JEE Main April 2025

Question Paper With Text Solution

07 April | Shift-1

PHYSICS

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911

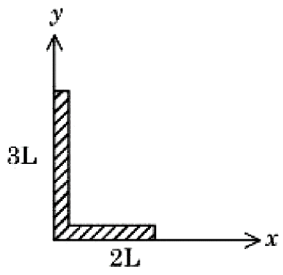
Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

JEE MAIN APRIL 2025 | 07 APRIL SHIFT-1

SECTION – A

Question ID : 3475772114

26. A rod of length 5 L is bent right angle keeping one side length as 2 L .



The position of the centre of mass of the system:

(Consider L = 10 cm)

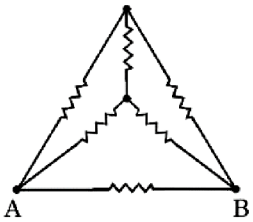
(1) $2\hat{i}+3\hat{j}$ (2) $4\hat{i}+9\hat{j}$ (3) $5\hat{i}+8\hat{j}$ (4) $3\hat{i}+7\hat{j}$

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772121

27. A wire of resistance R is bent into a triangular pyramid as shown in figure with each segment having same length. The resistance between points A and B is R / n. The value of n is :



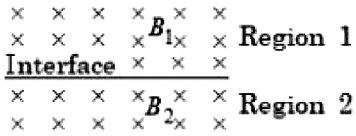
(1) 10 (2) 12 (3) 16 (4) 14

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772125

28. Uniform magnetic fields of different strengths (B_1 and B_2), both normal to the plane of the paper exist as shown in the figure. A charged particle of mass m and charge q, at the interface at an instant, moves into the region 2 with velocity v and returns to the interface. It continues to move into region 1 and finally reaches the interface. What is the displacement of the particle during this movement along the interface ?



(Consider the velocity of the particle to be normal to the magnetic field and $B_1 > B_2$)

(1) $\frac{mv}{qB_1}\left(1-\frac{B_2}{B_1}\right)$ (2) $\frac{mv}{qB_1}\left(1-\frac{B_1}{B_2}\right)$ (3) $\frac{mv}{qB_1}\left(1-\frac{B_2}{B_1}\right)\times 2$ (4) $\frac{mv}{qB_1}\left(1-\frac{B_1}{B_2}\right)\times 2$

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772124

29. The percentage increase in magnetic field (B) when space within a current carrying solenoid is filled with magnesium (magnetic susceptibility $\chi_{Mg} = 1.2\times10^{-5}$) is :

(1) $\frac{5}{3}\times10^{-5}\%$ (2) $\frac{5}{6}\times10^{-4}$ (3) $\frac{5}{6}\times10^{-5}$ (4) $\frac{6}{5}\times10^{-3}\%$

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772112

30. Two thin convex lenses of focal lengths 30 cm and 10 cm are placed coaxially, 10 cm apart. The power of this combination is:

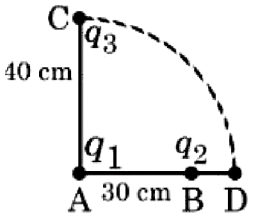
(1) 1 D (2) 10 D (3) 5 D (4) 20 D

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772123

31. Two charges q_1 and q_2 are separated by a distance of 30 cm . A third charge q_3 initially at ' C ' as shown in the figure, is moved along the circular path of radius 40 cm from C to D . If the"difference in potential energy due to movement of q_3 from C to D is given by $\frac{q_3 K}{4\pi\epsilon_0}$, the value of K is :



(1) $8q_2$ (2) $8q_1$ (3) $6q_2$ (4) $6q_2$

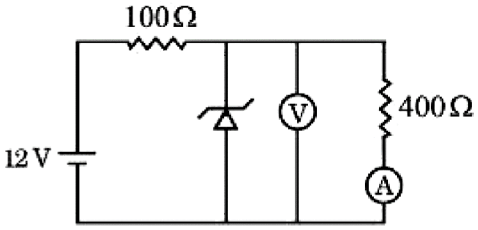
Ans. Official answer NTA (1)

Sol.

Question ID : 3475772130

32. In the following circuit, the reading of the ammeter will be

(Take Zener breakdown voltage= 4 V)



(1) 10 mA (2) 80 mA (3) 60 mA (4) 24 mA

Ans. Official answer NTA (1)

Sol.

Question ID : 3475772111

33. If $\in_0$ denotes the permittivity of free space and ϕ_E is the flux of the electric field through the area bounded by the closed surface, then dimensions of $\left(\in_0 \frac{d\phi_E}{dt}\right)$ are that of :

(1) electric charge (2) electric field (3) electric potential (4) electric current

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772117

34. Two wires A and B are made of same material having ratio of lengths $\frac{L_A}{L_B}=\frac{1}{3}$ and their diameters ratio $\frac{d_A}{d_B}=2$. If both the wires are stretched using same force, what would be the ratio of their respective elongations?

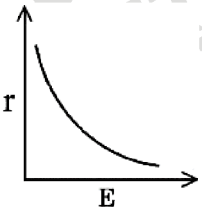
(1) 1 : 6 (2) 1 : 3 (3) 1 : 12 (4) 3 : 4

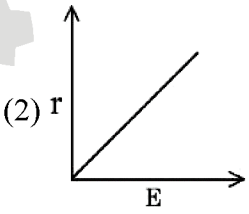
Ans. Official answer NTA (3)

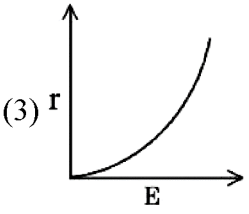
Sol.

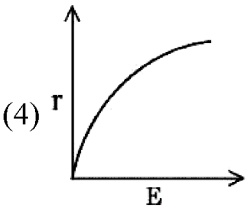
Question ID : 3475772122

35. A particle of charge q, mass m and kinetic energy E enters in magnetic field perpendicular to its velocity and undergoes a circular arc of radius (r). Which of the following curves represents the variation of r with E ?

(1) 

(2) 

(3) 

(4) 

Ans.

Ans. Official answer NTA (4)

Question ID : 3475772126

36. Two plane polarized light waves combine at a certain point whose electric field components are

$E_1 = E_o \sin \omega t$

$E_2 = E_o \sin\left(\omega t + \frac{\pi}{3}\right)$

Find the amplitude of the resultant wave.

(1) E_0 (2) $0.9\,E_0$ (3) $3.4\,E_0$ (4) $1.7\,E_0$

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772116

37. Two projectiles are fired from ground with same initial speeds from same point at angles $(45^\circ+\alpha)$ and $(45^\circ-\alpha)$ with horizontal direction. The ratio of their times of flights is

(1) $\frac{1-\tan\alpha}{1+\tan\alpha}$ (2) $\frac{1+\sin 2\alpha}{1-\sin 2\alpha}$ (3) 1 (4) $\frac{1+\tan\alpha}{1-\tan\alpha}$

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772128

38. For a hydrogen atom, the ratio of the largest wavelength of Lyman series to that of the Balmer series is

(1) 5 : 36 (2) 5 : 27 (3) 3 : 4 (4) 27 : 5

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772115

39. A cubic block of mass m is sliding down on an inclined plane at 60° with an acceleration of $\frac{g}{2}$, the value of coefficient of kinetic friction is

(1) $1-\frac{\sqrt{3}}{2}$ (2) $x\sqrt{3}-1$ (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{\sqrt{2}}{3}$

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772120

40. An ac current is represented as}

$$i = 5\sqrt{2} + 10\cos\left(650\pi t + \frac{\pi}{6}\right) \text{Amp}$$

The r.m.s value of the current is

(1) 10 Amp (2) 100 Amp (3) $5\sqrt{2}$ Amp (4) 50 Amp

Ans. Official answer NTA (1)

Sol.

Question ID : 3475772119

41. Two harmonic waves moving in the same direction superimpose to form a wave $x = a\cos(1.5t)\cos(50.5t)$ where t is in seconds. Find the period with which they beat. (close to nearest integer)

(1) 6 s (2) 1 s (3) 4 s (4) 2 s

Ans. Official answer NTA (4)

Sol.

Question ID : 3475772129

42. In a hydrogen like ion, the energy difference between the 2nd excitation energy state and ground is 108.8 eV. The atomic number of the ion is:

(1) 2 (2) 3 (3) 1 (4) 4

Ans. Official answer NTA (1)

Ans. By Matrix (2)

Sol.

Question ID : 3475772118

43. Match the **LIST-I** with **LIST-II**

LIST -I	**LIST-II**
A. Triatomic rigid gas	I. $\frac{C_p}{C_v}=\frac{5}{3}$
B. Diatomic non-rigid gas	II. $\frac{C_p}{C_v}=\frac{7}{5}$
C. Monoatomic gas	III. $\frac{C_p}{C_v}=\frac{4}{3}$
D. Diatomic rigid gas	IV. $\frac{C_p}{C_v}=\frac{9}{7}$

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II (2) A-III, B-II, C-IV, D-I
(3) A-IV, B-II, C-III, D-I (4) A-II, B-IV, C-I, D-III

Ans. Official answer NTA (1)

Sol.

Question ID : 3475772127

44. A lens having refractive index 1.6 has focal length of 12 cm , when it is in air. Find the focal length of the lens when it is placed in water.

(Take refractive index of water as 1.28)

(1) 655 mm (2) 288 mm (3) 555 mm (4) 355 mm

Ans. Official answer NTA (2)

Sol.

Question ID : 3475772113

45. An object of mass 1000 g experiences a time dependent force $\vec{F}=\left(2t\hat{i}+3t^2\hat{j}\right)N$. The power generated by the force at time t is:

(1) $\left(3t^3+5t^5\right)W$ (2) $\left(2t^2+3t^3\right)W$ (3) $\left(2t^3+3t^5\right)W$ (4) $\left(2t^2+18t^3\right)W$

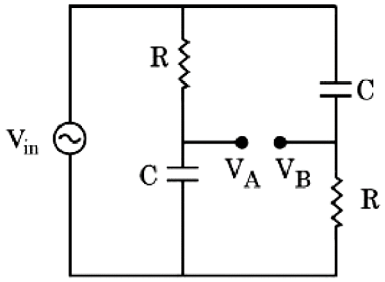
Ans. Official answer NTA (3)

Sol.

SECTION – B

Question ID : 3475772134

46. For ac circuit shown in figure, $R=100k\Omega$ and $C=100pF$ and the phase difference between V_{in} and $\left(V_B-V_A\right)$ is 90°. The input signal frequency is 10^x rad / sec , where ' x ' is _____.



Ans. Official answer NTA (5)

Sol.

Question ID : 3475772135

47. A container contains a liquid with refractive index of 1.2 up to a height of 60 cm and another liquid having refractive index 1.6 is added to height H above first liquid. If viewed from above, the apparent shift in the position of bottom of container is 40 cm . The value of H is _____ cm.

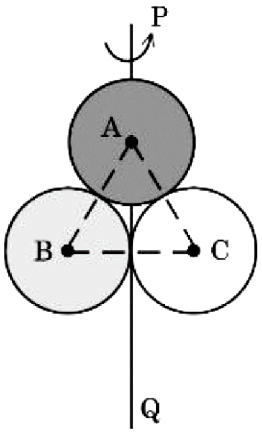
(Consider liquids are immisible)

Ans. Official answer NTA (80)

Sol.

Question ID : 3475772131

48. A, B and C are disc, solid sphere and spherical shell respectively with same radii and masses. These masses are placed as shown in figure.



The moment of inertia of the given system about PQ axis is $\frac{x}{15}I$, where I is the moment of inertia of the disc about its diameter. The value of x is _____ .

Ans. Official answer NTA (199)

Sol.

Question ID : 3475772132

49. A wire of length 10 cm and diameter 0.5 mm is used in a bulb. The temperature of the wire is 1727°C and power radiated by the wire is 94.2 W . Its emissivity is $\frac{x}{8}$ where x = _____ .

(Given $\sigma = 6.0\times10^{-8}\ \mathrm{W\,m^{-2}\,K^{-4}}, \pi = 3.14$ and assume that the emissivity of wire material is same at all wavelength.)

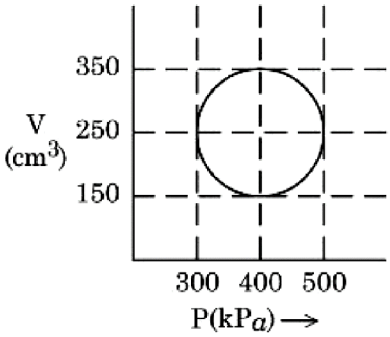
Ans. Official answer NTA (5)

Sol.

Question ID : 3475772133

50. An ideal gas has undergone through the cyclic process as shown in the figure. Work done by the gas in the entire cycle is _____ $\times 10^{-1}$ J.

(Take $\pi = 3.14$)



Ans. Official answer NTA (314)

Sol.