

JEE Main Online Exam 2019

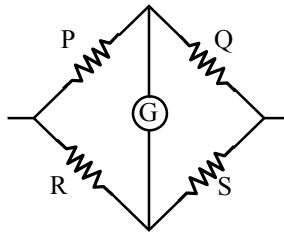
[Memory Based Paper]

Questions & Answer

11th January 2019 | Shift - I

PHYSICS

- Q.1** In the given circuit Galvanometer shows null deflection when $R = 400 \Omega$. If Q and P are interchanged, G has null deflection at $R = 405 \Omega$. The value of S =

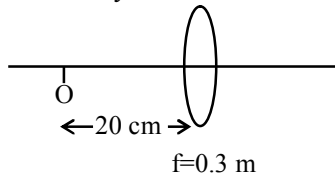


- Ans.** (1) 100Ω (2) 300Ω (3) 402.5Ω (4) 450Ω
[3]

- Q.2** Two equal resistance consume power 60 W when connected in series. The value of power when both are connected in parallel

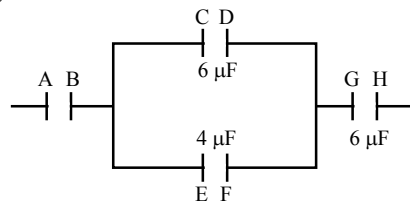
- Ans.** (1) 60 W (2) 120 W (3) 180 W (4) 240 W
[4]

- Q.3** Focal length of convex lens is 0.3 m. An object is at distance of 20 cm from lens at principle axis. When object is moving away from lens with velocity of 5 m/ then velocity of image will be



- Ans.** (1) 45 m/s away from lens (2) 25 m/s towards to lens
(3) 45 m/s towards to lens (4) 35 m/s away from lens
[3]

- Q.4** If charge at A is $-30 \mu\text{C}$, charge at D will be :



- Ans.** (1) $6 \mu\text{C}$ (2) $12 \mu\text{C}$ (3) $18 \mu\text{C}$ (4) $24 \mu\text{C}$
[3]

Q.5 A particle is projected with speed of 10 m/s at an angle 60° to vertical. The radius of curvature of particle at $t = 1$ sec will be

- (1) $\frac{10}{\sqrt{3}}$ (2) $10\sqrt{3}$ m (3) $\frac{20}{\sqrt{3}}$ (4) 20 m

Ans. [3]

Q.6 An electron is moving with speed 500 m/s in an uniform magnetic field $B = 100$ mT. Calculate radius of path of electron?

- (1) 14.22 nm (2) 28.44 nm (3) 14.22 Å (4) 28.44 Å

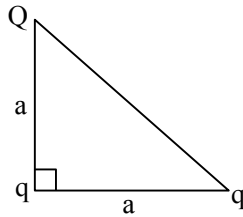
Ans. [2]

Q.7 Relation between temperature and volume of a diatomic gas in adiabatic process is $TV^x = \text{constant}$. Find value of x

- (1) $\frac{2}{5}$ (2) $\frac{7}{5}$ (3) $\frac{3}{5}$ (4) $\frac{2}{3}$

Ans. [1]

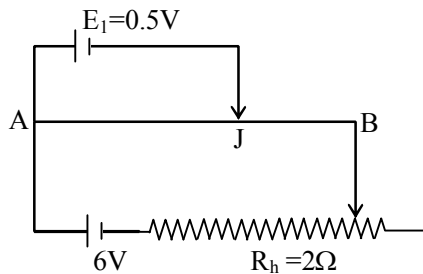
Q.8 For the system as shown, if potential energy of charge system is zero. The value of Q will be-



- (1) $-q \left(\frac{\sqrt{2}}{1+\sqrt{2}} \right)$ (2) $-q \frac{\sqrt{2}}{1-\sqrt{2}}$ (3) $-q \frac{2\sqrt{2}}{1+\sqrt{2}}$ (4) $-q \frac{2\sqrt{2}}{1-\sqrt{2}}$

Ans. [1]

Q.9 In the given circuit. Balance length $AJ = \ell$. If E_1 is replaced by E_2 and $R_h = 6 \Omega$. Find E_2 so that balance length remain same $R_{AB} = 4\Omega$



- (1) 0.3 V (2) 0.2 V (3) 0.8 V (4) 1 V

Ans. [1]

Q.10 A particle is moving in a circular path with speed 10 m/s. Change in velocity when it turns by angle 60° .

- (1) 5 m/s (2) 10 m/s (3) 0 m/s (4) 20 m/s

Ans. [1]

Q.11 The equation of plane progressive wave is given by $y = 0.03 \sin[450t - 9x]$. If mass per unit length of wire is 5 gm/m then find tension in wire-

- (1) 25 N (2) 12.5 N (3) 6.25 N (4) 45 N

Ans. [2]

Q.12 50 gm water at 40°C is mixed with m gm of ice at -20°C, 20 gm ice remain unmelted. Find m ?

- (1) 20 gm (2) 40 gm (3) 60 gm (4) 80 gm

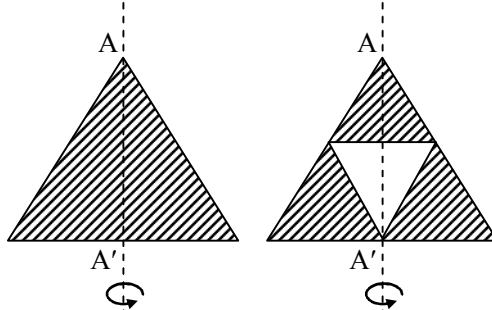
Ans. [2]

Q.13 3 mole of O₂ is mixed with 5 mole of He gas at common temperature 'T' Kelvin. Find the total energy of sample. (Vibrational component of energy is to be neglected).

- (1) $\frac{15}{2}RT$ (2) 8 RT (3) 15 RT (4) 10 RT

Ans. [3]

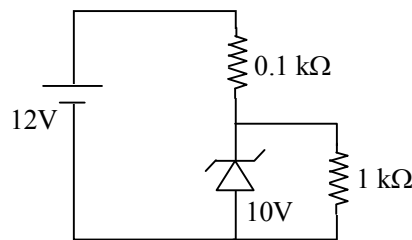
Q.14 The moment of inertia of equilateral plane sheet about axis AA' is I. If middle portion of this sheet which is also a equilateral plane sheet ; as shown in diagram is removed. Find the new moment of inertia of sheet about the same axis.



- (1) $\frac{I}{2}$ (2) $\frac{15I}{16}$ (3) $\frac{13I}{16}$ (4) $\frac{15I}{8}$

Ans. [2]

Q.15 Find current flowing through Zener diode.



- (1) 10 mA (2) 20 mA (3) 5 mA (4) 1 mA

Ans. [1]

Q.16 Equation of SHM of a particle is given by $X = A \sin\left(\frac{\pi t}{90}\right)$. Ratio of kinetic energy to potential energy of particle at $t = 210$ sec.

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

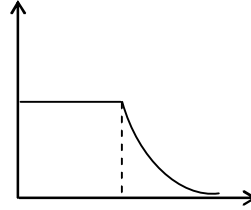
Ans. [2]

Q.17 A satellite is rotating near to the surface of earth. By what amount the speed should be increased so that it can escape from gravitational field of earth.

- (1) $(\sqrt{2} + 1)\sqrt{gR_e}$ (2) $(\sqrt{2} - 1)\sqrt{gR_e}$ (3) $\sqrt{gR_e}$ (4) $\sqrt{2gR_e}$

Ans. [2]

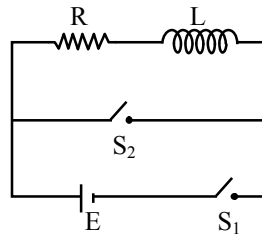
Q.18 Find correct option related to given graph.



- (1) Spherical shell V vs r
 (2) Spherical shell E vs r
 (3) Solid sphere V vs r
 (4) Solid sphere E vs r

Ans. [2]

Q.19 At $t = 0$, switch S_1 is closed. After some time ' S_1 ' is opened and ' S_2 ' is closed. Which of following graph represents the variation of current through inductor with time?



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

Ans. [2]

Q.20 If $F = \alpha\beta e^{-\frac{x^2}{\alpha TK}}$, find dimension of β . Here K = Boltzmann constant, F = force, X = distance, T = temperature

- (1) $M^2L^1T^{-3}$ (2) $M^2L^2T^{-4}$ (3) $M^1L^1T^{-4}$ (4) $M^2L^1T^{-4}$

Ans. [4]

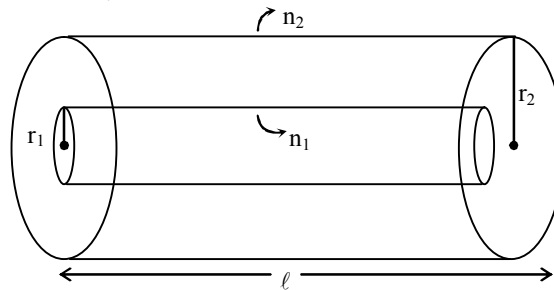
- Q.21** An electromagnetic wave is incident on a medium of refractive index n . Then find the ratio $\frac{E_i}{E_f} : \frac{B_i}{B_f}$.
- (1) $\sqrt{n} : \sqrt{n}$ (2) $\frac{1}{\sqrt{n}} : \frac{1}{\sqrt{n}}$ (3) $\sqrt{n} : \frac{1}{\sqrt{n}}$ (4) $\frac{1}{\sqrt{n}} : \sqrt{n}$

Ans. [3]

- Q.22** In YDSE setup, the path difference at a point on screen is $\frac{\lambda}{8}$. Find the ratio of intensity at that point to the maximum intensity obtained on the screen.
- (1) 0.74 (2) 0.85 (3) 0.50 (4) 0.25

Ans. [2]

- Q.23** Two solenoids (as shown in figure) with radii r_1 and r_2 are given. Calculate ratio of self inductance of inner solenoid to mutual inductance of system.



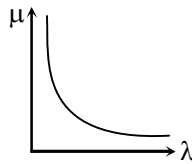
- (1) $\frac{n_1 r_1^2}{n_2 r_2^2}$ (2) $\frac{n_1 r_1}{n_2 r_2}$ (3) $\frac{n_1^2 r_1}{n_2^2 r_2}$ (4) $\frac{n_1}{n_2}$

Ans. [4]

- Q.24** The de-Broglie wavelength of an electron is 10^{-3} times wavelength of photon whose frequency is 6×10^{14} Hz. Find the speed of electron.
- (1) 2×10^6 m/s (2) 1.45×10^6 m/s (3) 5×10^2 m/s (4) 10^{10} m/s

Ans. [2]

- Q.25** Refractive index versus wavelength graph for a prism is shown in figure –



The graph of angle of deviation δ v/s λ for thin prism is best represented by –

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

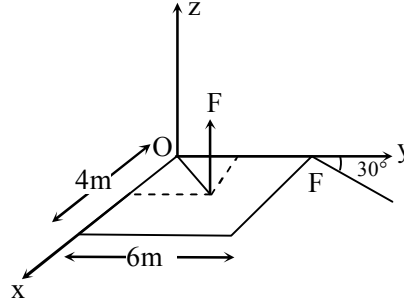
Ans. [1]

Q.26 Water is falling with velocity V on a mesh. 50% of water get pass through mesh and 25 % of water loose its momentum and 25 % of water bounce back. Find the pressure exerted by falling water on mesh. Density of water is ρ -

- (1) $\frac{\rho v^2}{4}$ (2) $\frac{\rho v^2}{8}$ (3) $\frac{3\rho v^2}{4}$ (4) $3\frac{\rho v^2}{8}$

Ans. [3]

Q.27 Two forces on a plane is applied as shown in figure calculate moment of these forces about point O –



- (1) $(2\hat{i} + 3\hat{j} - 3\hat{k})F$ (2) $(2\hat{i} - 3\hat{j} - 3\hat{k})F$ (3) $(2\hat{i} - 3\hat{j} + 3\hat{k})F$ (4) None

Ans. [3]