



## JEE Main Online Exam 2019

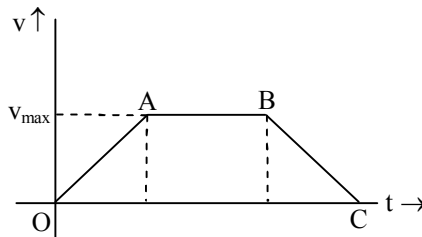
### [Memory Based Paper]

### Questions & Answer

10<sup>th</sup> January 2019 | Shift - II

#### PHYSICS

**Q.1** A particle starts from rest covers a distance of  $x$  with constant acceleration then move with constant velocity and cover distance  $2x$  then after come to rest with constant retardation with cover distance of  $3x$ , then ratio of  $v_{\max}/v_{\text{avg}}$  will be



(1) 3 : 5

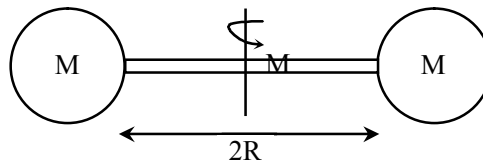
(2) 5 : 3

(3) 7 : 5

(4) 5 : 7

**Ans.** [2]

**Q.2** Find the moment of inertia about centre of mass of the system in which two solid sphere of radius  $R$  and mass  $M$  are connected as shown in figure.



(1)  $\frac{137MR^2}{15}$

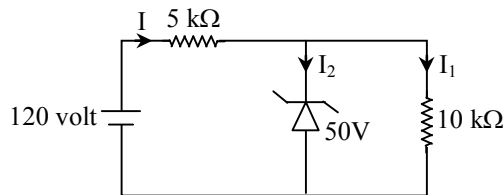
(2)  $\frac{132MR^2}{15}$

(3)  $\frac{135MR^2}{15}$

(4) None

**Ans.** [1]

**Q.3** Find current flowing through zener diode.



(1) 5 mA

(2) 14 mA

(3) 9 mA

(4) 2 mA

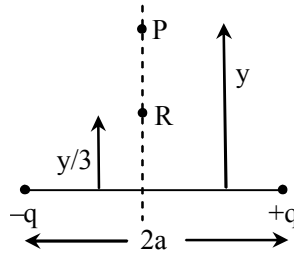
**Ans.** [3]

**Q.4** 0.5 mole of monoatomic gas is heated at constant pressure 1 atm to increase its temperature from 20°C to 90°C. Find approx value of work done.

- (1) 200 J                                      (2) 290 J                                      (3) 100 J                                      (4) 400 J

**Ans.** [2]

**Q.5** A charge is placed at point 'P' on equator of dipole and it experiences a force F. If we shift it to new position 'R' then find the new force on it.



- (1) 27 F                                      (2) F/27                                      (3) 8F                                      (4) F/8

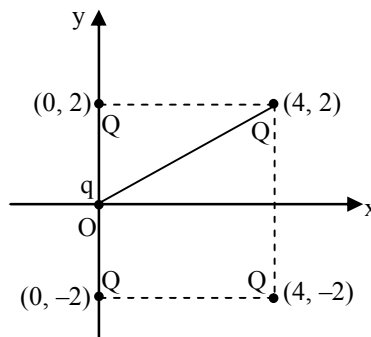
**Ans.** [1]

**Q.6** In YDSE experiment distance between two slit is d and distance between slits and screen is 2d. Wavelength light used in this experiment is  $\lambda$  such that first minima is obtained in front of one slit. The d in terms of  $\lambda$  is given by.

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

**Ans.** [2]

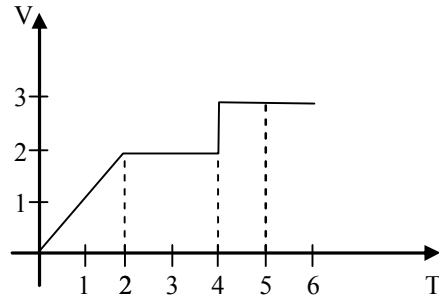
**Q.7** Find the work done in bringing a charge q from infinity to origin in the system of four charges as shown in figure



- (1)  $kqQ\left(1 + \frac{1}{\sqrt{5}}\right)$                                       (2)  $kqQ\left(1 - \frac{1}{\sqrt{5}}\right)$                                       (3)  $2kqQ\left(1 + \frac{1}{\sqrt{5}}\right)$                                       (4)  $2kqQ\left(1 - \frac{1}{\sqrt{5}}\right)$

**Ans.** [1]

Q.8 Find position of particle at  $t = 5$  sec, given that particle is initially at  $x = 0$



- (1) 2 m                      (2) 9 m                      (3) 12 m                      (4) 5 m

Ans. [2]

Q.9 If force  $P = 2F$  and  $Q = 3F$  are at angle  $\theta$  and its resultant becomes twice if force  $Q$  becomes double. Find the angle between force  $P$  and force  $Q$ .

- (1)  $60^\circ$                       (2)  $120^\circ$                       (3)  $30^\circ$                       (4)  $45^\circ$

Ans. [2]

Q.10 A parallel plate capacitor of capacitance  $12 \text{ pF}$  is connected to  $10 \text{ V}$  battery, when it is fully charged battery is disconnected and dielectric of dielectric constant  $6$  is introduced between the plates then find energy dissipated during insertion of dielectric.

- (1)  $1 \times 10^{-9} \text{ J}$                       (2)  $5 \times 10^{-10} \text{ J}$                       (3)  $2 \times 10^{-10} \text{ J}$                       (4)  $2 \times 10^{-9} \text{ J}$

Ans. [2]

Q.11 A calorimeter of mass  $100 \text{ gm}$  has water of mass  $240 \text{ gm}$  at  $8.4^\circ\text{C}$ . A brass of mass  $192 \text{ gm}$  and specific heat  $0.09$  at temperature  $100^\circ\text{C}$  is mixed in calorimeter. Equilibrium temperature is  $14.36^\circ\text{C}$ . Find specific heat of calorimeter

- (1)  $0.02$                       (2)  $0.08$                       (3)  $0.1$                       (4)  $0.30$

Ans. [2]

Q.12 If force on a particle is  $\vec{F} = 3\hat{i} - 4\hat{j} \text{ N}$  and displacement is  $\vec{d} = 4\hat{i} \text{ meter}$ . If initial KE is  $3 \text{ J}$  then kinetic energy after displacement is

- (1)  $12 \text{ J}$                       (2)  $9 \text{ J}$                       (3)  $15 \text{ J}$                       (4)  $10 \text{ J}$

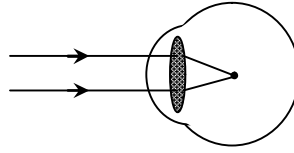
Ans. [3]

Q.13 A particle is executing S.H.M. with amplitude  $5 \text{ cm}$  along  $x$  axis, origin as mean position. If at  $x = +4 \text{ cm}$  magnitude of velocity is equal to magnitude of acceleration then find time period of oscillation in seconds.

- (1)  $\frac{4\pi}{3}$                       (2)  $6\pi$                       (3)  $\frac{8\pi}{3}$                       (4)  $\frac{9\pi}{2}$

Ans. [3]

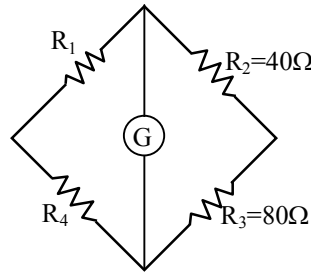
- Q.14** If parallel light beam is incident at cornea which has diameter 7.6 mm. Find the position of image from cornea if refractive index of liquid filled is 1.34.



- (1) 7.6 mm                      (2) 15.2 mm                      (3) 9.6 mm                      (4) 3.8 mm

**Ans.** [2]

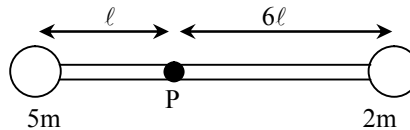
- Q.15** A balance wheat stone bridge with  $R_2 = 40 \Omega$ ,  $R_3 = 80 \Omega$  and carbon resistor  $R_1$  of three colour band of orange, red and brown is given. Determine the value of  $R_4$



- (1)  $540 \Omega$                       (2)  $640 \Omega$                       (3)  $740 \Omega$                       (4)  $840 \Omega$

**Ans.** [2]

- Q.16** Two mass  $2m$  and  $5m$  are connected by massless rod as shown in figure. Rod hinged at point P and free to rotate in vertical plane, initially rod is in horizontal position then angular acceleration is



- (1)  $\frac{2g}{11l}$                       (2)  $\frac{g}{11l}$                       (3)  $\frac{3g}{11l}$                       (4)  $\frac{5g}{11l}$

**Ans.** [2]

- Q.17** There is change of current from 10 amp to 25 amp in 1 second in inductor. Induced emf develop in inductor is 25 volt. Find the change in energy of inductor

- (1) 437.5 J                      (2) 520 J                      (3) 260 J                      (4) 130 J

**Ans.** [1]

- Q.18** When 1.1A electric current flow through a resistance then power dissipation is 44W. Now some potential difference of 22 volt is applied, then find dissipated power.

- (1) 13.31W                      (2) 15W                      (3) 10W                      (4) 12.45W

**Ans.** [1]

- Q.19** Oil of specific gravity 0.9 is filled in massless cylindrical vessel of volume 310 ml, this cylinder with oil is floating in water. Now, it is depressed slightly in vertical direction and then released. It starts oscillating. Determine angular frequency of oscillation.  
(1) 40 rad/s (2) 20 rad/s (3) 10 rad/s (4) 30 rad/s  
**Ans.** [2]
- Q.20** If beam of light of intensity  $4.4 \text{ W/m}^2$  is incident on a metal surface of area  $10^{-4} \text{ m}^2$  normally. If energy of each photon is 10 eV and efficiency of ejection of photoelectrons is 10%, then find number of photoelectrons ejected per second and the maximum kinetic energy of photoelectron if work function of metal is 5eV  
(1)  $2.75 \times 10^{13}/\text{sec}$ , 5 eV (2)  $2.75 \times 10^{18}$ , 5 eV  
(3)  $2.75 \times 10^{12}/\text{sec}$ , 10 eV (4)  $2.75 \times 10^{18}$ , 10 eV  
**Ans.** [1]
- Q.21** Magnetic moment of cylinder and circular loop of same mass and same radius are M and 2M respectively if they are placed in uniform magnetic field B. The time period of oscillation of cylinder is  $T_C$  and time period of circular loop is  $T_\ell$ . Select the correct option  
(1)  $T_\ell = 0.5 T_C$  (2)  $T_\ell = 2.5 T_C$  (3)  $T_\ell = T_C$  (4)  $T_\ell = 2 T_C$   
**Ans.** [3]
- Q.22** When one mole of an monoatomic ideal gas is compressed from  $5 \text{ m}^3$  to  $1 \text{ m}^3$  against constant external pressure of 4 atm, then energy is released which is used to heat 1 mole of aluminium. Specific heat of aluminum =  $24 \text{ KJ mole}^{-1} \text{ K}^{-1}$ . Find the change in temperature of aluminum  
(1)  $\frac{100}{3} \text{ K}$  (2) 300 K (3)  $\frac{500}{3} \text{ K}$  (4) 500 K  
**Ans.** [3]
- Q.23** 2 Kg of He gas under pressure =  $4 \times 10^4 \text{ N/m}^2$  and density =  $8 \text{ kg/m}^3$ . Find order of energy due to translation.  
(1) 2 (2) 4 (3) 3 (4) 2  
**Ans.** [2]
- Q.24** Magnetic compass needle of length 0.12 metre and magnetic moment  $1.8 \text{ A-m}^2$  is in equilibrium at  $45^\circ$  angle with horizontal N-S direction.  $B_H = 5 \times 10^{-5} \text{ Tesla}$  determine the force required to apply at the end of needle & perpendicular to it to keep it in equilibrium in horizontal N-S direction.  
(1) 4.03 mN (2) 1.06 mN (3) 6.02 mN (4) 8.01 mN  
**Ans.** [2]
- Q.25** Maximum number of overtones can be heard by a person due to resonance with closed organ pipe with fundamental frequency 1500 Hz.  
(1) 6 (2) 8 (3) 7 (4) 4  
**Ans.** [3]