

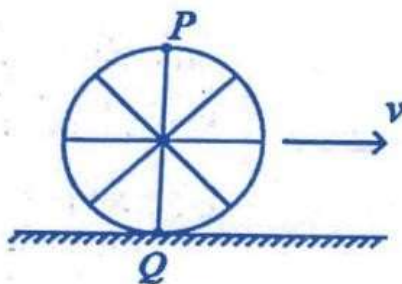
# MEDENG JUNIOR COLLEGE

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NEET- 2024 QUESTION PAPER WITH SOLUTION

## PHYSICS SECTION - A

1. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is  $v$  in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively)?



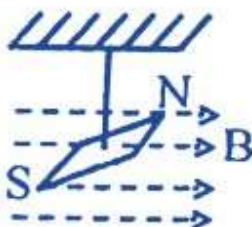
- 1) Both the points P and Q move with equal speed.
  - 2) Point P has zero speed
  - 3) Point P moves slower than point Q
  - 4) Point P moves faster than point Q
- Key (4)

2. An unpolarised light beam strikes a glass surface at Brewster's angle. Then

- 1) Both the reflected and refracted light will be completely polarized.
- 2) the reflected light will be completely polarised but the refracted light will be partially polarised.
- 3) the reflected light will be partially polarised.
- 4) the refracted light will be completely polarised.

Ans : 2

3. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is  $9.8 \times 10^{-6} \text{ kg m}^2$ . If the magnitude of magnetic moment of the needle is  $x \times 10^{-5} \text{ Am}^2$ ; then the value of 'x' is :



- 1)  $50\pi^2$
- 2)  $1280\pi^2$
- 3)  $5\pi^2$
- 4)  $128\pi^2$

$$f = \frac{20}{5} = 4$$

$$T = \frac{1}{4} = 2\pi \sqrt{\frac{I}{MB}}$$

$$\frac{1}{16} = \frac{4\pi^2 (9.8 \times 10^{-6})}{x \times 10^{-5} \times 4.9 \times 10^{-1}}$$

$$X = 16 \times 8\pi^2 \times 10^1$$

$$= 1280\pi^2$$

**KEY : (2 )**

4. Consider the following statements A and B and identify the correct answer"

A. For a solar-cell, the I-V characteristics lies in the IV quadrant of the given graph.

B. In a reverse biased pn junction diode, the current measured in ( $\mu\text{A}$ ), is due to majority charge carries.

- 1) Both A and B are correct
- 2) Both A and B are incorrect
- 3) A is correct but B is incorrect
- 4) A is incorrect but B is correct

**KEY : (4)**

5. Match List I with List II.

List I

List II

(Spectral Lines of Transitions from) (Wavelengths (nm)) Hydrogen for

- |                           |            |
|---------------------------|------------|
| A. $n_2 = 3$ to $n_1 = 2$ | I. 410.2   |
| B. $n_2 = 4$ to $n_1 = 2$ | II. 434.1  |
| C. $n_2 = 5$ to $n_1 = 2$ | III. 656.3 |
| D. $n_2 = 6$ to $n_1 = 2$ | IV. 486.1  |

Choose the correct answer from the options given below:

- (1) A-IV, B-III, C-I, D-II
- (2) A-I, B-II, C-III, D-IV
- (3) A-II, B-I, C-IV, D-III
- (4) A-III, B-IV, C-II, D-I

ANSWER : Using  $\frac{1}{\lambda} = R \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$

$$\lambda = \frac{36}{5} = \frac{7.2}{R} (-3) = 656.3 \text{ nm}$$

$$\lambda = \frac{16}{3} = \frac{5.3}{R} (-4) = 486.1 \text{ nm}$$

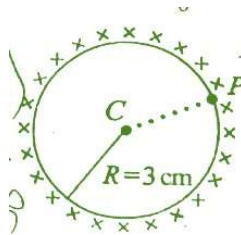
$$\lambda = \frac{100}{21} = \frac{4.7}{R} (-2) = 434.1 \text{ nm}$$

$$\lambda = \frac{36}{8} = \frac{4.5}{R} (-1) = 410.2 \text{ nm}$$

KEY: (4)

6. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is :

$$\left( \text{Take } \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ SI units} \right)$$

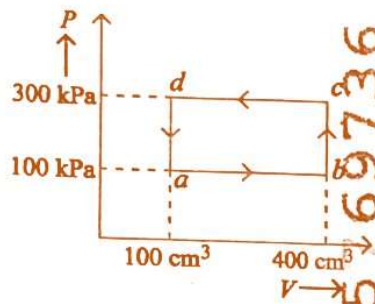


- 1)  $0.5 \times 10^5$       2) zero      3)  $3 \times 10^5$       4)  $1 \times 10^5$

ANSWER : As the potential is same from center to surface of a shell, potential difference between point C & P is zero.

KEY : ( 2 )

7. A thermodynamic system is taken through the cycle abcda. The work done by the gas along the path bc is :



- 1) - 90 J      2) - 60 J      3) zero      4) 30 J

ANSWER : BC- Path is isochoric process  
Hence,  $W = 0$

Key : ( 3 )

8. Two bodies A and B of same mass undergo completely inelastic one dimensional collision. The body A moves with velocity  $v_1$  while body B is at rest before collision. The velocity of the system after collision is  $v_2$ .

The ratio  $V_1 : v_2$  is : "

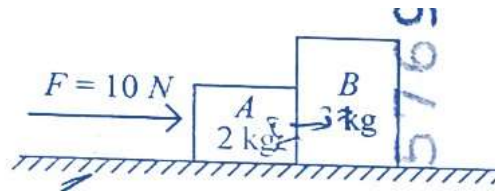
- 1) 4 : 1                      2) 1 : 4                      3) 1 : 2                      4) 2 : 1

ANSWER :  $mv_1 = 2mv_2$

$$\frac{v_1}{v_2} = \frac{2}{1}$$

KEY : (4)

9. A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3kg, respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is :



- 1) 6 N                      2) 10 N                      3) ZERO                      4) 4N

$$f = \frac{Fm_2}{m_1 + m_2}$$

$$f = \frac{10 \times 3}{5}$$

$$f = 6N$$

Key : (1)

10. If  $c$  is the velocity of light in free space, the correct statement about photon among the following are

A. The energy of photon is  $E = hv$

B. The velocity of a photon is  $c$

C. the momentum of a photon,  $P = \frac{hv}{c}$

D. In a photon - electron collision, both total energy and total momentum are conserved

E. photon possesses positive charge

Choose the correct answer from the options given below

- 1) A, C and D only      2) A, B, D and E only      3) A and B only      4) A,B,C and D only

Key ( 4)

11. At any instant of time  $t$ , the displacement of any particle is given by  $2t - 1$  ( SI unit) under the influence of force of 5N. The value of instantaneous power is ( in SI unit) :

- 1) 7                                      2) 6                                      3) 10                                      4) 5

$$x = 2t - 1$$

$$v = \frac{dx}{dt} = \frac{d}{dt}(2t - 1)$$

$$v = 2$$

$$P = F \cdot v$$

$$P = 5 \times 2$$

$$P = 10 \text{ W}$$

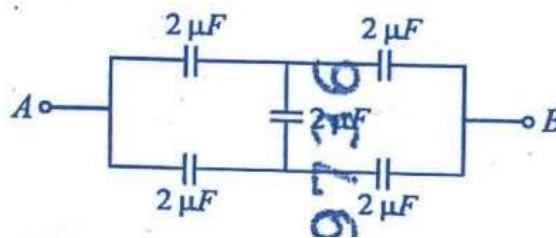
Key : (3)

12. If the monochromatic source in Young's double slit experiment is replaced by white light, then

- 1) there will be a central bright white fringe surrounded by a few coloured fringes.  
 2) all bright fringes will be of equal width.  
 3) interference pattern will disappear  
 4) there will be a central dark fringe surrounded by a few coloured fringes.

Key : (1)

13. In the following circuit, the equivalent capacitance between terminal A and terminal B is :

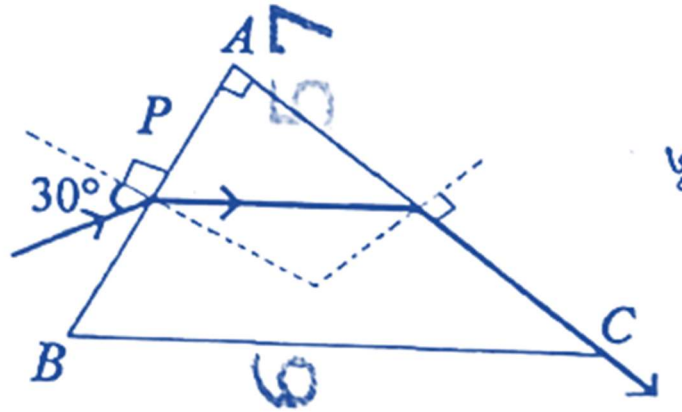


- 1)  $0.5 \mu F$                                       2)  $4 \mu F$                                       3)  $2 \mu F$                                       4)  $1 \mu F$

ANSWER : Balanced Wheatstone bridge

Key : (3)

14. A light ray enters through a right angled prism at point P with the angle of incidence  $30^\circ$  as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is :



1)  $\frac{\sqrt{3}}{4}$

2)  $\frac{\sqrt{3}}{2}$

3)  $\frac{\sqrt{5}}{4}$

4)  $\frac{\sqrt{5}}{2}$

$$r_1 + r_2 = 90^\circ$$

$$\sin 30^\circ = \mu \sin r_1$$

$$\sin r_1 = \frac{\sin 30}{\mu}$$

$$\sin r_1 = \frac{1}{2\mu}$$

$$\cos r_1 = \sqrt{1 - \frac{1}{4\mu^2}} \quad \text{--- (1)}$$

$$\mu = \frac{1}{\sin r_2}$$

$$\mu = \frac{1}{\sin(90 - r_1)}$$

$$\mu = \frac{1}{\cos r_1}$$

$$\cos r_1 = \frac{1}{\mu} \quad \text{--- (2)}$$

From (1) and (2)

$$\frac{1}{\mu} = \sqrt{1 - \frac{1}{4\mu^2}}$$

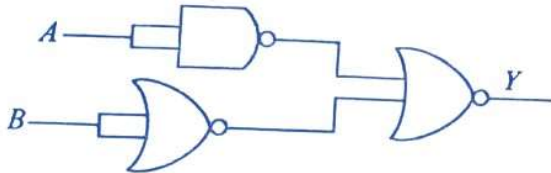
$$\frac{1}{\mu^2} = 1 - \frac{1}{4\mu^2}$$

$$\frac{1}{\mu^2} + \frac{1}{4\mu^2} = \frac{1}{1}$$

$$\mu = \frac{\sqrt{5}}{2}$$

Key : ( 4)

15. The output (Y) of the given logic gate is similar to the output of an/a"



1) OR gate

2) AND gate

3) NAND gate

4) NOR gate

ANSWER :  $Y = A + B = \overline{A} \overline{B}$

$Y = A.B$  (AND Gate)

Key : (2)

16. A particle moving with uniform speed in a circular path maintains:

1) constant velocity but varying acceleration

2) varying velocity and varying acceleration

3) constant velocity

4) constant acceleration

ANSWER : Varying velocity and Varying acceleration

Key : (2)

17. The quantities which have the same dimensions as those of solid angle are:

1) strain and arc

2) angular speed and stress

3) strain and angle

4) stress and angle

ANSWER : Strain and angle

Key : (3)

18. In a vernier calipers, (N+1) divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is:

- 1) 100N                      2) 10(N + 1)                      3)  $\frac{1}{10N}$                       4)  $\frac{1}{100(N+1)}$

$$V.C = 1MSD - 1VSL$$

$$= 1MSD - \frac{N}{N+1}MSD$$

$$= 0.1 \times 10^{-3} \times 10^2 \times \frac{1}{N+1}$$

$$= \frac{1}{100} \left( \frac{1}{N+1} \right)$$

KEY : (4)

19. The terminal voltage of the battery, whose emf is 10V and internal resistance 1  $\Omega$ , when connected through an external resistance of 4 $\Omega$  as shown in figure is :

- 1) 8v                      2) 10v                      3) 4V                      4) 6V

$$\text{ANSWER : } I = \frac{10}{5} = 2A$$

$$V = E - Ir$$

$$= 10 - (2 \times 1)$$

$$= 8 \text{ volt}$$

KEY : (1)

20. A bob is whirled in a horizontal plane by means of a string with an initial speed of  $\omega$  rpm. T tension in the string is T. If speed becomes 2 while keeping the same radius, the tension in the string becomes :

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



$$\text{ANSWER : } F = \frac{mv^2}{r} = m\omega^2 r$$

$$T = \frac{mv^2}{r} = m\omega^2$$

$$\frac{T^1}{T} = \frac{4\omega^2}{\omega^2} = 4$$

$$T^1 = 4T$$

KEY : ( 4)

21. If  $x = 5 \sin\left(\pi t + \frac{\pi}{3}\right)$  m, represents the motion of particle executing simple harmonic motion, the amplitude and time period of motion, respectively are :

1) 5cm, 1s                      2) 5m, 1 s                      3) 5m, 2s                      4) 5m, 2s

$$\text{ANSWER : } x = 5 \sin\left(\pi t + \frac{\pi}{3}\right) \text{ m}$$

$$\text{Amplitude} = 5 \text{ m} \quad \omega = \pi$$

$$\frac{2\pi}{T} = \pi \Rightarrow T = 2 \text{ s}$$

KEY : (4)

22. In an ideal transformer, the turns ratio is  $\frac{N_p}{N_s} = \frac{1}{2}$  the ratio  $V_s : V_p$  is equal to ( the symbols carrying their usual meaning )

1) 1 : 1                      2) 1 : 4                      3) 1:2                      4) 2:1

For ideal transformer

$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{2}{1}$$

KEY : ( 4)

23. Given below are two statements: one is labeled as Assertion A and the other is labeled as Reason R.

**Assertion A:** The potential (V) at any axial point, at 2 m distance (r) from the centre of the dipole of dipole moment vector  $\vec{P}$  of magnitude,  $4 \times 10^{-6} \text{ Cm}$  is  $\pm 9 \times 10^3 \text{ V}$  .

$$\left( \text{Take } \frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ SI units} \right)$$

**Reasons R:**  $V = \pm \frac{2}{4\pi \epsilon_0 r^2}$  where r is the distance of any axial point, situated at 2m from the centre of the dipole.

In the light of the above statements, choose the correct answer from the options given below

- 1) A is true but R is false
- 2) A is false but R is true
- 3) Both A and R are true and R is the correct explanation of A
- 4) Both A and R are true and R is NOT the correct explanation of A

$$V = \frac{1}{4\pi\epsilon_0} \frac{P}{r^2}$$

$$= 9 \times 10^9 \times \frac{4 \times 10^{-6}}{4} = \pm 9 \times 10^3$$

### Electric potential at a point on the axial line at a

distance  $r$  is  $V = \frac{1}{4\pi\epsilon_0} \frac{P}{r^2}$

KEY : (1)

- 24.** A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is  $0.07 \text{ Nm}^{-1}$ , then the excess force required to take it away from the surface is :

- 1) 1.98 mN                      2) 99 N                      3) 19.8 mN                      4) 198 N

$$F = T \times 2\pi r$$

$$= 0.07 \times 2 \times 3.14 \times 4.5 \times 10^{-2}$$

$$= 19.1 \text{ m N}$$

KEY : (3)

25. A tightly wound 100 turns coil of radius 10cm carries a current of 7A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of the free space as  $4\pi \times 10^{-7}$  SI units ):

- 1) 4.4 mT                      2) 44T                      3) 44mT                      4) 4.4T

$$B = \frac{\mu_0 NI}{2r}$$

$$= \frac{4 \pi \times 10^{-7} \times 10^2 \times 7}{2 \times 0.1} = 4.4 \text{ mT}$$

KEY : (1)

26. Given below are two statements:

Statement I : Atoms are electrically neutral as they contain equal number of positive and negative charges.

Statement II: Atoms of each element are stable and emit their characteristic spectrum. In the light of the above statements, choose the most appropriate answer from the options given below:

- 1) Statement I is correct but Statement II is incorrect
- 2) Statement I is incorrect but Statement II is correct
- 3) Both Statement I and Statement II are correct
- 4) Both Statement I and Statement II are incorrect

KEY : (1)

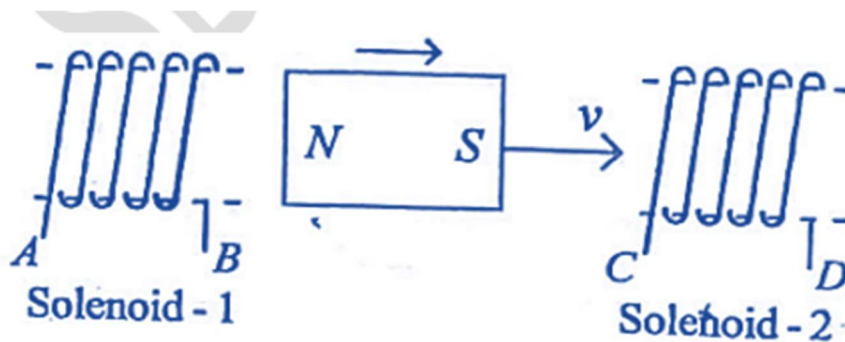
27. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is  $2400 \text{ g cm}^2$ . The length of the  $400 \text{ g}$  rod is nearly:

- 1)  $20.7 \text{ cm}$                       2)  $72.0 \text{ cm}$                       3)  $8.5 \text{ cm}$                       4)  $17.5 \text{ cm}$

$$I = \frac{ML^2}{12}$$

$M=400 \text{ g}$  and  $I = 2400 \text{ gcm}^2$

KEY : (3)



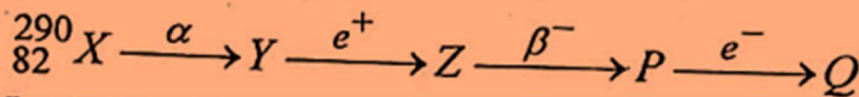
28. In the above diagram, a strong bar magnet is moving towards solenoid -2 from solenoid -1. The direction of induced current

In solenoid - 1 and that in solenoid - 2 respectively, are through the directions:

- 1) AB and CD                      2) BA and DC                      3) AB and DC                      4) BA and CD

According to Lens law

KEY : (3)



29.

In the nuclear emission stated above, the mass number and atomic number of the product Q respectively are:

- 1) 288,82                      2) 286,81                      3) 280,81                      4) 286, 80



KEY : ( 2)

30. The mass of a planet is  $\frac{1}{10}$ th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is:

- 1)  $4.9 \text{ ms}^{-2}$                       2)  $3.92 \text{ ms}^{-2}$                       3)  $19.6 \text{ ms}^{-2}$                       4)  $9.8 \text{ ms}^{-2}$

$$\text{ANSWER : } g \propto \frac{M}{R^2}$$

$$M_p = 1/10 M_e \text{ and } D_p = D_e/2$$

KEY : (2)

31. The maximum elongation of a steel wire of 1m length if the elastic limit of steel and its Young's modulus, respectively, are  $8 \times 10^8 \text{ Nm}^{-2}$  and  $2 \times 10^{11} \text{ Nm}^{-2}$  is

- 1) 40 mm                      2) 8 mm                      3) 4 mm                      4) 0.4 mm

$$\text{ANSWER : } Y = \frac{FL}{A\Delta l}$$

$$Y = 2 \times 10^{11} \text{ N/m}^2, L = 1 \text{ m and } F/A = 8 \times 10^8 \text{ N/m}^2$$

KEY : (3)

32. Match List - I with List - II

List - I

List - II

( material)

( susceptibility( $\chi$ ) )

A. Diamagnetic

I.  $\chi = 0$

B. Ferromagnetic

II.  $0 > \chi > -1$

C. Paramagnetic

III.  $\chi > 0$

D. Non - magnetic      IV.  $0 < \chi < \varepsilon$  ( a small positive number)

Choose the correct answer from the options given below

1) A - III, B - II, C - I, D - IV

2) A-IV, B-III, C-II, D-I

3) A-II, B-III, C-IV, D-I

4) A-II, B-I, C-III, D-IV

ANSWER : A-II , B-III , C-IV , D-I

KEY : (3)

33. A logic circuit provides the output Y as per the following truth table:

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is

1) B

2)  $\bar{B}$

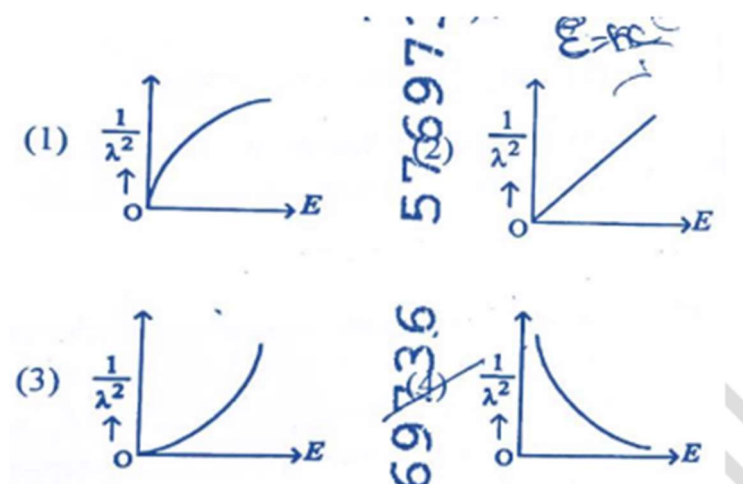
3)  $A \cdot B + A$

4)  $A \cdot B + \bar{A}$

ANSWER :  $Y = \bar{B}$

KEY : (1)

34. The graph which shows the variation of  $\left(\frac{1}{\lambda^2}\right)$  and its kinetic energy, E is ( where  $\lambda$  is de Broglie wavelength of a free particle) :



$$\lambda^2 = \frac{h^2}{2mK}$$

KEY : (2)

35. A wire of length 'l' and resistance  $100\ \Omega$  is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

1)  $55\ \Omega$                       2)  $60\ \Omega$                       3)  $26\ \Omega$                       4)  $52\ \Omega$

**five  $10\ \Omega$  parts in series make  $50\ \Omega$**

**five  $10\ \Omega$  parts in parallel make  $2\ \Omega$**

**$\therefore 52\ \Omega$**

### SECTION - B

36. If the mass of the bob in a simple pendulum increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is  $\frac{x}{2}$  times its original time period. Then the value of x is

1)  $2\sqrt{3}$                       2) 4                      3)  $\sqrt{3}$                       4)  $\sqrt{2}$

**ANSWER :  $T \propto \sqrt{l}$**

$$\frac{T}{T_1} = \sqrt{2}$$

$$x = \sqrt{2}$$

KEY : (4)

37. A force defined by  $F = \alpha t^2 + \beta t$  acts on a particle at a given time t. The factor which is dimensionless, if  $\alpha$  and  $\beta$  are constants, is:

1)  $\alpha \beta t$                       2)  $\alpha \beta / t$                       3)  $\beta t / \alpha$                       4)  $\alpha t / \beta$

$$\frac{\alpha t}{\beta} = \frac{\frac{F}{t^2} \times t}{\frac{F}{t}} = \text{dimensionless}$$

KEY : (4)

38. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle  $60^\circ$  with each other. The magnetic moment of this new magnet is :

1) 2M                      2)  $\frac{M}{\sqrt{3}}$                       3) M                      4)  $\frac{M}{2}$

ANSWER : Side of equilateral triangle is half of initial length of dipole

Dipole moment is halved

Key (4)

39. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then
- A. the charge stored in it, increases
  - B. the energy stored in it, decreases.
  - C. its capacitance increases
  - D. the ratio of charge to its potential remains the same.
  - E. the produce of charge and voltage increases.

Choose the most appropriate answer from the options given below:

- 1) B, D and E only      2) A, B and C only      3) A,B and E only      4) A,C and E only

Key : (4)

40. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is:

- 1) 17                      2) 32                      3) 34                      4) 28

$$f_0 = 140 \text{ cm}$$

$$f_e = 5 \text{ cm}$$

$$m = \frac{f_0}{f_e} = \frac{140}{5} = 28$$

Key : (4)

41. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is:

- 1) 1:2                      2) 2:3                      3) 1:1                      4) 2:9

$$\text{ANSWER : } P_A = 1000 \text{ W}, P_B = 2000 \text{ W}$$

$$\text{Heaters connected in series } P_1 = 2/3$$

$$\text{Heaters connected in parallel } P_2 = 3$$

$$P_1/P_2 = 2/9$$

Key : (4)

42. A metallic bar of Young's modulus,  $0.5 \times 10^{11} \text{ Nm}^{-2}$  and coefficient of linear thermal expansion  $10^{-5} \text{ }^{\circ}\text{C}^{-1}$ , length 1m and area of cross - section  $10^{-3} \text{ m}^2$  is heated from  $0^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  without expansion or bending. The compressive force developed in it is

- 1)  $100 \times 10^3 \text{ N}$                       2)  $2 \times 10^3 \text{ N}$                       3)  $5 \times 10^3 \text{ N}$                       4)  $20 \times 10^3 \text{ N}$

**ANSWER :  $F = AY\alpha\Delta T$**

**$F = 50 \times 10^3$**

KEY : (4)

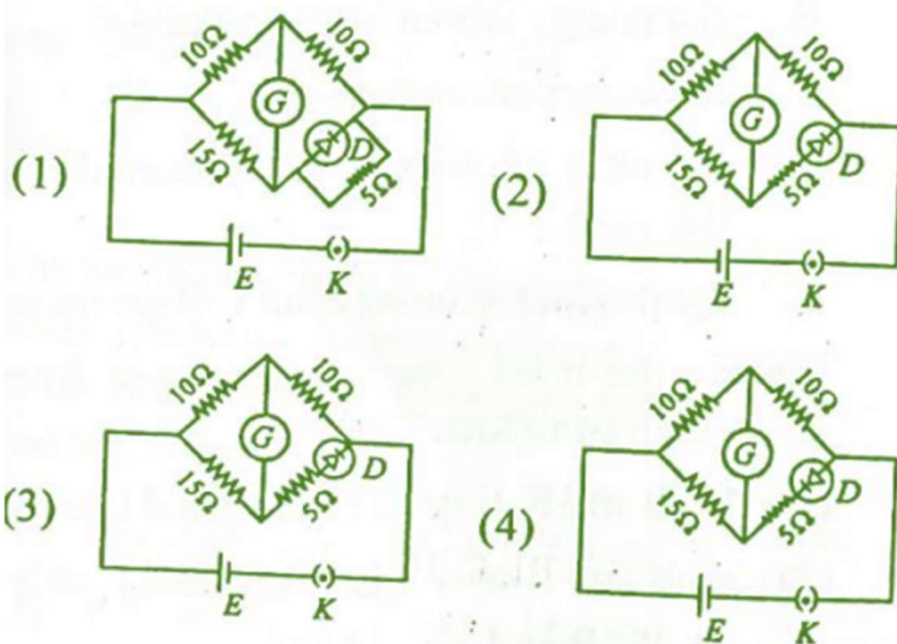
43. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If  $I$  is the current in the circuit, then in the gap between the plates:

- 1) displacement current of magnitude equal to  $I$  flows in a direction opposite to that of  $I$ .  
 2) displacement current of magnitude greater than  $I$  flows but can be in any direction.  
 3) there is no current  
 4) displacement current of magnitude equal to  $I$  flows in the same direction as  $I$ .

ANSWER : displacement current of magnitude equal to  $I$  flows in same direction as  $I$ .

KEY : (4)

44. Choose the correct circuit which can achieve the bridge balance



KEY : ( Bonus)

45. The minimum energy required to launch a satellite of mass  $m$  from the surface of earth of mass  $M$  and radius  $R$  in a circular orbit at an altitude of  $2R$  from the surface of the earth is:



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

$$2) \frac{GmM}{3R}$$

$$3) \frac{5GmM}{6R}$$

$$4) \frac{2GmM}{3R}$$

**ANSWER : On surface it has on potential energy**

$$E_i = -\frac{GMm}{R}$$

**At distance (3R)**

$$E_f = PE + KE$$

$$E_f = -\frac{GMm}{6R}$$

**∴ Energy required is**

$$E = E_f - E_i = \frac{5GMm}{6R}$$

KEY : (3)

**46.** The property which is not of an electromagnetic wave travelling in free space is that:

1) they travel with a speed equal to  $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

2) they originate from charges moving with uniform speed

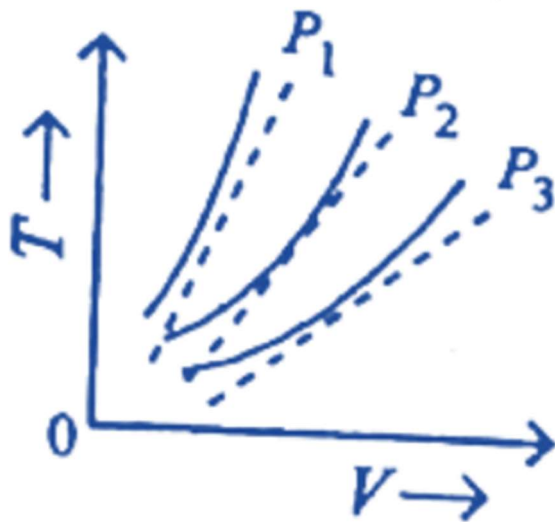
3) they are transverse in nature

4) the energy density in electric field is equal to energy density in magnetic field.

ANSWER : Oscillating or accelerating charge is source of em - wave

KEY : (2)

**47.** The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures  $P_1$ ,  $P_2$  and  $P_3$  compared with those of Charles's law represented as dotted lines



Then the correct relation is

- 1)  $P_2 > P_1 > P_3$       2)  $P_1 > P_2 > P_3$       3)  $P_3 > P_2 > P_1$       4)  $P_1 > P_3 > P_2$

**ANSWER :  $PV = NRT$**

$$\frac{T}{V} = \frac{P}{R}$$

$$\text{SLOPE} = \frac{T}{V} = \frac{P}{R}$$

**AS  $(\text{SLOPE})_1 > (\text{SLOPE})_2$**

**$\therefore P_1 > P_2 > P_3$**

KEY : (2)

48. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to:
- A. hold the sheet there if it is magnetic
  - B. hold the sheet there if it is non-magnetic
  - C. move the sheet away from the pole with uniform velocity if it is conducting
  - D. move the sheet away from the pole with uniform velocity if it is both, non-conducting and non-polar.

Choose the correct statement (s) from the options given below:

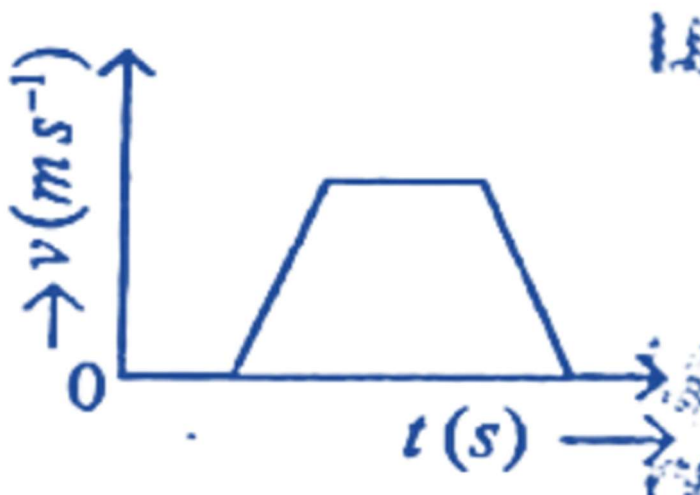
- 1) A, C and D only      2) C only      3) B and D only      4) A and C only

**ANSWER :** if the sheet is magnetic there will be force between the already present magnetic field and the field of the magnetic sheet.

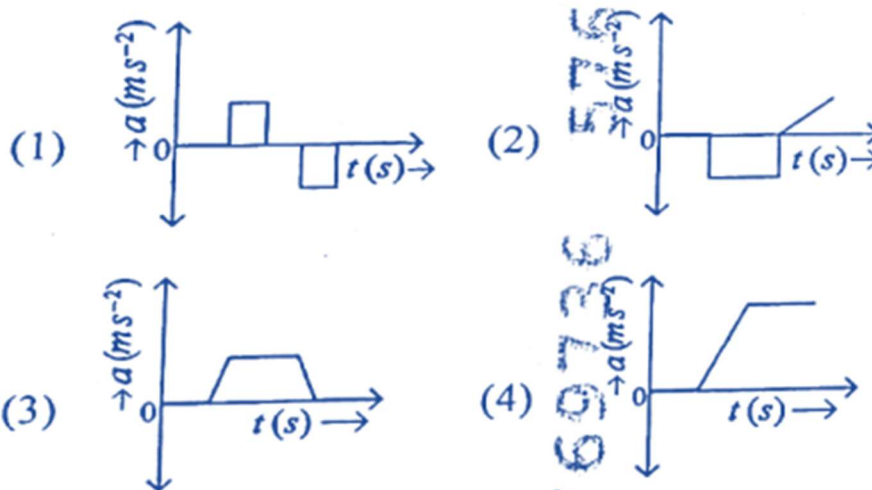
**therefore to hold the sheet still a counter force will be required, that cancels the force between the two fields.**

KEY : (1)

49. The velocity ( $v$ ) – time ( $t$ ) plot of the motion of a body is shown below:



The acceleration ( $a$ ) – time ( $t$ ) graph that best suits this motion is:



**ANSWER :** ZERO HENCE  $a = 0$

**AFTER SAME TIME SLOPE IS CONSTANT ( +Ve)**

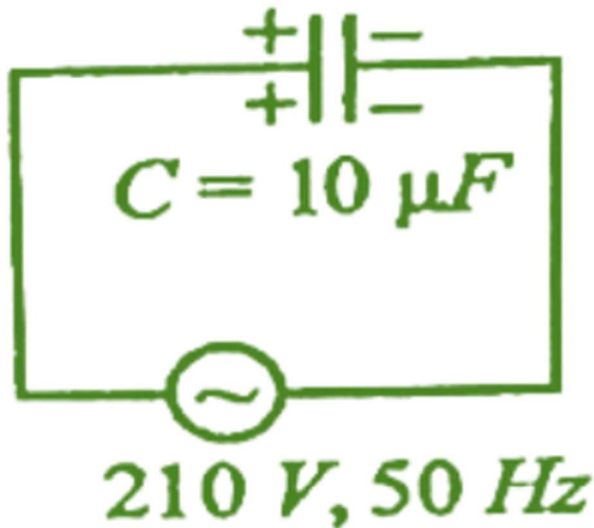
**Therefore  $a = \text{CONSTANT}$**

Next slope is zero  $a = 0$

NEXT SLOPE IS CONSTANT BUT NEGATIVE HENCE  $A = \text{constant} (-ve)$

KEY : (1)

50. A  $10 \mu F$  capacitor is connected to a 210V, 50Hz source as shown in figure. The peak current in the circuit is nearly ( $\pi = 3.14$ )



1) 1.20A

2) 0.35 A

3) 0.58 A

4) 0.93A

ANSWER :  $I_0 = \frac{V_0}{X_C} = \frac{V_0}{\frac{1}{\omega C}} = \omega C V_0$

$= 2\pi f C \times \sqrt{2} v_{rms}$

$= 2\sqrt{2} \times 3.14 \times 50 \times 210 \times 10 \times 10^{-6}$

$= 0.93$

KEY : (4)