



JEE Main Online Exam 2019

[Memory Based Paper]

Questions & Answer

10th January 2019 | Shift - I

PHYSICS

Q.1 Two dipoles $\vec{p}_1 = -2qa\hat{i}$ and $\vec{p}_2 = 4qa\hat{i}$ are placed at distance R along X-axis, at what distance from dipole p_1 electric potential due to both the dipoles will be same on x-axis.

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

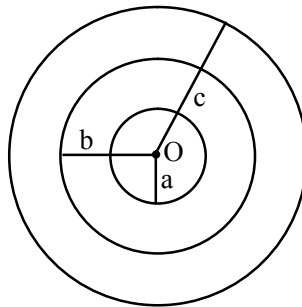
(2) $\frac{R}{\sqrt{2}-1}$

(3) $\frac{R\sqrt{2}}{\sqrt{2}+1}$

(4) $\frac{R}{\sqrt{2}+1}$

Ans. [4]

Q.2 Some charge Q is to be distributed on 3 concentric shell such that surface charge density on each shell is same as shown. Find the electric potential at distance r ($< a$) from point O .



(1) $\frac{Q(a+b-c)}{4\pi\epsilon_0(a^2+b^2+c^2)}$

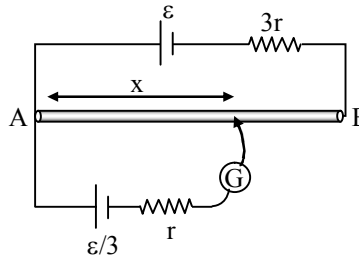
(2) $\frac{Q(a+b+c)}{4\pi\epsilon_0(a^2+b^2+c^2)}$

(3) $\frac{Q(a+b+c)}{4\pi\epsilon_0(a^2-b^2+c^2)}$

(4) $\frac{Q(a+b-c)}{4\pi\epsilon_0(a^2+b^2-c^2)}$

Ans. [2]

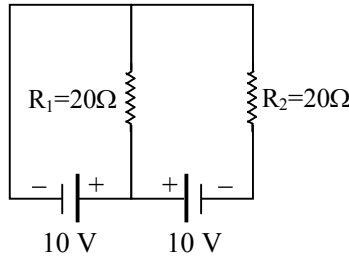
Q.3 Find the position of Jockey from point A so that there is no deflection in Galvanometer. Length of wire AB is L and its resistance is 12 r.



- | | |
|------------------------------------|------------------------------------|
| (1) $\frac{5L}{12}$ from point 'A' | (2) $\frac{5L}{6}$ from point 'A' |
| (3) $\frac{5L}{12}$ from point 'B' | (4) $\frac{7L}{12}$ from point 'A' |

Ans. [1]

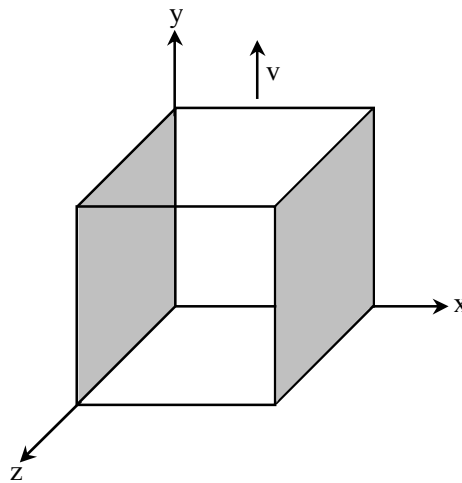
Q.4 Find electric current flowing through R_1 and R_2 .



- | | | | |
|------------------|----------------|-----------------|---------------|
| (1) 0.5 A, 0.5 A | (2) 0.5 A, 0 A | (3) 0.05 A, 0 A | (4) 0 A, 0.5A |
|------------------|----------------|-----------------|---------------|

Ans. [2]

Q.5 A cube of side 2cm is moving along y-direction, with speed 6 m/s in the presence of uniform magnetic field of 0.1 T along z-direction. Find electric potential difference between the two planes perpendicular to x-axis.



- | | | | |
|----------|----------|-----------|-----------|
| (1) 4 mV | (2) 8 mV | (3) 12 mV | (4) 16 mV |
|----------|----------|-----------|-----------|

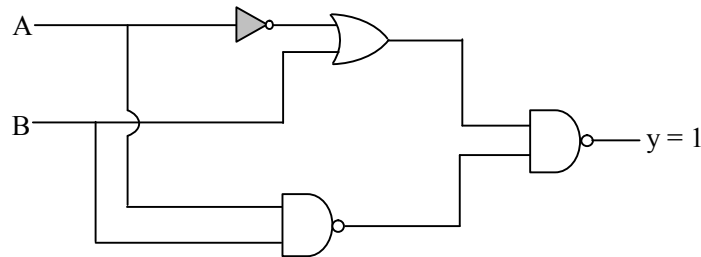
Ans. [3]

Q.6 A magnetic dipole of dipole moment $1 \text{ A}\cdot\text{m}^2$ is placed along the direction of magnetic field $B = B_0 \cos \omega t$, where $\omega = 0.125 \text{ rad/s}$, if at $t = 1 \text{ sec}$ the dipole is reversed, then find the total work done.

- (1) $-MB$ (2) $2MB$ (3) $+MB$ (4) $-2MB$

Ans. [2]

Q.7 Select the value of A and B for output $y = 1$



- (1) $A = 1, B = 1$ (2) $A = 1, B = 0$ (3) $A = 0, B = 0$ (4) $A = 0, B = 1$

Ans. [2]

Q.8 A satellite is moving with a constant speed ' V ' in a circular orbit about the earth. An object of mass ' m ' is ejected from the satellite such that it just escapes from the gravitational pull of the earth. At the time of its ejection, the kinetic energy of the object is -

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

Ans. [2]

Q.9 A ball of mass 0.3 kg is released from a tower of height 100 m , simultaneously a bullet of mass 0.2 kg fired vertically upward from point just below it with speed 100 m/s find height attained above the tower by combined mass system after collision

- (1) 35 (2) 40 (3) 45 (4) 140

Ans. [2]

Q.10 A source approaching a stationary observer to times, at one time with speed 17 m/s and at second time with speed 34 m/s find ratio of observed frequencies by observer in these two cases.

- (1) $\frac{357}{374}$ (2) $\frac{306}{323}$ (3) $\frac{323}{306}$ (4) $\frac{374}{357}$

Ans. [2]

Q.11 Two sprayers spread water with projecting speeds 1 km/hr and 2 km/hr then find ratio of maximum area covered by water sprayers

- (1) $1 : 16$ (2) $1 : 8$ (3) $1 : 4$ (4) $1 : 32$

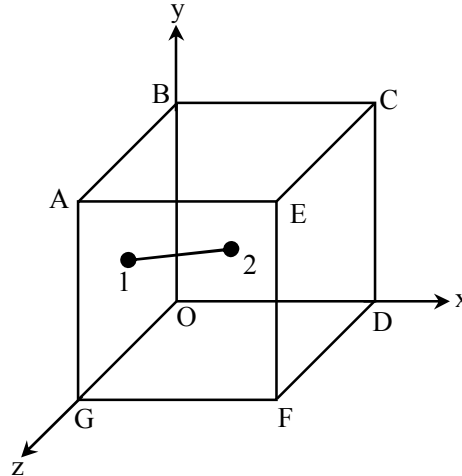
Ans. [1]

Q.12 A new system is made in which unit of length is 50 cm and unit of mass is 2 kg, then 128 kg/m^3 unit of density of SI system each equal to unit in new system

- (1) 4 (2) 8 (3) 12 (4) 16

Ans. [2]

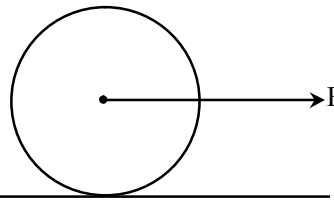
Q.13 Find unit vector from point 1 to point 2, where point 1 is centre of z-y plane & point 2 is centre of x-y plane (BCDO)



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

Ans. [1]

Q.14 A solid cylinder of radius R and mass m rolls on a rough surface and a constant force applied at its centre then find the angular acceleration



- (1) $\frac{3F}{mR}$ (2) $\frac{2F}{mR}$ (3) $\frac{2}{3} \frac{F}{mR}$ (4) $\frac{3F}{5mR}$

Ans. [3]

Q.15 A plano convex lens made up of material of refractive index μ_1 having radius of curvature R, is of focal length f_1 another planocconcave lens is made up of material μ_2 having same radius of curvature R is of focal length f_2 . If $f_2 = 2f_1$, then correct relation b/w μ_1 & μ_2 is -

- (1) $2\mu_2 + \mu_1 = 3$ (2) $2\mu_2 - \mu_1 = 3$ (3) $2\mu_1 + \mu_2 = 1$ (4) $2\mu_2 + \mu_1 = 1$

Ans. [1]

Q.16 If magnetic field is given by $B = B_0 \cos \omega t$, then find maximum value of electric field.

- (1) B_0/C (2) CB_0 (3) $\frac{B_0}{C^2}$ (4) C^2B_0

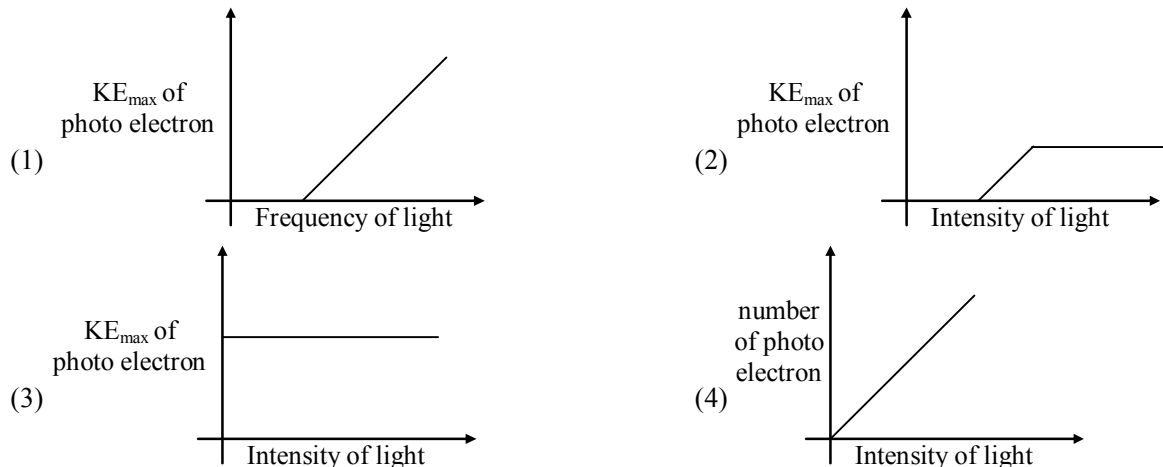
Ans. [2]

Q.17 Initial activity of fresh sample of radioactive Nuclei is 1600 DPS. After $t = 8$ sec activity of sample become 100 dPS. Find the Activity of sample at $t = 6$ sec.

- (1) 200 dPS (2) 300 dPS (3) 400 dPS (4) 600 dPS

Ans. [1]

Q.18 In a photo electric effect experiment select the incorrect graph



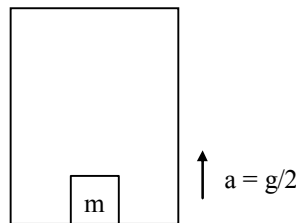
Ans. [2]

Q.19 A light circular mop of radius 'R' is used for mopping by applying uniformly distributed force 'F' on its top surface. If friction coefficient between mop and floor is ' μ ' and it is moving with constant angular speed ' ω ' then find the torque produced by the mopping machine.

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

Ans. [3]

Q.20 A lift starts upwards from rest with aceleration $g/2$ find work done by normal force act on block of mass m placed inside the lift in the 't'.



- (1) $\frac{1}{8}mg^2t^2$ (2) $\frac{mg^2t^2}{4}$ (3) $\frac{3}{8}mg^2t^2$ (4) $\frac{5}{8}mg^2t^2$

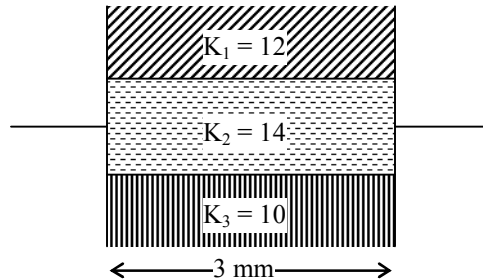
Ans. [3]

Q.21 A string fixed at two ends vibrates such that its frequency is 100 Hz, length 1 m, tension 8 N and its mass is 5g find distance between two consecutive nodes?

- (1) 40 cm (2) 20 cm (3) 25 cm (4) 10 cm

Ans. [2]

Q.22 Three di-electric slabs of equal cross-sectional area having dielectric constants $K_1 = 12$, $K_2 = 14$ & $K_3 = 10$ are completely filled between plates of capacitor completely as shown. Find equivalent di-electric constant.



- (1) 12 (2) 15 (3) 14 (4) 10

Ans. [1]

Q.23 A conducting rod with thermal conductivity $K = 0.01 \text{ W/m}^2\text{-K}$ and of length 1m is kept at temperatures 1000 K & 100 K across it's ends. Calculate heat flux passing through the rod.

- (1) 100 W/m^2 (2) 90 W/m^2 (3) 10 W/m^2 (4) 9 W/m^2

Ans. [2]

Q.24 A small hole of coss-section area 1 cm^2 is made at the bottom of a cylindrical vessel is given. Water is added in cylinder at the rate of $10^{-4} \text{ m}^3/\text{s}$. Find equilibrium height in the cylinder

- (1) 10 cm (2) 20 cm (3) 5 cm (4) None

Ans. [3]

Q.25 In YDSE, maximum for two wavelengths λ_1 & λ_2 belonging to visible region (380 nm – 740 nm), is formed

at angular position $\left(\frac{1}{40}\right)$ radian on the screen. If the slit separation is $d = 10^{-4} \text{ m}$, then find λ_1 & λ_2 .

- (1) 500 nm, 625 nm (2) 400 nm, 600 nm (3) 400 nm, 625 nm (4) 500 nm, 400 nm

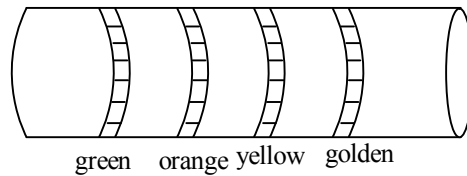
Ans. [1]

Q.26 A wire of 18Ω resistance is in the shape of equilateral triangle. Find equivalent resistance between any two vertices of the triangle?

- (1) 4Ω (2) 8Ω (3) 12Ω (4) 6Ω

Ans. [1]

Q.27 A carbon resistor is given whose maximum power rating is 2 watt. Determine the maximum current that can flow through it



(1) $0.548 \times 10^{-2} \pm 2.5\%$

(2) $0.274 \times 10^{-2} \pm 2.5\%$

(3) $0.137 \times 10^{-2} \pm 2.5\%$

(4) None

Ans. [2]

Q.28 If a rod of length L is rotating with $2n$ rotations per second and one end is hinged at origin. Find the magnetic moment of rod if linear charge density varies as $\rho(x) = \frac{\rho_0 x}{L}$ c/m.

(1) $\frac{\pi n \rho_0 L^2}{3}$

(2) $\frac{\pi n \rho_0 L^2}{2}$

(3) $\frac{\pi n \rho_0 L^2}{4}$

(4) $\frac{\pi n \rho_0 L^2}{5}$

Ans. [2]

Q.29 Resolving power of electron microscope depends on wavelength λ . Minimum distance between two object for just resolution is 10^{-9} metre. Determine the order of minimum kinetic energy of electron.

(1) 2 eV

(2) 0.5 eV

(3) 4 eV

(4) 12 eV

Ans. [2]

Q.30 A transmitting antenna at the top of a tower has a height 32 m and the height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in line of sight (LOS mode)?

(1) 55.4 km

(2) 45.5 km

(3) 54.5 km

(4) 455 km

Ans. [2]