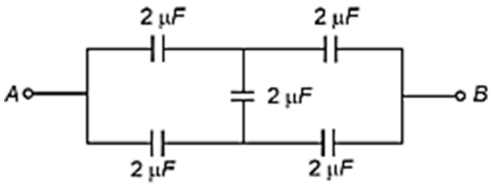
Correct Option: A

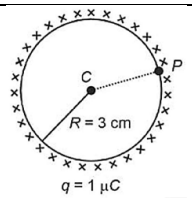
Solution:



Given circuit is balanced Wheatstone bridge

$C_{AB} = 1 + 1 = 2\mu$F

28. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is:
(Take $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ SI units)



(A) 3×10^5 (B) 1×10^5

(C) 0.5×10^5 (D) Zero

NEET 2

Correct Option: D

Solution:

For uniformly charged spherical shell,

$$V = \frac{kq}{R} \quad (For\ r \leq R)$$

$$\therefore \quad V_C = V_P$$

$$V_C - V_P = Zero$$

29. Given below are two statements: one is labell Assertion A and the other is labelled as Reason **R**.
Assertion A: The potential (V) at any axial point, distance (r) from the centre of the dipole of dipol ment vector $\vec{p}$ of magnitude, 4×10^{-6}Cm, is 10^3 V.
(Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ SI units)
Reason R: $V = \pm\frac{2P}{4\pi\epsilon_0 r^2}$, where r is the distance axial point, situated at 2 m from the centre of the di In the light of the above statements, choose the answer from the options given below:

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

(B) Both A and R are true and R is NOT the corre planation of A.

(C) A is true but R is false.

(D) A is false but R is true.

NEET 2

Correct Option: C

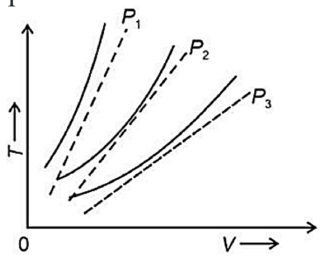
Solution:

The potential V at any point, at distance r from centre dipole $= \frac{KP\cos\theta}{r^2}$

At axial point where $\theta = 0°$, $V = \frac{KP}{r^2} = \frac{9\times10^9\times4\times10^{-6}}{2^2} =$ 9×10^3 V

At axial point where $\theta = 180°$, $V = \frac{-KP}{r^2} = -9 \times 10^3$

30. The following graph represents the T – V curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1, P_2 and P_3 compared with those of Charles's law represented as dotted lines.



Then the correct relation is :

(A) $P_3 > P_2 > P_1$ (B) $P_1 > P_3 > P_2$

(C) $P_2 > P_1 > P_3$ (D) $P_1 > P_2 > P_3$

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Correct Option: A

Solution:

At same temperature, curve with higher volume corresponds to lower pressure.

$V_3 > V_2 > V_1$

$\Rightarrow P_1 > P_2 > P_3$

(We draw a straight line parallel to volume axis to get this)

31. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{x}{2}$ times its original time period. Then the value of x is:

(A) $\sqrt{3}$ (B) $\sqrt{2}$

(C) $2\sqrt{3}$ (D) 4

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Correct Option: B

Solution:

$T' = 2\pi\sqrt{\frac{\ell'}{g}}$ where $\ell' = \frac{\ell}{2}$

$T = 2\pi\sqrt{\frac{\ell}{g}}$

$T' = \frac{x}{2}T$

$2\pi\sqrt{\frac{\ell}{2g}} = \frac{x}{2}2\pi\sqrt{\frac{\ell}{g}}$

$\frac{1}{\sqrt{2}} = \frac{x}{2} \Rightarrow x = \sqrt{2}$

32. If $x = 5\sin(\pi t + \frac{\pi}{3})$ m represents the motion of a p executing simple harmonic motion, the amplitud time period of motion, respectively, are

(A) 5 cm, 2 s (B) 5 m, 2 s

(C) 5 cm, 1 s (D) 5 m, 1 s

NEET 2

Correct Option: B

Solution:

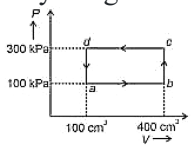
$x = 5\sin(\pi t + \frac{\pi}{3})$ m

Amplitude = 5 m

$\omega = \pi = \frac{2\pi}{T}$

$T = \frac{2\pi}{\pi} = 2$ s

33. A thermodynamic system is taken through the abcda. The work done by the gas along the path bc i



(A) Zero (B) 30 J (C) -90 J (D) -60

NEET 2

Correct Option: A

Solution:

Path bc is an isochoric process.

∴ Work done by gas along path bc is zero.

34. The maximum elongation of a steel wire of 1 m le the elastic limit of steel and its Young's modulus, r tively, are $8 \times 10^8 \text{Nm}^{-2}$ and 2×10^{11} N m^{-2}, is:

(A) 4 mm (B) 0.4 mm (C) 40 mm (D) 8 m

NEET 2

Correct Option: A

Solution:

In the case for maximum elongation,

Stress = Elastic limit

$\delta_{\max} = \frac{\sigma_{elastic} \times L}{\text{Young's modulus}} = \frac{8 \times 10^8 \times 1}{2 \times 10^{11}} = 4 \times 10^{-}$

$n = 4$ mm

i.e. maximum elongation is 4 mm

35. The minimum energy required to launch a satellite of mass m from the surface of earth of mass M and radius R in a circular orbit at an altitude of 2 R from the surface of the earth is:

(A) $\frac{5GmM}{6R}$ (B) $\frac{2GmM}{3R}$

(C) $\frac{GmM}{2R}$ (D) $\frac{GmM}{3R}$

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Correct Option: A

Solution:

Apply energy conservation,

$$U_i + K_i = U_f + K_f$$
$$\Rightarrow -\frac{GMIm}{R} + K_i = -\frac{GMIm}{3R} + \frac{1}{2}mv^2$$
$$\Rightarrow -\frac{GMm}{R} + K_i = -\frac{GMm}{3R} + \frac{1}{2} \times m \times \frac{GM}{3R}$$
$$\Rightarrow K_i = -\frac{1}{6}\frac{GMm}{R} + \frac{GMm}{R}$$
$$K_i = \frac{5}{6}\frac{GMm}{R}$$

36. The mass of a planet is $\frac{1}{10}$th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is:

(A) 19.6 m s^{-2}

(B) 9.8 m s^{-2}

(C) 4.9 m s^{-2}

(D) 3.92 m s^{-2}

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Correct Option: D

Solution:

$$g' = \frac{GM'}{R'^2} = \frac{GM}{10\left(\frac{R}{2}\right)^2}$$
$$= \frac{4}{10}\frac{GM}{R^2} = 0.4 \times 9.8$$
$$= 3.92 \text{ m s}^{-2}$$

37. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is 2400 g cm^2. The length of the 400 g rod is nearly:

(A) 8.5 cm (B) 17.5 cm (C) 20.7 cm (D) 72.0 cm

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Correct Option: A

Solution:

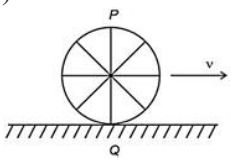
Moment of inertia of rod $= I = \frac{m\ell^2}{12}$

$$\Rightarrow \quad 2400 = 400\frac{\ell^2}{12}$$

$$\Rightarrow \quad 72 = \ell^2$$

$$\Rightarrow \quad \ell = \sqrt{72} = 8.48 \text{ cm} \simeq 8.5 \text{ cm}$$

38. A wheel of a bullock cart is rolling on a level r shown in the figure below. If its linear speed is v direction shown, which one of the following opti correct (P and Q are any highest and lowest points wheel, respectively)?



(A) Point P moves slower than point Q

(B) Point P moves faster than point Q

(C) Both the points P and Q move with equal speed

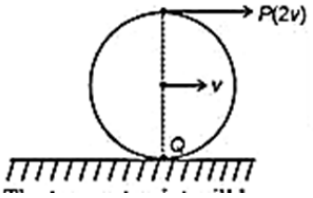
(D) Point P has zero speed

NEET 2

Correct Option: B

Solution:

In the case of pure rolling,



The topmost point will have velocity $2v$ while point Q lowest point will have zero velocity. Hence point P mo faster than point Q .

39. Two bodies A and B of same mass undergo complet inelastic one dimensional collision. The body A mo with velocity v_1 while body B is at rest before collis The velocity of the system after collision is v_2. The $v_1 : v_2$ is

(A) 1 : 2 (B) 2 : 1 (C) 4 : 1 (D) 1 : 4

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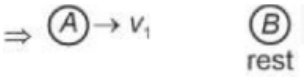
Correct Option: B

Solution:

Before collision



It undergoes completely inelastic collision Using conservation of linear momentum

Initial momentum = Final momentum

$\Rightarrow mv_1 = mv_2 + mv_2$

$\Rightarrow mv_1 = 2mv_2$

$\Rightarrow \frac{v_1}{v_2} = \frac{2}{1}$

40. At any instant of time t, the displacement of any particle is given by $2t - 1$ (SI unit) under the influence of force of 5 N. The value of instantaneous power is (in SI unit):

(A) 10 (B) 5 (C) 7 (D) 6

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Correct Option: A

Solution:

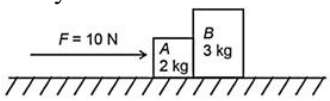
$x = 2t - 1$

$= \frac{dx}{dt} = 2 \text{ m/s}$

$P = F \cdot v$

$= 5 \times 2 = 10 \text{ W}$

41. A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3 kg respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is :



(A) Zero (B) 4 N (C) 6 N (D) 10 N

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Correct Option: C

Solution:

$\mathrm{F} = (\mathrm{M}_1 + \mathrm{M}_2)\, a$

$a = \frac{10}{2+3} = 2 \text{ ms}^{-2}$

$\mathrm{F}' = \mathrm{M}_2(2) = 3 \times 2 \text{ N} = 6 \text{ N}$

42. A force defined by $\mathrm{F} = \alpha t^2 + \beta t$ acts on a particle at a given time t. The factor which is dimensionless, if α and β are constants, is:

(A) $\beta t/\alpha$ (B) $\alpha t/\beta$ (C) $\alpha\beta t$ (D) $\alpha\beta/t$

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Correct Option: B

Solution:

From principle of homogeneity

$[F] = [\alpha t^2] = [\beta t]$

$[\alpha] = \frac{[F]}{[t^2]} and [\beta] = \frac{[F]}{[t]}$

$\therefore [\alpha][t] = [\beta]$

$\therefore \frac{\alpha t}{\beta} = dimensionless$

43. The quantities which have the same dimensions as of solid angle are:

(A) strain and angle (B) stress and angle

(C) strain and arc (D) angular speed and

NEET 2

Correct Option: A

Solution:

Solid angle $d\Omega = \frac{dA}{r^2}$ has dimension $[M^0 L^0 T^0]$.

Strain $= \frac{\Delta l}{l}$ has dimensions $[M^0 L^0 T^0]$.

Angle measured in radians is also dimensionless $[M^0 L^0 T^0]$.

$\theta = \frac{l}{r}$

44. A thin flat circular disc of radius 4.5 cm is placed over the surface of water. If surface tension of w 0.07 N/m, then the excess force required to take it from the surface is:

(A) 19.8 mN (B) 198 N (C) 1.98 mN (D) 99 N

NEET 2

Correct Option: A

Solution:

.

45. A particle moving with uniform speed in a circular p maintains

(A) Constant velocity

(B) Constant acceleration

(C) Constant velocity and varying acceleration

(D) Varying velocity and varying acceleration

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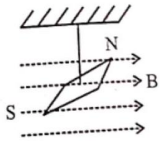
Correct Option: D

Solution:

Both velocity and acceleration vary in direction.

46. In a uniform magnetic field of 0.049 T , a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is 9.8×10^{-6} kg m^2. If the magnitude of magnetic moment of the needle is $x \times 10^{-5}\text{Am}^2$, then the value of ' x ' is :



(A) $5\pi^2$ (B) $128\pi^2$

(C) $50\pi^2$ (D) $1280\pi^2$

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Correct Option: D

Solution:

Time period of oscillation, $\text{T} = 2\pi\sqrt{\frac{\text{I}}{\text{MB}}}$

$\Rightarrow \quad \frac{1}{4} = 2\pi\sqrt{\frac{9.8\times10^{-6}}{\text{M}\times0.049}}$

$\Rightarrow \quad \frac{1}{16} = 4\pi^2 \times \frac{9.8\times10^{-6}}{\text{M}\times49\times10^{-3}}$

$\Rightarrow \quad \text{M} = \frac{4\pi^2\times9.8\times10^{-6}}{49\times10^{-3}} \times 16$

$\Rightarrow \quad \frac{4\pi^2\times9.8\times16\times10^{-3}}{49}$

$= 12.8\pi^2 \times 10^{-3} \times 10^{-2} \times 10^2$

$= 1280\pi^2 \times 10^{-5}\text{Am}^2$

$\therefore \quad \text{x} = 1280\pi^2$

47. A bob is whirled in a horizontal plane by means of a string with an initial speed of ωrpm. The tension in the string is T . If speed becomes 2ω while keeping the same radius, the tension in the string becomes

(A) T (B) 4T

(C) $\frac{T}{4}$ (D) $\sqrt{2}T$

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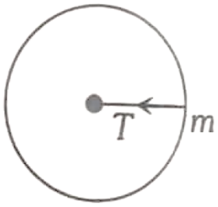
Correct Option: B

Solution:



$F_{cp} = ma_{cp}$

$F_{cp} = m\omega^2 r$

$T = m\omega^2 r$

Now speed becomes ' 2ω '

$T' = m(2\omega)^2 r \Rightarrow T' = 4m\omega^2 r \Rightarrow T' = 4T$

48. A metallic bar of Young's modulus, $0.5 \times 10^{11}\text{Nm}^{-}$ coefficient of linear thermal expansion $10^{-5}{}^\circ\text{C}^{-1}$, 1 m and area of cross-section 10^{-3} m^2 is heated 0°C to 100°C without expansion or bending. The pressive force developed in it is

(A) 5×10^3 N (B) 50×10^3 N

(C) 100×10^3 N (D) 2×10^3 N

NEET 2

Correct Option: B

Solution:

Given,

Young's modulus, $Y = 0.5\times10^{11}\text{Nm}^{-2}$

Coefficient of linear thermal expansion,

$\alpha = 10^{-5^\circ}\text{C}^{-1}$

Length, $l = 1\text{m}$

Area of cross-section, $A = 10^{-3}\text{ m}^2$

$\Delta T = 100^\circ\text{C}$

We know that, stress $= Y \cdot \frac{\Delta l}{l}$

Here,

$\Delta l = l\,\alpha\,\Delta T$

$= 1\times10^{-5}\times100 = 10^{-3}$

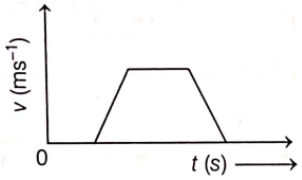
$\Rightarrow \quad \frac{F}{A} = Y \cdot \frac{10^{-3}}{1}$

Compressive force,

$F = 0.5\times10^{11}\times10^{-3}\times10^{-3}$

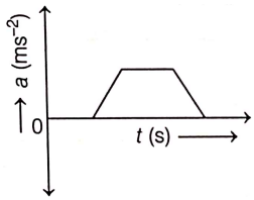
$= 0.5\times10^5 = 50\times10^3\text{ N}$

49. The velocity v-time t plot of the motion of a body is shown below.

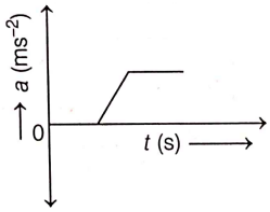


The acceleration a-time t graph that best suits this motion is

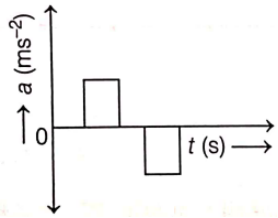
(A)



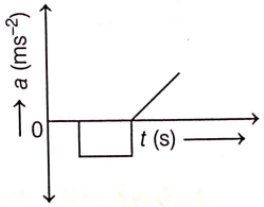
(B)



(C)



(D)



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Correct Option: C

Solution:

We know that

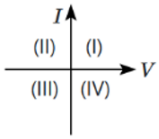
$$a = \frac{dv}{dt}$$

For $v =$ constant, $a = 0$

Thus, for $v - t$ graph when v is positive and linearly increasing a will be positive constant and if v is decreasing linearly a will be negative constant.

Hence, option (c) is correct.

50. Consider the following Statements **A** and **B** and id the correct answer:



A. For a solar-cell, the $I - V$ characteristics lies IV quadrant of the given graph. B. In a reverse-bias junction diode, the current measured in (μA), is majority charge carriers.

(A) **A** is incorrect but **B** is correct.

(B) Both A and B are correct.

(C) Both A and B are incorrect.

(D) A is correct but B is incorrect.

NEET 2

Correct Option: D

Solution:

Solution not Required.

NEET 2024 Paper - ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	A	D	B	B	B	B	A	B	C
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	D	B	D	C	C	D	B	D	B	B
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	B	C	B	B	C	B	A	D	C	A
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	B	B	A	A	A	D	A	B	B	A
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	C	B	A	A	D	D	B	B	C	D