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Answer & Solutions

for

NEET 2022

Physics

1. The dimensions $\left[MLT^{-2}A^{-2}\right]$ belong to the:

(1) magnetic permeability

(2) electric permittivity

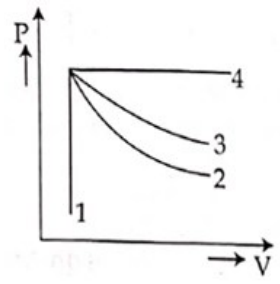
(3) magnetic flux

(4) self inductance

Sol. Answer (1)

$$\frac{F}{L}=\frac{\mu_0 i_1 i_2}{2\pi r}\Rightarrow[\mu_0]=[MLT^{-2}A^{-2}]$$

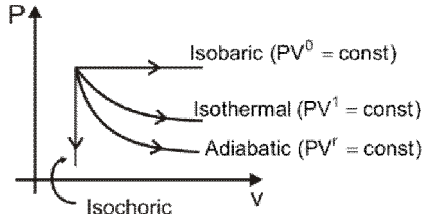
2. An ideal gas undergoes four different processes from the same initial state as shown in the figure below. Those processes are adiabatic, isothermal, isobaric and isochoric. The curve which represents the adiabatic process among 1, 2,3 and 4 is:



(1) 3 (2) 4

(3) 1 (4) 2

Sol. Answer (4)



3. A biconvex lens has radii of curvature, 20 cm each. If the refractive index of the material of the lens is 1.5, the power of the lens is:

(1) +5D (2) infinity

(3) +2D (4) +20 D

Sol. Answer (1)

$$P=\frac{1}{F}\qquad\text{(F in meter)}$$

$$\frac{1}{F}=(1.5-1)\left(\frac{1}{20}+\frac{1}{20}\right)=+\frac{0.5}{10}=\frac{1}{20}$$

$$P=\frac{100}{20}=+5D$$

4. The ratio of the radius of gyration of a thin uniform disc about an axis passing through its centre and normal to its plane to the radius of gyration of the disc about its diameter is

(1) 4 : 1 (2) $1:\sqrt{2}$

(3) 2 : 1 (4) $\sqrt{2}:1$

Sol. Answer (4)

$$I_{centre}=\frac{MR^2}{2}\Rightarrow K_1=\frac{R}{\sqrt{2}}$$

$$I_{diameter}=\frac{MR^2}{4}\Rightarrow K_2=\frac{R}{2}$$

$$\text{Ratio }\frac{K_1}{K_2}=\frac{R/\sqrt{2}}{R/2}=\frac{\sqrt{2}}{1}$$

5. The angle between the electric lines of force and the equipotential surface is:

(1) 90^0 (2) 180^0

(3) 0^0 (4) 45^0

Sol. Answer (1)

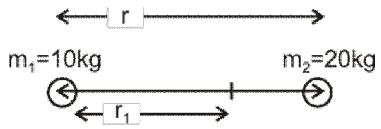
Electric field lines are always perpendicular to an equipotential surface.

6. Two objects of mass 10 kg and 20 kg respectively are connected to the two ends of a rigid rod of length 10 m with negligible mass. The distance of the center of mass of the system from the 10 kg mass is

(1) 10 m (2) 5 m

(3) $\frac{10}{3}$m (4) $\frac{20}{3}$m

Sol. Answer (4)



$$r_1 = \frac{m_2}{m_1 + m_2} r = \left(\frac{20}{10+20}\right) \times 10 = \frac{20}{3} m$$

7. The ratio of the distances travelled by a freely falling body in the 1st, 2nd, 3rd and 4th second:

(1) 1 : 3 : 5 : 7 (2) 1 : 1 : 1 : 1

(3) 1 : 2 : 3 : 4 (4) 1 : 4 : 9 : 16

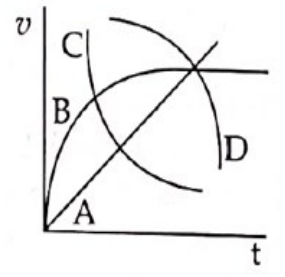
Sol. Answer (1)

$$S = u + \frac{a}{2}(2n-1)$$

$$S_1 = \frac{g}{2} \times 1 \quad S_2 = \frac{g}{2} \times 3 \quad S_3 = \frac{g}{2} \times 5 \quad S_4 = \frac{g}{2} \times 7$$

$$S_1 : S_2 : S_3 : S_4 = 1 : 3 : 5 : 7$$

8. A spherical ball is dropped in a long column of a highly viscous liquid. The curve in the graph shown, which represents the speed of the ball (υ) as a function of time (t) is:



(1) C (2) D

(3) A (4) B

Sol. Answer (4)

As time passes viscous drag acting on ball increases and finally a stage comes, when its speed become constant (called terminal speed)

9. The angular speed of a fly wheel moving with uniform angular acceleration changes from 1200 rpm to 3120 rpm in 16 seconds. The angular acceleration in rad/s^2 is:

(1) 12 π (2) 104 π

(3) 2 π (4) 4 π

Sol. Answer (4)

$$w_i = 1200\,\text{rpm} = 1200 \times \frac{2\pi}{60} = 40\pi \text{ rad/s}$$

$$w_f = 3120\,\text{rpm} = 3120 \times \frac{2\pi}{60} = 104\pi \text{ rad/s}$$

$$w_f = w_i + \alpha t$$

$$104\pi = 40\pi + \alpha \times 16$$

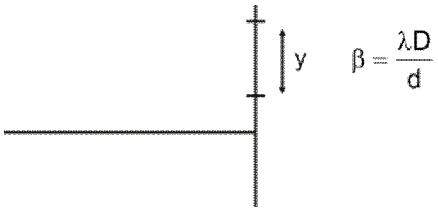
$$\alpha = \frac{64\pi}{16} = 4\pi \text{ rad/s}^2$$

10. In a Yong's double slit experiment, a student observed 8 fringes in a certain segment of screen when a monochromatic light of 600 nm wavelength is used. If the wavelength of light is changed to 400 nm, then the number of fringes he would observe in the same region of the screen is:

(1) 9 (2) 12

(3) 6 (4) 8

Sol. Answer (2)



$$y = n_1\beta_1 = n_2\beta_2$$

$$\Rightarrow n_1\lambda_1 = n_2\lambda_2$$

$$\Rightarrow n_2 = \frac{n_1\lambda_1}{\lambda_2}$$

$$= 8 \times \frac{600}{400}$$

$$n_2 = 12$$

11. Match List-I with List-II

List-I (Electromagnetic waves)	List-II (Wavelength)
(a) AM radio waves	(i) 10^{-10} m
(b) Microwaves	(ii) 10^2 m

(c) Infrared radiations (iii) 10^{-2} m

(d) X-rays (iv) 10^{-4} m

Choose the correct answer from the options given below:

(1) (a)-(iii), (b)-(iv), (c)-(ii), d-(i)

(2) (a)-(ii), (b)-(iii), (c)-(iv), d-(i)

(3) (a)-(iv), (b)-(iii), (c)-(ii), d-(i)

(4) (a)-(iii), (b)-(ii), (c)-(i), d-(iv)

Sol. Answer (2)

AM radio waves – 10^{2} m

microwaves – 10^{-2} m

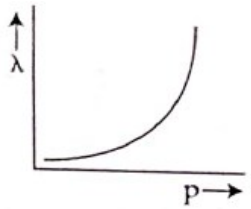
Infrared – 10^{-4} m

x-rays – 10^{-10} m

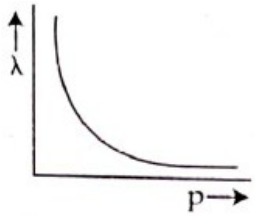
a-(ii), b-(iii), c-(iv), d-(i)

12. The graph which shows the variation of the de Broglie wavelength (λ) of a particle and its associated momentum (p) is:

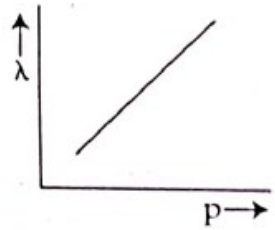
(1)



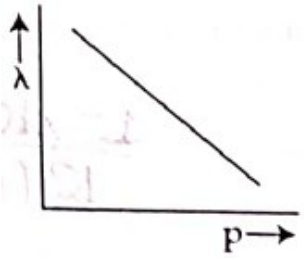
(2)



(3)

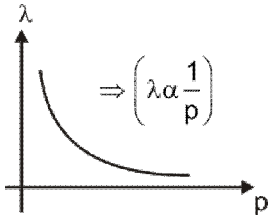


(4)



Sol. Answer (2)

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



13. When light propagates through a material medium of relative permittivity ϵ_r and relative permeability μ_r, the velocity of light, v is given by (c-velocity of light in vacuum)

(1) $v = \sqrt{\frac{\epsilon_r}{\mu_r}}$ (2) $v = \frac{c}{\sqrt{\epsilon_r\ \mu_r}}$

(3) $v = c$ (4) $v = \sqrt{\frac{\mu_r}{\epsilon_r}}$

Sol. Answer (2)

$$v = \frac{1}{\sqrt{\mu\ \epsilon}} \qquad \mu = \mu_r\,\mu_0$$

$$\epsilon = \epsilon_r\,\epsilon_0$$

$$v = \frac{1}{\sqrt{\epsilon_0 \epsilon_r\ \mu_0\mu_r}} \qquad c = \frac{1}{\sqrt{\epsilon_0\ \mu_0}}$$

$$\Rightarrow\ v = \frac{c}{\sqrt{\mu_r\ \epsilon_r}}$$

14. If a soap bubble expands, the pressure inside the bubble:

(1) remains the same

(2) is equal to the atmospheric pressure

(3) decreases

(4) increases

Sol. Answer (3)

$$P_{in} - P_{out} = \frac{4T}{R}$$

as

$$R \text{ increases} \Rightarrow \frac{4T}{R} \text{decreases}$$

$$\Rightarrow P_{in} \text{decreases} (P_{out} = \text{constant})$$

15. A body of mass 60 g experiences a gravitational force of 3.0 N, when placed at a particular point. The magnitude of the gravitational field intensity at that point is:

(1) 20 N / kg (2) 180 N / kg

(3) 0.05 N / kg (4) 50 N / kg

Sol. Answer (4)

$F = mE_g$ E_g = Gravitational field intensity

$$\frac{3}{0.06} = E_g$$

$E_g = 50$ N / kg

16. In the given nuclear reaction, the element X is

$${}^{22}_{11}Na \rightarrow X + e^{+} + \nu$$

(1) ${}^{22}_{10}Ne$ (2) ${}^{22}_{12}Mg$

(3) ${}^{23}_{11}Na$ (4) ${}^{23}_{10}Ne$

Sol. Answer (1)

$${}^{22}_{11}Na \longrightarrow {}^{A}_{Z}X + {}^{0}_{+1}e + \nu$$

A = 22

11 = Z + 1

Z = 11 – 1 = 10

17. Let T_1 and T_2 be the energy of an electron in the first and second excited states of hydrogen atom, respectively. According to the Bohr's model of an atom, the ratio $T_1 : T_2$ is:

(1) 4 : 9 (2) 9 : 4

(3) 1 : 4 (4) 4 : 1

Sol. Answer (2)

$$E = -\frac{13.6}{n^2}eV$$

First excited state n = 2 $T_1 = \frac{-13.6}{4}eV$

Second excited state n = 3 $T_2 = \frac{-13.6}{9}eV$

$$\frac{T_1}{T_2} = \frac{9}{4}$$

18. When two monochromatic lights of frequency, ν and $\frac{\nu}{2}$ are incident on a photoelectric metal, their stopping potential becomes $\frac{V_S}{2}$ and V_S respectively. The threshold frequency for this metal is:

(1) $\frac{2}{3}\nu$ (2) $\frac{3}{2}\nu$

(3) 2ν (4) 3ν

Sol. Answer (....)

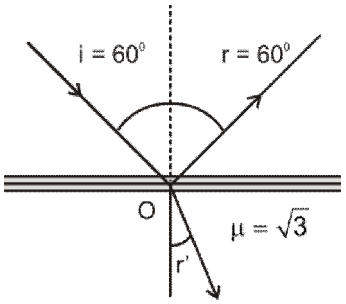
Technical Error in this questions (No option is correct)

19. A light ray falls on a glass surface of refractive index $\sqrt{3}$, at an angle 60^0. The angle between the refracted and reflected rays would be:

(1) 90^0 (2) 120^0

(3) 30^0 (4) 60^0

Sol. Answer (1)



Given $\angle I = 60^0$

Since $\angle r = \angle i$

$\angle r = 60^0$

By Snell's law at "O"

$1 \times \sin 60 = = \sqrt{3} \times \sin r'$

$\sin r' = \frac{1}{2} \Rightarrow r' = 30^0$

Angle between refracted and reflected rays will be 90^0

20. A shell of mass m is at rest initially. It explodes into three fragments having mass in the ratio $2:2:1$. If the fragments having equal mass fly off along mutually perpendicular directions with speed ν, the speed of the third (lighter) fragment is:

(1) $2\sqrt{2}\nu$ (2) $3\sqrt{2}\nu$

(3) ν (4) $\sqrt{2}\nu$

Sol. Answer (1)

By conservation of linear momentum

$\vec{P_1} + \vec{P_2} + \vec{P_3} = 0$

$\vec{P_3} = -\left(\vec{P_1} + \vec{P_2}\right)$

Given $m_1 = 2m$, $m_2 = 2m$, $m_3 = m$

$\vec{P_1}$ and $\vec{P_2}$ are at 90^0 angle.

$\Rightarrow \left|\vec{P_3}\right| = \sqrt{P_1^2 + P_2^2}$

$mv_3 = \sqrt{4m^2v^2 + 4m^2v^2}$

$v_3 = 2\sqrt{2}v$

21. Two hollow conducting spheres of radii R_1 and R_2 ($R_1 >> R_2$) have equal charges. The potential would be

(1) Equal on both the spheres

(2) Dependent on the material property of the sphere

(3) More on bigger sphere

(4) More on smaller sphere

Sol. Answer (4)

We know potential on the surface of sphere

$$V = \frac{kQ}{R}$$

$$V \propto \frac{1}{R}$$

In question it is given $R_1 >> R_2$

Hence $V_1 << V_2$

22. As the temperature increases, the electrical resistance

(1) Increases for conductors but decreases for semiconductors

(2) Decreases for conductors but increases for semiconductors

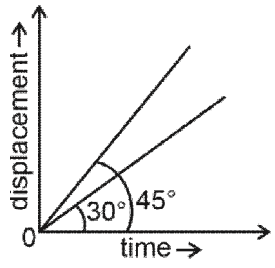
(3) Increases for both conductors and semiconductors

(4) Decreases for both conductors and semiconductors

Sol. Answer (1)

On increasing temperature, Resistance increases in conductors and decreases in semiconductors

23. The displacement-time graphs of two moving particles make angles of 30° and 45° with the *x*-axis as shown in the figure. The ratio of their respective velocity is



(1) 1 : 2

(2) $1:\sqrt{3}$

(3) $\sqrt{3}:1$

(4) 1 : 1

Sol. Answer (2)

Slope of straight line in x - t graph gives velocity

$$\therefore \quad \frac{V_1}{V_2} = \frac{\tan 30}{\tan 45} = \frac{1}{\sqrt{3}}$$

24. A square loop of side 1 m and resistance 1 Ω is placed in a magnetic field of 0.5 T. If the plane of loop is perpendicular to the direction of magnetic field, the magnetic flux through the loop is

(1) 1 weber

(2) Zero weber

(3) 2 weber

(4) 0.5 weber

Sol. Answer (4)

We know magnetic flux $\phi = BA\cos\theta$

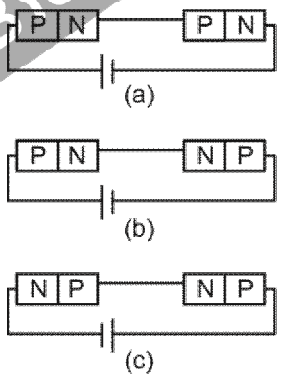
Here $\theta = 0$

$\phi = BA$

$\phi = 0.5 \times 1^2$

= 0.5 weber

25.



In the given circuits (a), (b) and (c), the potential drop across the two p-n junctions are equal in

(1) Circuit (c) only

(2) Both circuits (a) and (c)

(3) Circuit (a) only

(4) Circuit (b) only

Sol. Answer (2)

In circuits (a) and (c) both the diodes are connected in forward Bias, potential drop across junctions will be equal.

26. A copper wire of length 10 m and radius $(10^{-2}/\sqrt{\pi})$ m has electrical resistance of $10\,\Omega$. The current density in the wire for an electric field strength of 10 (V/m) is:

(1) 10^{-5} A/m^2

(2) 10^{5} A/m^2

(3) 10^{4} A/m^2

(4) 10^{6} A/m^2

Sol. Answer (2)

Given $l = 10$ m, $r = \frac{10^{-2}}{\sqrt{\pi}}$m

$R = 10\ \Omega, E = 10$ v/m

Current density J= ?

We know $J = \sigma E = \frac{E}{\rho}$

$$J = \frac{El}{RA} = \frac{10 \times 10}{10 \times \pi \times \frac{10^{-4}}{\pi}}$$

$J = 10^5$ A/m^2

27. An electric lift with a maximum load of 2000 kg (lift + passengers) is moving up with a constant speed of 1.5 ms^{-1}. The frictional force opposing the motion is 3000 N. The minimum power delivered by the motor to the lift in watts is: (g=10 ms^{-2})

(1) 34500

(2) 23500

(3) 23000

(4) 20000

Sol. Answer (1)

Total force required to move with constant speed,

Force = weight + friction

F = 20000 + 3000

F = 23000 N

Power, P = F.V

= 23000 × 1.5

P = 34500 W

28. Given below are two statements:

Statement-I :

Biot-Savart's law gives us the expression for the magnetic field strength of an infinitesimal current element (Idl) of a current carrying conductor only

Statement-II:

Biot-Savart's law is analogous to Coulomb's inverse square law of charge q, with the former being related to the field produced by a scalar source, Idl while the latter being produced by a vector source, q:

In light of above statements choose the **most appropriate** answer from the options given below:

(1) Statement I is correct and Statement II is incorrect

(2) Statement I is incorrect and Statement II is correct

(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect

Sol. Answer (1)

Biot-Savart's law give magnetic field due to current element 'Idl' which is a vector source.

29. Two resistors of resistance, 100 Ω and 200 Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100 Ω to that in 200 Ω in a given time is :

(1) 1:4

(2) 4:1

(3) 1:2

(4) 2:1

Sol. Answer (4)

We know thermal energy developed across resistors is

$$H = \frac{v^2}{R}t$$

Since resistors are connected in parallel for some time, v & t are constants.

$$\therefore H \propto \frac{1}{R}$$

$$\Rightarrow \frac{H_1}{H_2} = \frac{R_2}{R_1} = \frac{200}{100}$$

$$\Rightarrow \frac{H_1}{H_2} = \frac{2}{1}$$

30. The energy that will be ideally radiated by a 100 kW transmitter in 1 hour is:

(1) 36 × 10^5 J

(2) 1 × 10^5 J

(3) 36 × 10^7 J

(4) 36 × 10^4 J

Sol. Answer (3)

We know energy radiated

$E = P \times t$

$E = 100 \times 10^3 \times 60 \times 60$ J

$E = 36 \times 10^7$ J

31. A long solenoid of radius 1 mm has 100 turns per mm. If 1 A current flows in the solenoid, the magnetic field strength at the centre of the solenoid is:

(1) 12.56×10^{-4} T

(2) 6.28×10^{-4} T

(3) 6.28×10^{-2} T

(4) 12.56×10^{-2} T

Sol. Answer (4)

Given, $r = 10^{-3}$ m, $n = \frac{N}{l} = \frac{100}{10^{-3}}$

Magnetic field strength at the centre of solenoid

$B = \mu_0 ni$

$= 4\pi \times 10^{-7} \times \frac{100}{10^{-3}} \times 1$

$B = 12.56 \times 10^{-2}$T

32. Plane angle and solid angle have:

(1) No units and no dimensions

(2) Both units and dimensions

(3) Units but no dimensions

(4) Dimensions but no units

Sol. Answer (3)

We know plane angle = $\frac{l}{r}$

And solid angle = $\frac{A}{r^2}$

Hence both has no dimensional formula.

Unit of plane angle is radian and solid angle steradian.

33. In half wave rectification, if the input frequency is 60 Hz, then the output frequency would be:

(1) 60 Hz

(2) 120 Hz

(3) Zero

(4) 30 Hz

Sol. Answer (1)

In case of half wave rectifier output frequency will be same as input frequency.

34. The peak voltage of the ac source is equal to:

(1) $\sqrt{2}$ times the rms value of the ac source

(2) $\frac{1}{\sqrt{2}}$ times the rms value of the ac source

(3) The value of voltage supplied to the circuit

(4) The rms value of the ac source

Sol. Answer (1)

We know that RMS voltage is

$V_{RMS} = \frac{V_0}{\sqrt{2}}$

Peak voltage = $\sqrt{2} \times V_{RMS}$

35. If the initial tension on a stretched string is doubled, then the ratio of the initial and final speeds of a transverse wave along the string is:

(1) 1 : $\sqrt{2}$

(2) 1:2

(3) 1:1

(4) $\sqrt{2}$:1

Sol. Answer (1)

Velocity of transverse wave on a string

$v = \sqrt{\frac{T}{\mu}}$

T = Tension in the string

μ = mass per unit length

$v_1 = \sqrt{\frac{T_1}{\mu}}$; As per question $T_2 = 2T_1$

$v_2 = \sqrt{\frac{T_2}{\mu}}$

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

36. Two pendulums of length 121 cm and 100 cm start vibrating in phase. At some instant, the two are at their mean position in the same phase. The minimum number of vibrations of the shorter pendulum after which the two are again in phase at the mean position is:

(1) 10 (2) 8

(3) 11 (4) 9

Sol. Answer (3)

Time period of simple pendulum

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

$$\frac{T_1}{T_2} = \sqrt{\frac{L_1}{L_2}} = \sqrt{\frac{1.21}{1.00}} = \sqrt{\frac{121}{100}} = \frac{11}{10}$$

$$10\,T_1 = 11\,T_2$$

10 times period of longer pendulum = 11 times period of shorter pendulum

37. A ball is projected with a velocity, 10 ms^{-1}, at an angle of 60° with the vertical direction. Its speed at the highest point of its trajectory will be:

(1) 5 ms^{-1}

(2) 10 ms^{-1}

(3) Zero

(4) $5\sqrt{3}$ ms^{-1}

Sol. Answer (4)

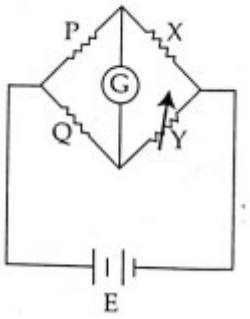
The angle with horizontal will be 30°

$\therefore$ at highest point of trajectory.

Vertical velocity is zero but only horizontal velocity remain non zero. i.e.,

$$\therefore u\cos 30^o = 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3}\ ms^{-1}$$

38. A wheat stone bridge is used to determine the value of unknown resistance X by adjusting the variable resistance Y as shown in the figure. For the most precise measurement of X, the resistances *P* and :*Q*



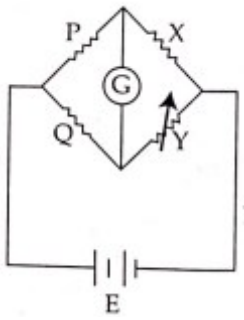
(1) Should be very large and unequal

(2) Do not play any significant role

(3) Should be approximately equal to 2X

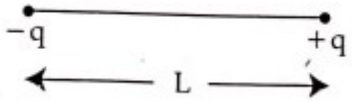
(4) Should be approximately equal and are small

Sol. Answer (4)



For most precise value of X the ratio P/Q needs to be equal to one. Also P, Q needs to be small resistance as if student used large value of P and Q, the current through the arms will be feeble. This will make the accurate determination of null point to be difficult.

39. Two point charges $-q$ and $+q$ are placed at a distance of *L*, as shown in the figure.



The magnitude of electric field intensity at a distance R(R>>L) varies as:

(1) $\frac{1}{R^4}$

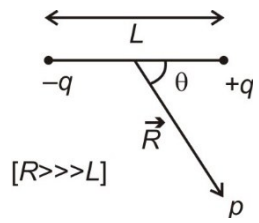
(2) $\frac{1}{R^6}$

(3) $\frac{1}{R^2}$

(4) $\frac{1}{R^3}$

Sol. Answer (4)

Electric field due to a dipole at a point



$$E_p = \frac{kp}{R^3}\sqrt{3\cos^2\theta + 1}$$

$$\therefore \left[E_p \propto \frac{1}{R^3}\right] \text{for short dipole}$$

40. Given below are two statements : One is labelled as **Assertion(A)** and the other is labelled as

Reason(R).

Assertion (A): The stretching of a spring is determined by the shear modulus of the material of the spring. **Reason (R):** A coil spring of copper has more tensile strength than a steel spring of same dimensions.

In the light of the above statements, choose the **most appropriate** answer from the options given below:

(1) (A) is true but (R) is false

(2) (A) is false but (R) is true

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

(4) Both (A) and (R) are true and (R) is not the correct explanation of (A)

Sol. Answer (1)

Assertion (A) is true as spring constant is determined by shear modulus of the material of the spring.

Reason (R) is false as steel has more tensile strength than copper.

41. A nucleus of mass number 189 splits into two nuclei having mass number 125 and 64. The ratio of radius of two daughter nuclei respectively is

(1) 5 : 4

(2) 25 : 16

(3) 1 : 1

(4) 4 : 5

Sol. Answer (1)

$R = R_0(A)^{\frac{1}{3}}$

$\frac{R_{125}}{R_{64}} = \left(\frac{125}{64}\right)^{\frac{1}{3}} = \frac{5}{4}$

42. Match List-I with List-II

	List-I		**List-II**
(a)	Gravitational constant(G)	(i)	$[L^2T^{-2}]$
(b)	Gravitational potential energy	(ii)	$[M^{-1}L^3T^{-2}]$
(c)	Gravitational potential	(iii)	$[LT^{-1}]$
(d)	Gravitational intensity	(iv)	$[ML^2T^{-2}]$

Choose the correct answer from the options given below

(1) (a) - (ii), (b) - (iv), (c) - (iii), (d) - (i)

(2) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)

(3) (a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)

(4) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

Sol. Answer (4)

$[G] = [M^{-1}L^3T^{-2}]$

$[GPE] = [ML^2T^{-2}]$

[Gravitational potential] = $[L^2T^{-2}]$

[Gravitational intensity] = $[LT^{-2}]$

43. The area of a rectangular field (in m^2) of length 55.3 m and breadth 25 m after rounding off the value for correct significant digits is

(1) 1382.5

(2) 14×10^2

(3) 138×10^1

(4) 1382

Sol. Answer (2)

Area of rectangle = $l \times b$

$= 55.3 \times 25 = 1382.5\ m^2$

Now l has 3 significant figures

b has 2 significant figures

In multiplication answer must have minimum significant figure.

So, answer must be $14 \times 10^2\ m^2$

44. A big circular coil of 1000 turns and average radius 10 m is rotating about its horizontal diameter at 2 rad s^{-1}. If the vertical component of earth's magnetic field at that place is 2×10^{-5} T and electrical resistance of the coil is 12.56 Ω, then the maximum induced current in the coil will be

(1) 1 A

(2) 2 A

(3) 0.25 A

(4) 1.5 A

Sol. Answer (1)

$e_{max} = NBA\omega$

$$I_{max} = \frac{e_{max}}{R} = \frac{NBA\omega}{R}$$

$$= \frac{1000 \times 2 \times 10^{-5} \times \pi \times 10^2 \times 2}{12.56}$$

$$= \frac{2 \times \pi \times 2}{12.56} = \frac{12.56}{12.56} = 1\,A$$

45. Two transparent media *A* and *B* are separated by a plane boundary. The speed of light in those media are 1.5×10^8m/s and 2.0×10^8 m / s, respectively. The critical angle for a ray of light for these two media is

(1) $\tan^{-1}$ (0.500)

(2) $\tan^{-1}$ (0.750)

(3) $\sin^{-1}$ (0.500)

(4) $\sin^{-1}$ (0.750)

Sol. Answer (4)

$$\frac{V_D}{V_R} = \frac{1.5\times10^8}{2.0\times10^8}$$

Critical angle $\sin i = \left(\frac{\mu_R}{\mu_D}\right)$

$$\sin i = \frac{C}{V_R}.\frac{V_D}{C} = \frac{V_D}{V_R}$$

$$\sin i = \frac{1.5\times10^8}{2\times10^8} = \left(\frac{3}{4}\right)$$

$$\sin i = 0.75$$

$$i = \sin^{-1}[0.75]$$

46. A series LCR circuit with inductance 10H, capacitance10μF, resistance 50Ω is connected to an ac source of voltage, V=200 sin(100t) volt. If there so nant frequency of the LCR circuit is v_0 and the frequency of the ac source is v, then

(1) $\nu_0 = \frac{50}{\pi}$Hz, $\nu = 50$ Hz

(2) $\nu = 100$ Hz, $\nu_0 = \frac{100}{\pi}$Hz

(3) $\nu_0 = \nu = 50$ Hz

(4) $\nu_0 = \nu = \frac{50}{\pi}$ Hz

Sol. Answer (4)

Resonant frequency

$$2\pi\nu_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{10\times10^{-6}\times10}}$$

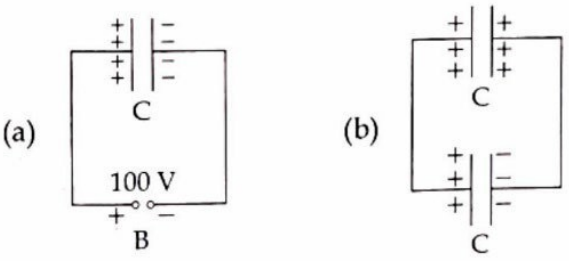
$$2\pi\nu_0 = 100$$

$$\nu_0 = \left(\frac{50}{\pi}\right)\text{Hz}$$

$$\nu = 200\sin(100t)$$

$$100 = 2\pi\nu \Rightarrow \nu = \left(\frac{50}{\pi}\right)\text{Hz}$$

47. A capacitor of capacitance C = 900 pF is charges fully by 100 V battery B as shown in figure (a). Then it is disconnected from the battery and connected to another uncharged capacitor of capacitance C = 900 pF as shown in figure (b). The electrostatic energy stored by the system (b) is



(1) 2.25×10^{-6}J

(2) 1.5×10^{-6}J

(3) 4.5×10^{-6}J

(4) 3.25×10^{-6}J

Sol. Answer (1)

$$U_{initial} = \frac{1}{2}CV^2 = \frac{1}{2}C\times(100)^2 = 5000C$$

Lost $\Delta U = \frac{1}{2}\frac{C_1C_2}{C_1+C_2}(V_1-V_2)^2 = \frac{1}{2}\frac{C^2}{2C}(100-0)^2$

$$= \frac{1}{4}C(100)^2 = 2500C$$

$$\therefore U_{final} = U_i - \Delta U = 5000C - 2500C = 2500C$$

$$= 2500\times900\times10^{-12}$$

$$= 225\times10^{-8}$$

$$U_{final} = 2.25\times10^{-6}\text{ J}$$

48. From Ampere's circuital law for a long straight wire of circular cross-section carrying a steady current, the variation of magnetic field in the inside and outside region of the wire is

(1) A linearly increasing function of distance r upto the boundary of the wire and then decreasing one with $\frac{1}{r}$ dependence for the outside region.

(2) A linearly decreasing function of distance upto the boundary of the wire and then a linearly increasing one for the outside region.

(3) Uniform the remains constant for both the regions.

(4) A linearly increasing function of distance upto the boundary of the wire and then linearly decreasing for the outside region.

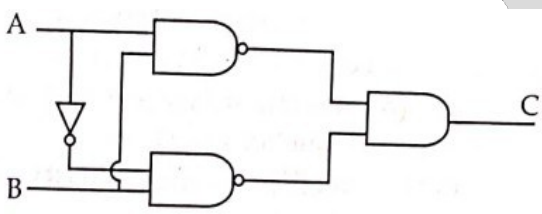
Sol. Answer (1)

For a cylindrical wire of radius R carrying steady current

For $r<R$, $B \propto r$ increasing

For $r>R$, $B \propto \frac{1}{r}$ decreasing

49.



The truth table for the given logic circuit is

(1)

A	B	C
0	0	1
0	1	0
1	0	1
1	1	0

(2)

A	B	C
0	0	0
0	1	1
1	0	0
1	1	1

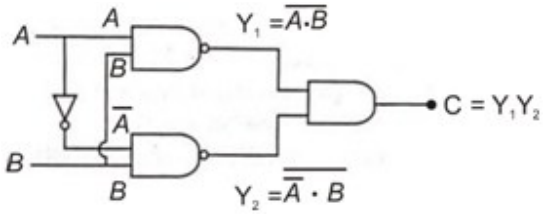
(3)

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

(4)

A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

Sol. Answer (1)



Truth Table

A	B	Y_1	Y_2	C
0	0	1	1	1
0	1	1	0	0
1	0	1	1	1
1	1	0	1	0

50. The volume occupied by the molecules contained in 4.5 kg water at STP, if the intermolecular forces vanish away is

(1) 5.6×10^{-3} m^3

(2) 5.6 m^3

(3) 5.6×10^{6} m^3

(4) 5.6×10^{3} m^3

Sol. Answer (2)

In absence of intermolecular forces water will exist in vapour phase

$PV = nRT$

$PV = \frac{m}{M}RT$

$1.01\times10^5 \times V = \frac{4.5\times10^3}{18}\times 8.3\times 273$

V = 5.6 m^3

❑ ❑ ❑

17/07/2022

Test Booklet Code-S5

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Answer Key
NEET 2022

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