CAREER POINT

JEE Main Online Exam 2019

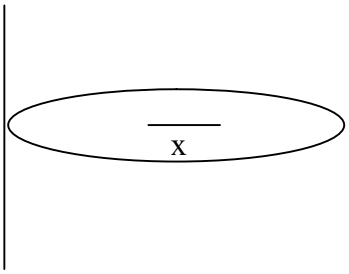
Questions & Solutions

8th April 2019 | Shift - I

(Memory Based)

PHYSICS

Q.1 The density of a circular disc is given as $\sigma = \rho_0 x$ where 'x' is the distance from the centre. Its moment of inertia about an axis perpendicular to its plane and passing through its edge is :



(1) $\frac{15}{16}\rho_0\pi R^5$ (2) $\frac{16}{15}\rho_0\pi R^5$ (3) $\frac{6}{5}\rho_0\pi R^5$ (4) $\frac{5}{6}\rho_0\pi R^5$

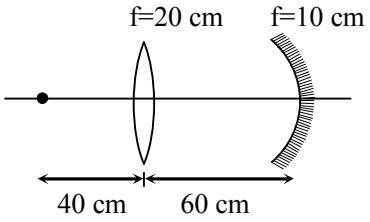
Ans. **[2]**

Q.2 10^{22} gas molecules each of mass 10^{-26} gm strikes on an area of $1m^2$. Velocity of each molecule is 10^4 m/s. If all the collision are elastic calculate pressure on that area -

(1) 2×10^{-3} N/m^2 (2) 3×10^{-3} N/m^2 (3) 2×10^{-4} N/m^2 (4) 3×10^{-4} N/m^2

Ans. **[1]**

Q.3 Convex lens of focal length 20 cm & a concave mirror of focal length 10 cm are separated by distance 60 cm. An object is placed at a distance of 40 cm from convex lens, as shown in figure. Find the position of final image ?

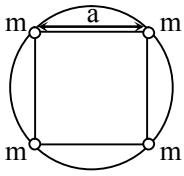


(1) at object itself (2) at 20 cm. from lens on object side

(3) at infinite distance from lens (4) at the optic centre of lens

Ans. **[1]**

Q.4 Four particles of same mass "m" are moving in a circle under their mutual attraction force. If all four mass are placed at the corners of a square of side a (m), then find the velocity of particles –



(1) $\sqrt{\frac{GM}{a}\left(1+\frac{1}{2\sqrt{2}}\right)}$ (2) $\sqrt{\frac{GM}{a}\left(\frac{1}{\sqrt{2}}+1\right)}$

(3) $\sqrt{\frac{GM}{a}\left(\sqrt{2}+\frac{1}{2}\right)}$ (4) $\sqrt{\frac{GM}{a}\left(2+\frac{1}{\sqrt{2}}\right)}$

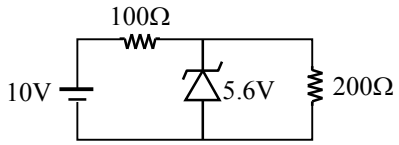
Ans. **[1]**

Q.5 Capacitor of capacitance 15μF of voltage rating 500 V. maximum electric field that can be beared by it is 2000 v/m find dielectric constant. (given that $A = 9\pi \times 10^2 m^2$)

(1) 500 (2) 150 (3) 300 (4) 250

Ans. **[2]**

Q.6 In the circuit shown in figure, find the potential difference across 200Ω resistance –



(1) 5.6 V (2) 6.6 V (3) 3.3 V (4) 5 V

Ans. **[1]**

Q.7 Two particles having debrogely wavelength moving perpendicular direction of wavelengths λ_1 & λ_2 collide inelastics, then find the debrogely wavelength of wavelength of new particles -

(1) $\frac{\lambda_1^2\lambda_2^2}{\lambda_1+\lambda_2}$ (2) $\frac{\lambda_1\lambda_2}{\lambda_1^2+\lambda_2^2}$ (3) $\frac{\lambda_1^2\lambda_2^2}{\sqrt{\lambda_1^2+\lambda_2^2}}$ (4) $\frac{\lambda_1\lambda_2}{\sqrt{\lambda_1^2+\lambda_2^2}}$

Ans. **[4]**

Q.8 Pendulum of mass 2 gm is placed in an electric field of 2000 Nm that is horizontal in direction charge of pendulum is 5 μc calculate angle made by string with horizontal -

(1) $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$ (2) $\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$ (3) $\tan^{-1}(2)$ (4) $\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$

Ans. **[3]**

Q.9 $V = V_0 \sin(100\pi t)$ R = Calculate the time in which current become $I_{max}/2$ to I_{max}

(1) $\frac{1}{200}$s (2) $\frac{1}{300}$s (3) $\frac{1}{400}$s (4) $\frac{1}{600}$s

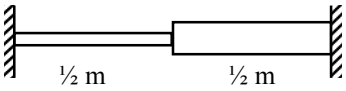
Ans. **[2]**

Q.10 When a wire of length ℓ and cross sectional area A is stretched by length $\Delta\ell$ by applying force F. Young's modulus of elasticity is -

(1) $\frac{F\ell}{A\Delta\ell}$ (2) $\frac{F\Delta\ell}{A\ell}$ (3) $\frac{FA}{A\Delta\ell}$ (4) $\frac{F^2\Delta\ell}{2A\ell}$

Ans. **[1]**

Q.11 Strings are of same material at joint there is a node ratio of radius is 1 : 2 then ratio of antinode in two string -



(1) $\frac{3}{2}$ (2) 2 (3) $\frac{1}{2}$ (4) $\frac{2}{3}$

Ans. **[3]**

Q.12 A coil of n turn is placed in x-z plane having current i, it is placed in magnetic field $B\hat{i}$. Find torque on coils -

(1) NIAB (2) zero (3) $\sqrt{2}$ NIAB (4) 2NIAR

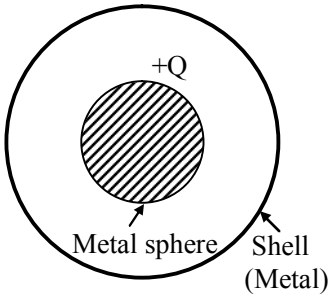
Ans. **[1]**

Q.13 Ratio of amplitude of two wave is 3/1. Find ratio of maximum and minimum intensity $\frac{I_{max}}{I_{min}} = ?$

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

Ans. **[2]**

Q.14 Charge Q is given to an isolated metal sphere, and there is hollow spherical with no charge on it as shown in figure. If outer shell is given a charge –4Q then potential difference between spheres changes from V to V′ then value of V′ :



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

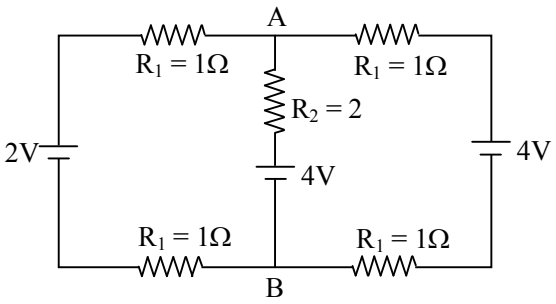
Ans. **[1]**

Q.15 Dimension of $\sqrt{\frac{\epsilon_0}{\mu_0}}$ are

(1) $[M^{-2}L^{-4}T^6A^4]$ (2) $[M^{-1}L^{-2}T^3A^2]$ (3) $[M^{-2}L^{-5}T^4A^{-2}]$ (4) $[M^{-1}L^4T^{-3}A^2]$

Ans. **[2]**

Q.16



Find $V_A - V_B = ?$

(1) 2.7 V (2) 3.7 V (3) 3.3 V (4) 2 V

Ans. **[3]**

Q.17 An electromagnetic wave travel in +x direction with $\vec{E} = 6V/m\,\hat{j}$. The direction of magnetic field with its magnitude -

(1) 2×10^{-8} T, +z direction (2) 2×10^{-8} T, –z direction

(3) 10^{-8} T, +z direction (4) 10^{-8} T, –z direction

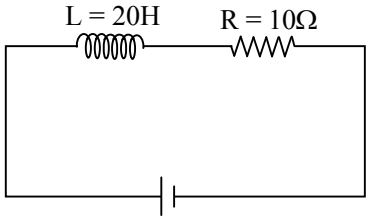
Ans. **[1]**

Q.18 A load of 4 kg is attached with an elastic rod of radius r = 2 cm. Find the stress in rod - ($g = 3\pi$)

(1) 3×10^4 (2) 2×10^4 (3) 5×10^4 (4) 6×10^4

Ans. **[1]**

Q.19 Find the time at which rate of heat dissipation in resistor is same as rate at magnetic energy stored in inductor-



(1) $\ell n\, 2$ (2) $2\ \ell n\, 2$ (3) $3\ \ell n\, 2$ (4) $4\ \ell n\, 2$

Ans. **[2]**

Q.20 The electric field of EM wave is 6 volt/m. The magnetic field associated with the wave if the wave is propagating in +x direction ane electric field along y-axix is :

(1) $10^{-8}\,T\,\hat{K}$ (2) $2 \times 10^{-8}\,T\,\hat{K}$ (3) $3 \times 10^{-8}\,T\,\hat{K}$ (4) $4 \times 10^{-8}\,T\,\hat{K}$

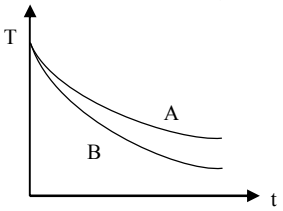
Ans. **[2]**

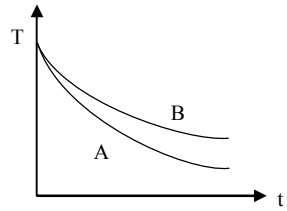
Q.21 An electron of H-atom de-excites from energy level $n_1 = 2$ to $n_2 = 1$ and the emitted photon is incident on He^- ions in ground state and first excited states. Which of the following transition is possible.

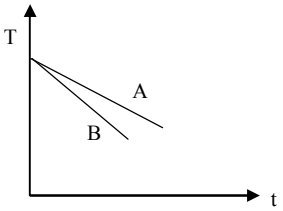
(1) n = 1 to n = 4 (2) n = 2 to n = 4 (3) n = 2 to n = 3 (4) n = 1 to n = 3

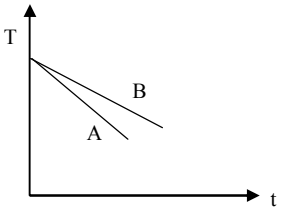
Ans. **[2]**

Q.22 Two identical containers of same emissivity containing liquids A & B at same temperature of 60ºC initially and densities ρ_A and ρ_B respectively, where $\rho_A < \rho_B$. Which plot best represents the temeperature variation of both with time? Given (S_A = 1000 J/kg-K, S_B = 2000 J/Kg-K)

(1)


(2)


(3)


(4)


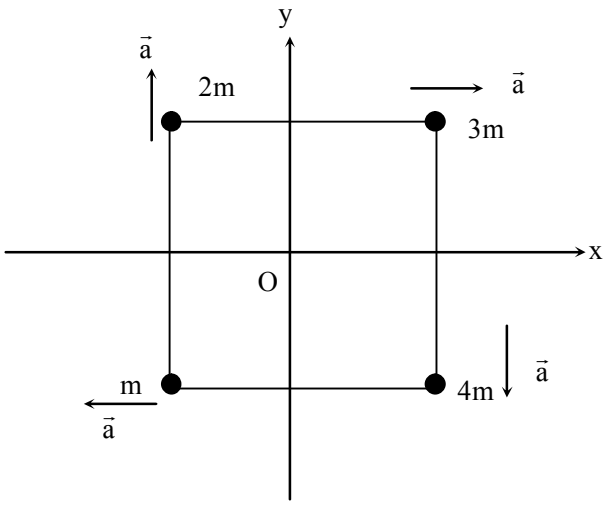
Ans. **[2]**

Q.23 The wavelength of carrier wave in optical cable fiber is :

(1) 900 nm (2) 2700 nm (3) 1500 nm (4) 2000 nm

Ans. **[3]**

Q.24 At the given instant the four particle having masses and acceleration as shown in the figure lie at vertices of a square. Acceleration of the center of mass of the system is :



(1) $\frac{1}{5}(\hat{i}-\hat{j})$ (2) $\frac{1}{5}(\hat{j}-\hat{i})$ (3) $\frac{1}{5}(\hat{i}+\hat{j})$ (4) $-\frac{1}{5}(\hat{i}-\hat{j})$

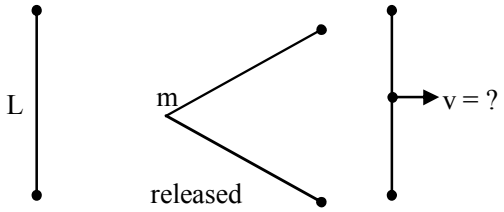
Ans. **[1]**

Q.25 A carbon resistance with color band is 200Ω. If red band is replaced by green band then the new resistance is :

(1) 500Ω (2) 300Ω (3) 400Ω (4) 100Ω

Ans. **[1]**

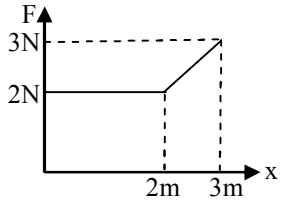
Q.26 An elastic string of length 42 cm and cross section area $10^{-2}m^2$ is attached between two pegs at distance 6 mm as shown in the figure. A particle of mass m is kept at midpoint of string stretched as shown in figure by 20 cm and released. As the string attains natural lengths, the particle attains a speed of 20 m/s. Then young modulus Y of string is of order



(1) 10^8 (2) 10^{12} (3) 10^6 (4) 10^4

Ans. **[3]**

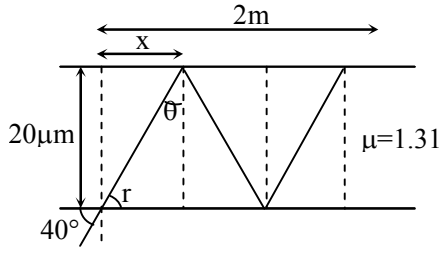
Q.27 Force displacement graph of a particle stating from rest is given in the figure shown, The kinetic energy of particle at x= 3m is



(1) 6.5 J (2) 7.5 J (3) 6 J (4) 5 J

Ans. **[1]**

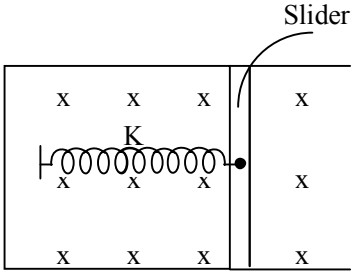
Q.28 Find out no. of reflection after which right Ray will exit from (Given sin 40° = 0.64)



(1) 130000 (2) 57803 (3) 140000 (4) 150000

Ans. **[2]**

Q.29 A conducting slider of resistance R(10Ω), mass 50 g & length 10 cm is kept on a U-shaped frame as shown in figure. There is uniform magnetic field (B = 0.1T) perpendicular to plane of frame. The slider is attached to a spring (K = 0.5 N/m). It is displaced by A_0 & released time is which amplitude become A_0/e is –



(1) 9000 s (2) 10000 s (3) 12000 s (4) 15000 s

Ans. **[2]**

Q.30 A liquid of coefficient of viscosity η = 1 poise is following in a pipe of radius 3 cm such that the rate volume flow is 1000 min. Determine the Reynolds number -

(1) 3536 (2) 3500 (3) 3400 (4) 3600

Ans. **[1]**