



## JEE Main Online Exam 2019

### [Memory Based Paper]

### Questions & Answer

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

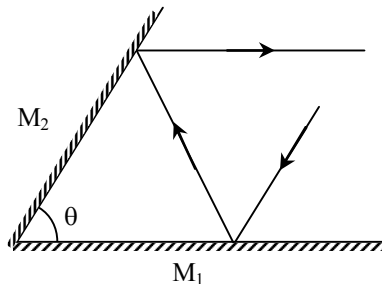
### PHYSICS

**Q.1** A particle is executing S.H.M. of Amplitude of  $A$  along  $x$ -axis. If origin is taken as a mean position. Find the position where kinetic energy & potential energy of particle are same.

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

**Ans.** [3]

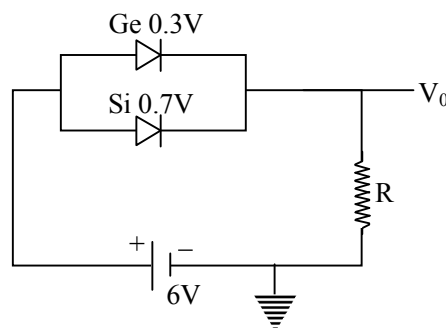
**Q.2** A ray parallel to  $M_2$  is incident on  $M_1$  mirror, after two reflections it becomes parallel to  $M_1$  as shown. Find angle  $\theta$



- (1)  $60^\circ$                                       (2)  $30^\circ$                                       (3)  $45^\circ$                                       (4)  $90^\circ$

**Ans.** [1]

**Q.3** Find the value of  $V_0$ .



- (1) 5.7 V                                      (2) 5.3 V                                      (3) 6 V                                      (4) 5V

**Ans.** [1]

**Q.4** If body of mass 2 kg is moving along x axis under an external force, whose displacement is given by  $x(t) = 3t^2 - 2t + 5$  m. Find the work done by force from  $t = 0$  to  $t = 5$  sec.

- (1) 78 J                                      (2) 780 J                                      (3) 600 J                                      (4) 200 J

**Ans.** [2]

**Q.5** 5.6 gm  $N_2$  gas is filled in closed container at temperature  $27^\circ C$ . Find the energy of the gas when rms speed of gas molecules get doubled.

- (1) 4980 J                                      (2) 9480 J                                      (3) 5040 J                                      (4) 9980 J

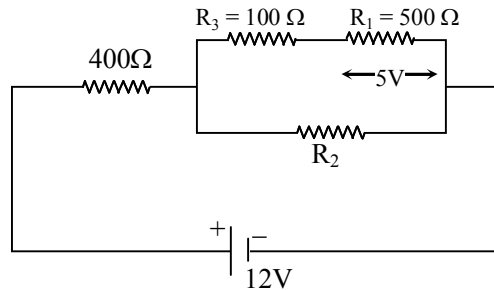
**Ans.** [1]

**Q.6** A loop of radius R is formed by a wire of length L. If current is 'i', magnetic field at center is B. If same current is passed through another coil having n turns formed by the same wire, magnetic field at center of new coil will be :

- (1) nB                                      (2)  $n^2B$                                       (3)  $\frac{B}{n}$                                       (4) B

**Ans.** [2]

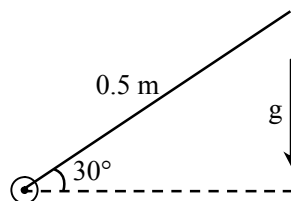
**Q.7** In the given circuit find out the value of  $R_2$  :



- (1) 1000  $\Omega$                                       (2) 1200  $\Omega$                                       (3) 500  $\Omega$                                       (4) 2000  $\Omega$

**Ans.** [2]

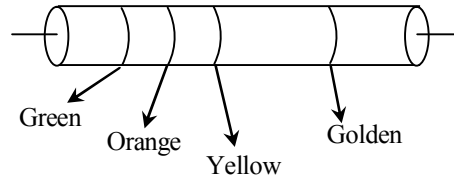
**Q.8** If a rod is hinged at one end released from rest, which makes  $30^\circ$  angle with horizontal as shown in figure find angular velocity of rod when it becomes horizontal.



- (1) 30 rad/sec                                      (2)  $\sqrt{30}$  rad/sec                                      (3)  $\sqrt{15}$  rad/sec                                      (4) 15 rad/sec

**Ans.** [2]

**Q.9** What is the resistance of given carbon resistance



(1)  $53 \times 10^4 \pm 5\%$

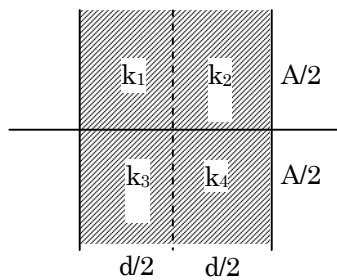
(2)  $43 \times 10^4 \pm 5\%$

(3)  $53 \times 10^4 \pm 10\%$

(4)  $43 \times 10^4 \pm 10\%$

**Ans.** [1]

**Q.10** Combination of different medium in capacitor is as shown keq will be :



(1)  $k_1 + k_2 + k_3 + k_4$

(2)  $\frac{k_1 k_2}{k_1 + k_2} + \frac{k_3 k_4}{k_3 + k_4}$

(3)  $\frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{1}{k_4}$

(4)  $k_1 + k_2 + \frac{k_3 k_4}{k_3 + k_4}$

**Ans.** [2]

**Q.11** Time period depends on Gravitational constant ( $G$ ), plank constant ( $h$ ) and speed of light ( $c$ ), then  $T$  is proportional to

(1)  $\frac{G^{1/2} h^{1/2}}{C^{3/2}}$

(2)  $\frac{G^{1/2} h}{C^{5/2}}$

(3)  $\frac{G h^{1/2}}{C^{5/2}}$

(4)  $\frac{G^{1/2} h^{1/2}}{C^{5/2}}$

**Ans.** [4]

**Q.12**  $E_0$  &  $B_0$  are amplitude of electric and magnetic field of EM wave then correct relationship is

(1)  $E_0 = \frac{B_0}{2}$

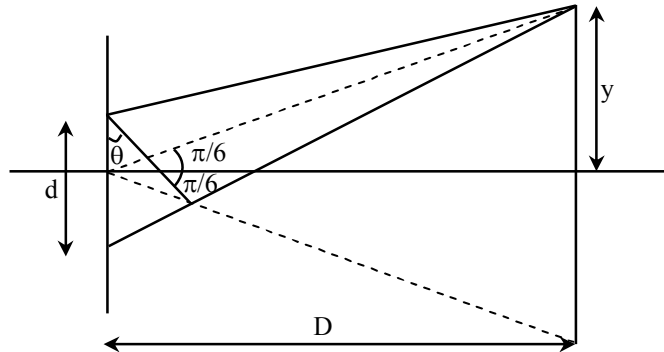
(2)  $E_0 < B_0$

(3)  $E_0 > B_0$

(4)  $E_0 = B_0$

**Ans.** [3]

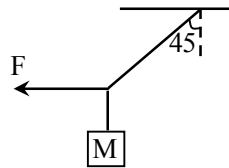
**Q.13** In Y.D.S.E experiment wave length of monochromatic light is 500 nm and distance between slits is  $d = 0.37$  mm. Find the total number of maximum between angle  $-\frac{\pi}{6}$  to  $\frac{\pi}{6}$  as shown in figure.



- (1) 635                                      (2) 640                                      (3) 641                                      (4) 541

**Ans.** [3]

**Q.14** Find F for given figure



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

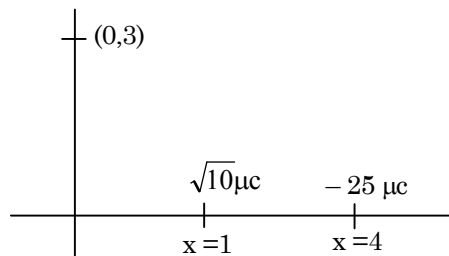
**Ans.** [3]

**Q.15** A constant magnetic field 0.5T present in a region in which a charge particle moves in a circle of radius  $\frac{1}{2}$  cm, charge on particle is  $1.6 \times 10^{-19}C$ , if electric field of 20 V/m is also applied, the particle starts moving in straight line, then find mass of particle ?

- (1)  $2 \times 10^{-22} Kg$                                       (2)  $1 \times 10^{-23} Kg$                                       (3)  $1 \times 10^{-12} Kg$                                       (4) None

**Ans.** [2]

**Q.16** Two charges  $\sqrt{10} \mu c$  and  $-25 \mu c$  are placed at (1,0) and (4,0), electric field at (0,3) =



- (1)  $[63\hat{i} - 27\hat{j}]$                                       (2)  $10^2[63\hat{i} - 27\hat{j}]$                                       (3)  $[27\hat{i} - 63\hat{j}]$                                       (4)  $10^2[27\hat{i} - 63\hat{j}]$

**Ans.** [2]

**Q.17** A particle is taken at height  $h$  from earth surface and then it is given energy  $E$  to move it on circular path at this height. Energy required to project this particle upto height  $h$  from earth surface is equal to energy  $E$ , then find value of  $h$ .

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

**Ans.** [2]

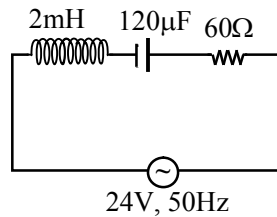
**Q.18** Two nuclei sample A and B initially have same activity. At any time  $t$  ratio of activity of B to that of A i.e.

$$\frac{R_B}{R_A} = e^{-3t}. \text{ Half life of A is } \ln(2) \text{ then half life of B is}$$

- (1)  $T_B = \frac{\ln(2)}{4}$  (2)  $T_B = \frac{\ln(2)}{2}$  (3)  $T_B = 2 \ln(2)$  (4) None

**Ans.** [1]

**Q.19** For the circuit as shown, power consumption is –



- (1) 4.1 watt (2) 8.2 watt (3) 12.3 watt (4) 2 watt

**Ans.** [2]

**Q.20** In a step down transformer input voltage is 2300V and output voltage is 230 V. If number of turns in primary winding is 4000. Find input current if efficiency of transformer is 90% and output current is 5A.

- (1)  $2/3$  (2)  $5/9$  (3)  $3/5$  (4) 2

**Ans.** [2]

**Q.21** Two particles A & B having acceleration  $a_1$  and  $a_2$  start the race from same point particle A complete the race 't' time before B and it have 'v' speed more than 'B'. Find v ?

- (1)  $v = \sqrt{a_1 a_2} t$  (2)  $v = \sqrt{a_1 a_2}$  (3)  $v = \sqrt{\frac{a_1 a_2}{t}}$  (4)  $v = \frac{a_1 a_2}{t}$

**Ans.** [1]

**Q.22** Find the maximum kinetic energy of photo electron if the magnetic field of incident light is given by  $B = B_0[\sin(3.14 \times 10^6 ct) + \sin(16.28 \times 10^6 ct)]$  T and work function of metal is 2.7 eV.

- (1) 0.2 eV (2) 1 eV (3) 0.5 eV (4) 1.3 eV

**Ans.** [3]

**Q.23** A particle is moving such that its position is given by

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

**Ans.** [2]

**Q.24** Volume charge density varies according to  $\rho(r) = \frac{A}{r^2} e^{-\frac{2r}{a}}$  where  $r$  is distance from center find radius in which total charge  $Q$  is enclosed.

- (1)  $\frac{a}{2} \ln\left(\frac{2\pi a A}{2\pi a A - Q}\right)$       (2)  $a \ln\left(\frac{\pi a A}{2\pi a A - Q}\right)$       (3)  $\frac{a}{4} \ln\left(\frac{\pi a A}{\pi a A - Q}\right)$       (4) None of these

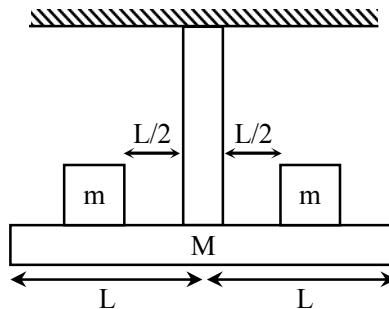
**Ans.** [1]

**Q.25** Two Carnot engine are connected in series and output work of both engine is same. If temperature of source of 1<sup>st</sup> engine is 600K and temperature of sink of 2<sup>nd</sup> engine is 400K. The temperature of junction will be

- (1) 300 K      (2) 400 K      (3) 500 K      (4) 600 K

**Ans.** [3]

**Q.26** A rod of mass  $M$  and length  $2L$  is performing SHM as Torsional pendulum in horizontal plane. Two blocks each of mass  $m$  are put at distance  $\frac{L}{2}$  from centre. The frequency after putting blocks of mass  $m$  is 20% of initial frequency. Then ratio of  $\frac{m}{M}$  will be :



- (1) 12      (2) 14      (3) 16      (4) 18

**Ans.** [3]

**Q.27** A musician is playing an open flute of length 50 cm at its second harmonic. A car is running towards the musician with speed 10 km/h. Find frequency observed by the man if speed of sound in air is 330 m/s.

- (1) 660 Hz      (2) 662 Hz      (3) 665 Hz      (4) 664 Hz

**Ans.** [3]

**Q.28** There is screw gauge having main scale division as well as pitch of circular scale is 0.5 mm. Circular scale has 100 divisions. If no object is placed then '0' of main scale is not visible and 3 division lies below reference main scale. If wire is placed in between jaws. Reading on main scale is 5.5 mm and 48<sup>th</sup> division matches with reference on main scale. The diameter of wire is

- (1) 7.235 mm      (2) 6.225 mm      (3) 5.634 mm      (4) 6.125 mm

**Ans.** [2]