



## JEE Main Online Exam 2019

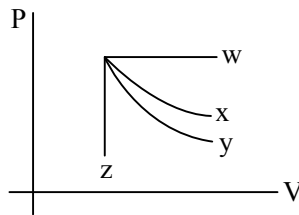
### Questions & Solutions

8th April 2019 | Shift - II

(Memory Based)

#### PHYSICS

**Q.1** Which of the following is correct order of isobaric, isochoric, isothermal and adiabatic process -



(1) w z x y

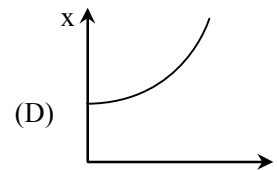
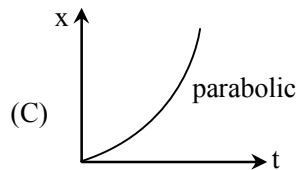
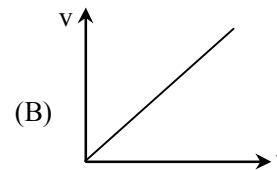
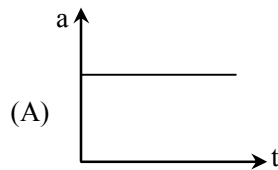
(2) z w x y

(3) x y w z

(4) w x y z

**Ans.** [1]

**Q.2** A particle is moving with constant acceleration starting from origin. Following graph are given for the motion of particle. Which of the following combination of graph are correct for the motion -



(1) A, B, C

(2) A, C, D

(3) A, B, D

(4) B, C, D

**Ans.** [1]

**Q.3** Which of the following is correct dimensional formula of linear momentum

if  $I \rightarrow$  moment of inertia

$h \rightarrow$  plank constant

$s \rightarrow$  surface tension

(1)  $\rho \propto \sqrt{\frac{I}{\delta}}$

(2)  $\rho \propto \sqrt{\frac{h}{I\delta}}$

(3)  $\rho \propto \sqrt{I\delta}$

(4)  $\rho \propto \sqrt{\frac{h}{\delta}}$

**Ans.** [3]

**Q.4**  $\epsilon = \epsilon_0 \cos(100t)$ , phase different between current and AC voltage source is  $\phi = \pi/4$  which of the following combination is true for that -

(1)  $R = 1k\Omega$ ,  $L = 1\mu H$

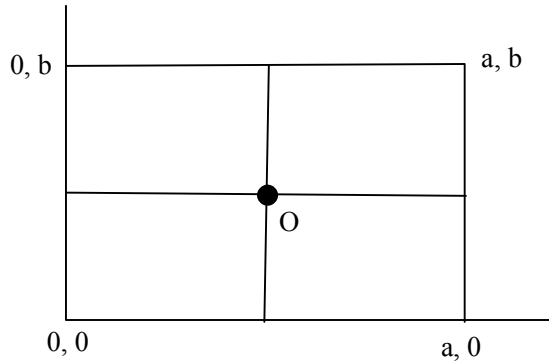
(2)  $R = 1 k\Omega$ ,  $C = 10\mu f$

(3)  $R = 10 k\Omega$ ,  $L = 1\mu H$

(4)  $R = 10 k\Omega$ ,  $C = 10\mu f$

**Ans.** [2]

**Q.5** A rectangular lamina is given as shown fig. find new coordinates of centre of mass after  $1/4^{\text{th}}$  part is removed



(1)  $\left(\frac{5a}{12}, \frac{5b}{12}\right)$

(2)  $\left(\frac{5a}{3}, 3b\right)$

(3)  $\left(\frac{7a}{12}, \frac{9b}{12}\right)$

(4)  $\left(\frac{5a}{9}, \frac{5b}{9}\right)$

**Ans.** [1]

**Q.6** A Sphere and a cylinder are given same initial velocity both does perfect rolling motion. Calculate the ratio of maximum height reached by sphere to cylinder

(1)  $\frac{15}{14}$

(2)  $\frac{14}{15}$

(3)  $\frac{7}{5}$

(4)  $\frac{7}{2}$

**Ans.** [2]

**Q.7** Electro field is given by  $E = Ax + B$  where  $A = 20$ ,  $B = 10$ , Potential at  $x = 1$  is  $V_1$  and potential at  $x = -5$  is  $V_2$  calculate  $V_1 - V_2$

(1) 320 V

(2) 180 V

(3) 280 V

(4) 350 V

**Ans.** [2]

**Q.8** A Transmitting antenna at the top of a tower has height 70 m and the height of the receiving antenna is  $h_R$ . the maximum distance between them for satisfactory communication in LOS mode is 50 km ( $R_E = 6.4 \times 10^6$  m)

(1) 40 m

(2) 32 m

(3) 25m

(4) 60m

**Ans.** [2]

**Q.9** Mass of earth is 64 times then moon there density are same if a particle required E energy to escape from earth the find centre required to escape from moon

- (1)  $\frac{E}{32}$                       (2)  $\frac{E}{16}$                       (3)  $\frac{E}{4}$                       (4) E

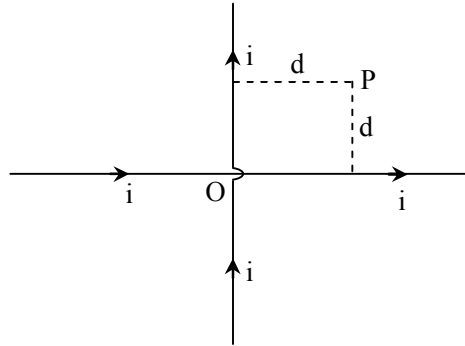
**Ans.** [2]

**Q.10** Find escape temperature have done for hydrogen, so that it escape from atmosphere -

- (1)  $10^4$  m/s                      (2)  $10^6$  m/s                      (3)  $10^8$  m/s                      (4) 100 m/s

**Ans.** [1]

**Q.11** Two infinite current carrying curve having current 'i' are perpendicular to each other as shown. The magnetic field at point P (d, d) is -



- (1) 0                      (2)  $\frac{\mu_0 i}{d} \hat{k}$                       (3)  $\frac{2\mu_0 i}{d} \hat{k}$                       (4)  $\frac{\mu_0 i}{2d} (\hat{i} + \hat{k})$

**Ans.** [1]

**Q.12** A dipole of charge q and distance d is placed in uniform electro field E. If initially dipole is in stable equilibrium, and rotated by small angle, calculate angular frequency – [m = mass of each particle]

- (1)  $\sqrt{\frac{2qE}{md^2}}$                       (2)  $\sqrt{\frac{2qE}{md}}$                       (3)  $\sqrt{\frac{4qE}{d}}$                       (4)  $\sqrt{\frac{4qE^2}{md}}$

**Ans.** [2]

**Q.13** The temperature of H<sub>2</sub> gas at which rms speed of H<sub>2</sub> molecule is equal to escape speed of a particle from earth surface is -

- (1)  $10^3$  K                      (2)  $2 \times 10^3$  K                      (3)  $10^4$  K                      (4)  $10^5$  K

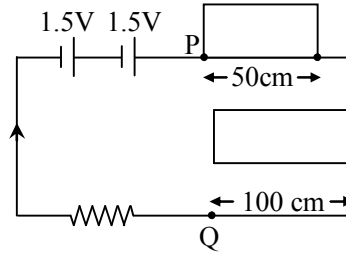
**Ans.** [3]

**Q.14** A convex lens and concave mirror are separated by distance 80 cm, focal length of convex lens is 20 cm. An object is placed at a distance 30 cm from lens such that final image location is independent to mirror. What can be the maximum distance between object and mirror to form virtual image when only mirror is present -

- (1) 10 cm                      (2) 20 cm                      (3) 30 cm                      (4) 40 cm

**Ans.** [1]

**Q.15** The potential gradient on wire PQ is  $10^{-5}$  V then the reading of voltmeter is -



- (1) 3 mV                      (2) 5 mV                      (3) 7 mV                      (4) 9 mV

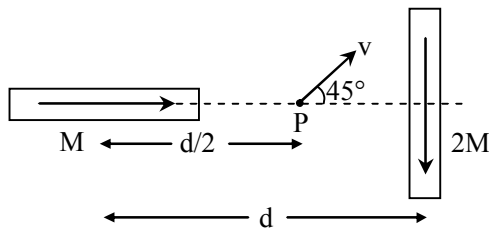
**Ans.** [2]

**Q.16** The ratio of density of nuclei  $O^{16}$  and  $Ca^{40}$  is -

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

**Ans.** [4]

**Q.17** Two bar magnets are placed as shown. A point charge  $Q$  is projected with velocity  $v$  as shown. The force experienced by the particle -



- (1) 0                      (2)  $4\sqrt{2} \mu_0 \frac{mQV}{\pi d^3}$                       (3)  $\sqrt{2} \mu_0 \frac{mQV}{\pi d^3}$                       (4)  $2\sqrt{2} \mu_0 \frac{mQV}{\pi d^3}$

**Ans.** [1]

**Q.18** A battery is of emf  $E$  and internal resistance  $r$ . The value of external resistance  $R$  so that power across external resistance is maximum -

- (1)  $R$                       (2)  $2R$                       (3)  $R/2$                       (4)  $R/4$

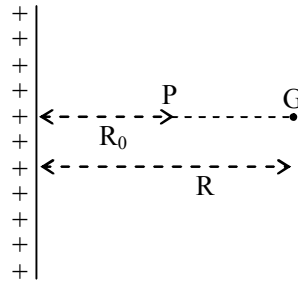
**Ans.** [1]

**Q.19** A simple pendulum undergoes 20 oscillations in 30 sec. What is the percentage error in the value of acceleration due to gravity provided length of pendulum is 55 cm. Least count for measurement of time and length are 1s and 1mm

- (1) 4%                      (2) 7%                      (3) 9%                      (4) 11%

**Ans.** [2]

**Q.20** A charge particle  $q$  is released at distance  $R_0$  from the infinite long wire of linear charge density  $\lambda$ . Then velocity will be proportional to- [At. distance  $R$  from the wire]



- (1)  $R^3$                       (2)  $e^{R/R_0}$                       (3)  $R^2$                       (4)  $\left[ \ln\left(\frac{R}{R_0}\right) \right]^{1/2}$

**Ans.** [4]

**Q.21** A particle under damped oscillation with frequency 5 Hz. After every 10 oscillation its amplitude becomes half. Find the time from beginning after which the amplitude becomes  $\frac{1}{1000}$  of its initial amplitude -

- (1) 40 sec                      (2) 20 sec                      (3) 50 sec                      (4) 100 sec

**Ans.** [2]

**Q.22** Two balls of mass  $m_1$  and  $m_2$  where  $m_2 = 0.5 m_1$ , undergo head on collision as shown in figure.



after the collision



If  $v_3 = 0.5v_1$ , find out  $v_4$  :

- (1)  $v_4 = v_1 + v_2$                       (2)  $v_4 = v_1 + 2v_2$                       (3)  $v_4 = 2v_1 + v_2$                       (4)  $v_4 = 2v_1 + 3v_2$

**Ans.** [1]

**Q.23** If  $\vec{A}_1$  and  $\vec{A}_2$  are two vectors such that  $|\vec{A}_1| = 3$  and  $|\vec{A}_2| = 5$  and  $|\vec{A}_1 + \vec{A}_2| = 5$ , the value of  $(2\vec{A}_1 + 3\vec{A}_2) \cdot (2\vec{A}_1 - 2\vec{A}_2)$  is-

- (1) 130                      (2) - 123                      (3) 250                      (4)  $\frac{300}{7}$

**Ans.** [2]

**Q.24** Two elastic wire A and B having length  $\ell_A = 2$  m and  $\ell_B = 1.5$  m have Young's modulus ratio  $\frac{Y_A}{Y_B} = \frac{7}{4}$ . If

$r_B = 2$  mm then the radius of A given that due to application of same force change in length in both is equal -

- (1) 1.7 mm                      (2) 1.9 mm                      (3) 2.7 mm                      (4) 2 mm

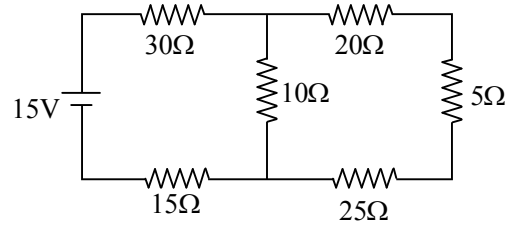
**Ans.** [1]

**Q.25** Light of wavelength  $\lambda$  is incident on metal surface, work function of metal is very less than the K.E. of photon. If wave length  $\lambda'$  is incident, the linear momentum of e becomes 1.5 times. Find out  $\lambda'$  -

- (1)  $\frac{5\lambda}{9}$                       (2)  $\frac{4\lambda}{3}$                       (3)  $\frac{3\lambda}{2}$                       (4)  $\frac{4\lambda}{9}$

**Ans.** [4]

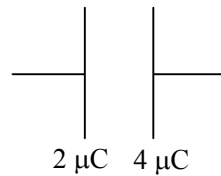
**Q.26** In the given circuit find out the total current drawn from the battery -



- (1)  $\frac{1}{8}$                       (2)  $\frac{7}{19}$                       (3)  $\frac{9}{32}$                       (4)  $\frac{4}{7}$

**Ans.** [3]

**Q.27** In the parallel plate capacitor of  $1 \mu\text{F}$  two plates are given charges  $2 \mu\text{C}$  and  $4 \mu\text{C}$ . The potential difference between the plates -



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

**Ans.** [2]