PAPER 1A SEMESTER-III

QUESTION PAPER-1A
OCTOBER, 2013

STD. 12 PHYSICS

Time : 2.30 Hours] **(Semester-III)** **[Total Marks : 100**

Instruction :

(1) There are 64 questions in this question paper. All questions are compulsory.
(2) Figure to the right indicate full marks to the question.
(3) Select proper option to make the statement correct.
(4) The OMR sheet is given for answering the questions. The answer of each question is represented by (A)O (B)O (C)O (D)O. Darken the circle ● of the correct anwser with ball-pen.
(5) Rough work is to be done on the space providend for this purpose in the Test Booklet only.
(6) Read the question carefully before your answer.

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1. Two spheres of radii R and 3R carry $\frac{q}{2}$ charge each. If they are now connected with a conducting wire and separated from each, so charge on each sphere is ____. 2

(A) q, q (B) $\frac{q}{2}, \frac{3q}{4}$ (C) $\frac{q}{4}, \frac{3q}{4}$ (D) $\frac{3q}{4}, \frac{q}{4}$

2. Four charges each of magnitude q are placed on the vertices A, B, C and D of a square of side length a. The resultant force acting on charge placed at corner B is ____. 2

(A) $\frac{3q^2}{4\pi \in_0 a^2}$ (B) $\left[\frac{1+2\sqrt{2}}{2}\right]\frac{q^2}{4\pi \in_0 a^2}$ (C) $\frac{4q^2}{4\pi \in_0 a^2}$ (D) $\left(2+\frac{1}{\sqrt{2}}\right)\frac{q^2}{4\pi \in_0 a^2}$

3. The position vectors of two point charges of 2μc each are $(2\hat{i} + 3\hat{j} - \hat{k})$ m and $(3\hat{i} + 5\hat{j} + \hat{k})$m respectively. Magnitude of the coulombian force acting between them is ______. 2

(A) 4×10^{-3} N (B) 4×10^{-9} N (C) 4×10^{-6} N (D) 12×10^{-3} N

4. If the charge on capacitor is increasede by 5C, the energy stored in the capacitor is increased by 21%, what will be initial charge on the capacitor ? 2

(A) 10 C (B) 20 C (C) 50 C (D) 4 0 C

5. The capacitance of a parallel plate capacitor having air medium is 9 pf, and the distance between the plates is d. Two dielectric substances of dielectric constant $K_1 = 3$ and $K_2 = 6$ are placed between these plates. If the thickness of these plates are $\frac{d}{3}$ and $\frac{2d}{3}$ respectively, the capacitance of the capacitor is ______. 4

(A) 20.25 pF (B) 45 pF (C) 1.8 pF (D) 40.5 pF

6. Two wires, one of aluminium and the other made of copper are of equal lengths and they also hav equal resistances. $\rho_{Al} = 2.63 \times 10^{-8}$ Ωm. $\rho_{Cu} = 1.72 \times 10^{-8}$ Ωm density of aluminium is 2.7×10^3 kg m^{-3} and density of copper is 8.9×10^3 kg m^{-3}. The ratio of mass of copper and aluminium is ______.

(A) 2.15 (B) 4.6 (C) 0.46 (D) 0.21

7. The maximum power dissipated in an external resistance R when connected to cell of emf E and internal resistance r will be ____.

(A) $\frac{E^2}{4r}$ (B) $\frac{E^2}{2r}$ (C) $\frac{E^2}{3r}$ (D) $\frac{E^2}{r}$

8. 2A electric current flows through a straight conductor. The line joining a point lying at a distance 10 cm from the wires on the perpendicular bisector of the wires makes an angle 60° with the two ends of wire intensity of magnetic field at this point is _______ T. **2**

(A) 15×10^{-7} (B) 20×10^{-8} (C) 20×10^{-7} (D) 2×10^{-7}

9. Two particles of masses M_1 and M_2 having the equal electricl charge are accelerated through equal potential difference and then move inside a uniform magnetic field normal to it. If the radii of their circular path are R_1 and R_2 respectively, the ratio of their masses is _______. **2**

(A) $\frac{R_1}{R_2}$ (B) $\frac{R_1^2}{R_2^2}$ (C) $\frac{R_2}{R_1}$ (D) $\sqrt{\frac{R_1}{R_2}}$

10. 4A current is flowing through the circular coil with radius 5 cm. It is kept in the uniform magnetic field of 0.2 T. Number of turns in the coil is 50. The work required to rotate it by 180° from equilibrium position is _______. **2**

(A) 0.628 J (B) 2.512 J (C) 0.2512 J (D) 25.12 J

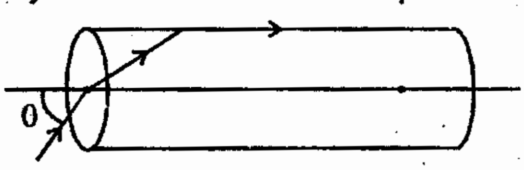
11. I electric current flows in a conducting wire of length L. If we bend it in a circular form its magnetic dipole moment would be _______. **2**

(A) $\frac{I^2L}{4\pi}$ (B) $\frac{IL^2}{4\pi}$ (C) $\frac{I^2L^2}{4\pi}$ (D) $\frac{IL}{4\pi}$

12. Two converging lenses of power 5D and 4D are placed 5 cm apart. The focal length and power of this combination will be _______. **4**

(A) 12.5 cm, 9D (B) 12.5 cm, 8D (C) 15.2 cm, 1D (D) 12.5 cm, 20D

13. The refractive index of transparent Cylindrical rod is $\frac{2}{\sqrt{3}}$. As shown in the figure the ray is incident at the mid point of its one end. **2**



For which angle of incidence, the ray become parallel to the length of rod.

(A) $\sin^{-1}\left(\frac{1}{2}\right)$ (B) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (C) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (D) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

14. An electron is accelerated from rest between two points at which potentials are 30 V and 50 V respectively. The De–Broglie wavelength associated with it will be _____. **2**

(A) 2.74 Å (B) 0.75 Å (C) 2.75 m (D) 7.5 Å

15. An electric bulb of 100W converts 3% of electric energy in to light energy. If the wavelength of light emitted is 6625 Å the number of photons emitted in 2s is _______. ($h = 6.625 \times 10^{-34}$ Js) **2**

(A) 10^{19} (B) 4×10^{19} (C) 2×10^{19} (D) 10^{18}

16. Two identical spheres carrying equal charge are separated by means of identical insulated strings. When they are immersed in a liquid, the angle between their strings remain the same as it was in air. If the density of material of the sphere and liquid are 1600 kgm^{-3} and 800 kgm^{-3} the dielectric constant of liquid will be _______. **3**

(A) 4 (B) 3 (C) 2 (D) 1

17. Mass of three copper wire are in the ratio 7 : 5 : 3 and their lengths are in the ratio 3 : 5 : 7. The ratio of their electrical resistance are ______. **2**

(A) 1 : 15 : 125 (B) 9 : 5 : 49 (C) $\frac{9}{7}:5:\frac{49}{3}$ (D) 9 : 15 : 49

18. A particle having 2c charges passes through magnetic field $4\hat{k}$T and some uniform electric field with velocity $25\hat{j}$ ms^{-1} if the Lorentz force acting on it is $400\hat{i}$N, the electric field in this region is ______. **3**

(A) $100\hat{i}$ Vm^{-1} (B) $100\hat{k}$ Vm^{-1} (C) $100\hat{j}$ Vm^{-1} (D) $10\hat{i}$ Vm^{-1}

19. A toroidal core with 5000 turns has inner and outer radii of 13 cm and 14 cm respectively. When a current of 0.4 A is passed, the magnetic field produced in the core is 2.5 T. The relative permeability of the core is ______. ($\mu_0 = 4\pi \times 10^{-7}$ TmA^{-1}) **3**

(A) 843.75 (B) 863.78 (C) 743.82 (D) 685

20. A narrow beam of light is incident on a glass plate of refractive index 1.6. It makes an angle 53° with normal to the interface. Find the lateral shift of the beam at the point of emergence, if thickness of plate is 30 mm. **3**

(A) 9.023 mm (B) 13.53 mm (C) 15.52 mm (D) 13.53 cm

21. An electron is at a distance of 5 m from a charge of 10 c. It's total energy is 21.2×10^{-10}J. Find its de–Broglie wave length at this point.

(h = 6.625 Js, $m_e = 9.1 \times 10^{-31}$ kg, $k = 9 \times 10^{10}$ SI] **3**

(A) 8.97×10^{-15}m (B) 6.94×10^{-13}M (C) 6.94×10^{-15}M (D) 8.97×10^{-13}m

22. Two identical thin rings each of radius 2 m are kept on same axis. at distance of 2 m apart. If charges on them are 5c and 3c respectively then the work required to move 1c charge from the centre of one ring to that of other ring is ______. **2**

(A) $\frac{18(\sqrt{2}-1)}{\sqrt{2}}$J (B) $9(\sqrt{2}-1) \times 10^9$J (C) $\frac{9(\sqrt{2}-1)}{\sqrt{2}} \times 10^9$J (D) $18(\sqrt{2}-1)$J

23. Two material have the value of α_1 and α_2 as 9×10^{-4}°C^{-1} and -6×10^{-4} °C^{-1} respectively. The resistivity of the first material is $\rho_{20} = 3 \times 10^{-8}$ Ωm. A new material is made combining the above two materials. The resistivity of the new material does not change with temperature. What should be the resistivity of second material ? Consider the reference temperature 20°C. Assume that the resistivity of the new material is equal to the sum of resistivity of its component material. **4**

(A) 4.5×10^{-8} Ωm (B) 2.4×10^{-8} ΩM (C) 2.25×10^{-8} Ωm (D) 3.5×10^{-8} Ωm

24. A thin glass (refractive index 1.5) lens has optical power of – 4D in air. Its optical power in a liquid medium with refractive index 1.6 will be ______. **2**

(A) + 0.5D (B) + 1.5D (C) – 0.5D (D) – 2.5D

25. The Electric Field in the region of the space is $\vec{E} = (5\hat{i} + 2\hat{j} + 3\hat{k})Nc^{-1}$. The electric flux passing through a surface of area 50 m^2 placed in X–Y plane inside the electric field is ______. **1**

(A) 250 Nm^2c^{-1} (B) 100 Nm^2c^{-1} (C) 150 Nm^2c^{-1} (D) 200 Nm^2c^{-1}

26. The dimensional formula Electric Field intensity is ______. **1**

(A) $M^1L^1T^{-2}A^{-1}$ (B) $M^1L^2T^{-3}A^{-1}$ (C) $M^1L^1T^{-3}A^{-1}$ (D) $M^1L^0T^{-3}A^{-1}$

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2. Two identical thin rings each of radius 2 m are kept on same axis. at distance of 2 m apart. If charges on them are 5c and 3c respectively then the work required to move 1c charge from the centre of one ring to that of other ring is ______. 2

(A) $\frac{18(\sqrt{2}-1)}{\sqrt{2}}$J (B) $9(\sqrt{2}-1) \times 10^9$J (C) $\frac{9(\sqrt{2}-1)}{\sqrt{2}} \times 10^9$J (D) $18(\sqrt{2}-1)$J

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4. A thin glass (refractive index 1.5) lens has optical power of – 4D in air. Its optical power in a liquid medium with refractive index 1.6 will be ______. 2

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27. Linear charge density on a straight wire of length L is $\lambda(x) = \lambda_0 x^4$. What is the total charge on the wire ? 1

(A) $\frac{\lambda_0 L}{2}$ (B) $\frac{\lambda_0 L^5}{5}$ (C) $\frac{\lambda_0 L^4}{4}$ (D) $\lambda_0 L$

28. The Force acting between two point charges in vacuum is F. The force acting at the same distance in the medium of dielectric constant K = 4 is ______. 1

(A) 4F (B) $\frac{F}{2}$ (C) 2F (D) $\frac{F}{4}$

29. An electric dipole coincides on Z–axis and its mid point is on the origin of the co-ordinate system. The electric field at an axial point at a distance Z from origin is $\vec{E}(z)$ and electric field at an equatorial point at a distance Y from origin is $\vec{E}(y)$. Here $Z = Y \geq a$. 1

SO $\left|\frac{\vec{E}(Z)}{\vec{E}(Y)}\right|$ = ______.

(A) 4 (B) 2 (C) 1 (D) 3

30. When two Spheres having 2θ and –θ charged are placed at a certain distance the force acting between them is F. Now they are connected by a conducting wire and again separated from each other how much force will act between them if the separation now is same as before the force acting between them will be. 1

(A) F (B) $\frac{F}{2}$ (C) $\frac{F}{8}$ (D) $\frac{F}{4}$

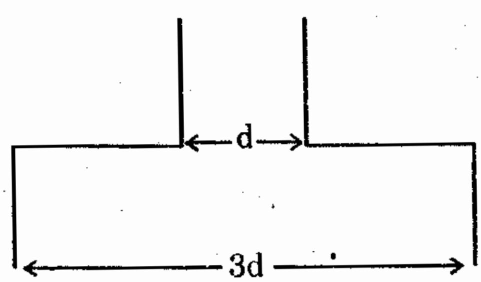
31. Two charged spheres of radii R_1 and R_2 are connected with the help of a conducting wire and then they are separated. The ratio of electric field on their surfaces are E_1 and E_2 respectively then $\frac{E_1}{E_2}$ = ______. 1

(A) $\frac{R_2}{R_1}$ (B) $\frac{R_2^2}{R_1^2}$ (C) $\frac{R_1}{R_2}$ (D) $\frac{R_1^2}{R_2^2}$

32. Six identical square metallic plates are arranged as shown in figure. Length of each plate is l. The Capacitance of this arrangement would be ______. 1

(A) $\frac{4 \epsilon_0 l^2}{3d}$ (B) $\frac{5 \epsilon_0 l^2}{d}$

(C) $\frac{5 \epsilon_0 l^2}{4d}$ (D) $\frac{3 \epsilon_0 l^2}{2d}$



33. On each vertices of a square, of each side equal to length a, + q, + q, –q and –q charges are there, so potential at the centre of the square is ______. 1

(A) $\frac{1}{4\pi \epsilon_0} \frac{q}{a}$ (B) $\frac{1}{4\pi \epsilon_0} \frac{4q}{a}$ (C) $\frac{1}{4\pi \epsilon_0} \frac{2q}{a}$ (D) zero

34. 27 small drops of water having same charge and same radius are combined to form one big drop. The ratio of capacitance of one big drop to small drop is ______. 1

(A) 2 : 1 (B) 3 : 1 (C) 1 : 3 (D) 1 : 2

35. If the electric potential at point in some region (x, y, z)m is $V(x, y, z) = 5x^2y \times 3y^2z + 2z^2x$. The X – component of Electric field (E_x) at a point (1, 2, 0) is ___unit. 1

(A) –10 (B) –15 (C) 20 (D) 0

36. Radius of nucleus of an atom of z = 50 is 9×10^{-15} m. Electric potential on the surface of the nucleus is ______. 1

(A) 9×10^6V (B) 9 V (C) 80V (D) 8×10^6 V

37. Two plates are 10cm apart and the potential difference between them is 20V. The electric field between the plates is ______. V/m. 1

(A) 2 (B) 20 (C) 200 (D) 0.5

38. On applying an electric field of 15×10^{-6} Vm^{-1} across a conductor, current density through it is 3.0 Am^{-2} the resistivity of the conductor is ______. 1

(A) $45 \times 10^{-6}\Omega m$ (B) $0.5 \times 10^{-6}\Omega m$ (C) $5 \times 10^{-6}\Omega m$ (D) $2 \times 10^5\Omega m$

39. The charge flowing the conductor at time t is $Q = 4t^2 + 6t + 4$, the current flowing through it at t = 2s is ______. 1

(A) 22A (B) 6A (C) 16A (D) 15A

40. The drift velocity of free electrons through a conducting wire of radius r carrying current I is v_d. If the same current is passed through conductor of radius 3r, what will be the drift velocity ? 1

(A) $3v_d$ (B) $\frac{v_d}{q}$ (C) v_d (D) $6v_d$

41. L is the length and D is diameter of a conducting wire. For which of the following dimension will the resistance of wire become minimum ? 1

(A) 2L, $\frac{D}{2}$ (B) $\frac{L}{2}$, 2D (C) L, D (D) 2L, 2D

42. Length of wire and resistance RΩ is increased 5 times, so its resistance become 100Ω therefore R = ______. (The volume of the wire remain same during increase in length). 1

(A) 20Ω (B) 40Ω (C) 4Ω (D) 2Ω

43. Resistance of a potentiometer wire is R. Ω heat H Cal. is produced in it per second on passing electric current through it. How much is the value of current passing through it ______ ? 1

(A) HR (B) $\frac{JH}{R}$ (C) $\sqrt{\frac{JH}{R}}$ (D) H/R

44. The dimensional formula of resistivity is ______. 1

(A) $M^1L^2T^{-3}A^{-2}$ (B) $M^1L^3T^{-3}A^{-2}$ (C) $M^1L^3T^{-2}A^{-3}$ (D) $M^1L^1T^{-2}A^{-1}$

45. The magnetic field at the centre of ring carrying electric current is ______ of Area of the ring. 1

(A) inversely proportional to sq[illegible] of (B) inversely proportional

(C) directly proportional (D) directly proportional to square root of

46. An electron performs circular motion of radius r perpendicular to uniform magnetic field B. The Kinetic energy gained by this electron in half the revolution is ______.

(A) $\frac{1}{2}mv^2$ (B) 0 (C) $\frac{1}{4}mv^2$ (D) $\pi rBev$

47. A strong magnetic field is applied on a stationary electron. Then the electron ____. 1

(A) begain spin (B) moves opposite the direction of magnetic field

(C) moves in the direction of the field (D) remain stationary

48. The resistance of moving coil galvanometer is 99 Ω. What value of shunt is required to pass 10% of main current through the glvanometer ? 1

(A) 11Ω (B) 10Ω (C) 9.9Ω (D) 9Ω

49. The Magnetic field at a point which is at a perpendicular distance r from a long current carrying wire is 0.5T. The field of induction at a distance $\frac{r}{2}$ from the same current carrying wire is ______. 1

(A) 0.25T (B) 0.75T (C) 1T (D) 2T

50. On passing 10A current through the circular coil of radius 5cm, magnetic field produce at the center of coil is 3.14×10^{-3}T. Number of turns in the coil will be ______. 1

(A) 250 (B) 50 (C) 25 (D) 100

51. Out of following the resistance of which device is maximum ? 1

(A) Galvanometer (B) Voltmeter (C) Ammeter (D) Mili Ammeter

52. The magnetic susceptibilities of a substance is −0.925. Its relative magnetic permeability is ______. 1

(A) 0.075 (B) −0.075 (C) 1.925 (D) 1.075

53. The magnet of pole strnegth p and magnetic moment $\vec{m}$ is cut into two pieces along its axis. Its pole strength and magnetic moment now become ______. 1

(A) p, $\frac{\vec{m}}{2}$ (B) $\frac{p}{2}$, $\vec{m}$ (C) $\frac{p}{2}$, $\frac{\vec{m}}{2}$ (D) p, $\vec{m}$

54. A proton and an alpha particle enter in a uniform magnetic field perpendicularly with same speed. The periodic time of circular motion of alpha particle will be ______ that of proton. 1

(A) Four times (B) Three times (C) Two times (D) Equal to

55. A bar magnet is oscillating in earth's magnetic field with periodic time T. If a similar magnet with the same mass and volume has magnetic dipole moment 9 times that of magnet, then its periodic time will be ______. 1

(A) $\frac{T}{3}$ (B) T (C) 3T (D) 9T

56. A thin convex lens has equal radii of curvature equal to 20 cm. If the refractive index of convex lens is 1.5, its focal length will be ______. 1

(A) 10 cm (B) 15 cm (B) 20 cm (D) 40 cm

57. The refractive index of water is 4/3. The distance travel by light in water in 3 second is ______. ($c = 3 \times 10^8\ ms^{-1}$) 1

(A) 6.75×10^8m (B) 13.5×10^8m (C) 4.5×10^8m (D) 2.25×10^8m

58. A person can not see the object beyond 200 cm. The power of lens to correct the vision will be ______. 1

(A) +0.5D (B) +5D (C) –0.5D (D) –5D

59. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will ______. 1

(A) zero (B) infinite (C) reduce (D) increase

60. When a ray of light travel from one medium to other then the physical quantity which does not change is ______. 1

(A) velocity (B) wave length (C) frequency (D) intensity

61. When a piece of sodium or potassium are exposed to sun light ______. 1

(A) they will become negatively charged (B) will remain neutral

(C) they will become positively charged (D) will emit proton

62. The dimensional formula of Plank Constant is ______. 1

(A) $M^1L^2T^{-1}$ (B) $M^1L^0T^{-2}$ (C) $M^1L^2T^{-3}$ (D) $M^1L^2T^{-2}$

63. The linear momentum of a particle is 1.1×10^4 kgms^{-1}. The De-Broglie wave length associated with this particle is ______. ($h = 6.6 \times 10^{-34}$ JS).

(A) 6×10^{-29} nm (B) 12×10^{-29}nm (C) 6×10^{-29}m (D) 3×10^{-29}nm

64. If λ is the wave length of incident radiation and ϕ is the work function of metal, under which condition photo–electric effect will not occur ?

(A) $\lambda > \frac{hc}{\phi}$ (B) $\lambda < \frac{hc}{\phi}$ (C) $\lambda = \frac{hc}{\phi}$ (D) $\lambda \leq \frac{hc}{\phi}$

Question Paper-1 : October 2013 Answers

1. (C) $\frac{q}{4}, \frac{3q}{4}$

➢ In touching method, distribution of charge of sphere's are directly proportional to radius of sphere

$\therefore q_1 \propto R_1, q_2 \propto R_2$

$\therefore \frac{q_1}{q_2} = \frac{R_1}{R_2} = \frac{R}{3R}$

$\therefore q_2 = 3q_1$

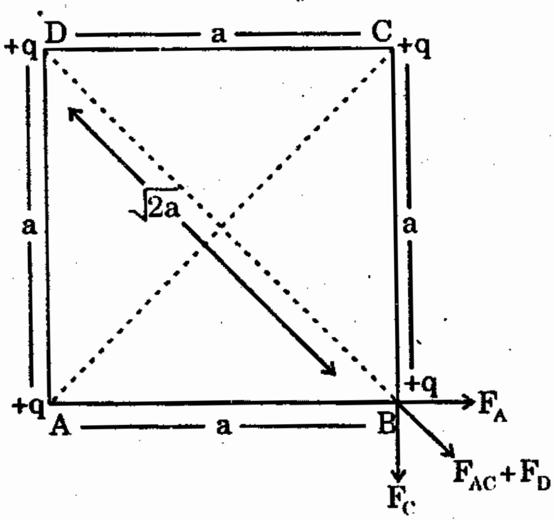
Now $q_1 + q_2 = q$

$\therefore q_1 + 3q_1 = q \qquad \therefore 4q_1 = q$

$\therefore q_1 = \frac{q}{4}$ and $q_2 = \frac{3q}{4}$

$\therefore q_1 = \frac{q}{4}, q_2 = \frac{3q}{4}$

2. (B) $\left[\frac{1+2\sqrt{2}}{2}\right]\frac{q^2}{4\pi \in_0 a^2}$

➢ 

Here $F_{AC} = \sqrt{F_A^2 + F_C^2}$

Now $F_{net} = F_{AC} + F_D = \sqrt{F_A^2 + F_C^2} + F_D$

$F_A = F_B = \frac{kq^2}{a^2}, F_D = \frac{kq^2}{(\sqrt{2}a)^2} = \frac{kq^2}{2a^2}$

$\therefore F_{net} = \sqrt{\left(\frac{kq^2}{a^2}\right)^2 + \left(\frac{kq^2}{a^2}\right)^2} + \frac{kq^2}{2a^2}$

$= \sqrt{2\left(\frac{kq^2}{a^2}\right)^2} + \frac{kq^2}{2a^2}$

$\therefore F_{net} = \sqrt{2}\frac{kq^2}{a^2} + \frac{kq^2}{\sqrt{2}a^2} = \frac{kq^2}{a^2}\left(\sqrt{2} + \frac{1}{2}\right)$

$= \left(\frac{1+2\sqrt{2}}{2}\right)\frac{q^2}{4\pi \in_0 a^2}$

3. (D) 12×10^{-3} N

➢ $q_1 = q_2 = 2\mu C = 2 \times 10^{-6}$ C

$\vec{r_1} = (2, 3, -1)m, \vec{r_2} = (3, 5, 1)m$

$\vec{F_{12}} = \frac{kq_1q_2}{(\vec{r_1} - \vec{r_2})^3}(\vec{r_1} - \vec{r_2}) \qquad ...(1)$

here $\vec{r_1} - \vec{r_2} = (2, 3, -1) - (3, 5, 1)$
$= (-1, -2, -2)$

$\therefore |\vec{r_1} - \vec{r_2}| = \sqrt{1^2 + 2^2 + 2^2}$
$= \sqrt{1+4+4} = 3m$

So equation (1) become,

$\vec{F_{12}} = \frac{9\times10^9 \times 2\times10^{-6}\times2\times10^{-6}}{(3)^3}$ (−1, −2, −2

$= 4 \times 10^{-3}(-1, -2, -2)$

$\therefore |\vec{F_{12}}| = 4 \times 10^{-3}\sqrt{1+4+4}$

$= 4 \times 10^{-3}\sqrt{9}$

$= 4 \times 3 \times 10^{-3} = 12 \times 10^{-3}$ N

4. (B) 20 C

➢ $U = \frac{Q^2}{2C}$

$\therefore U + \frac{21}{100}U = \frac{(Q+2)^2}{2C}$

$\therefore \frac{1.21U}{U} = \frac{(Q+2)^2}{Q^2}$

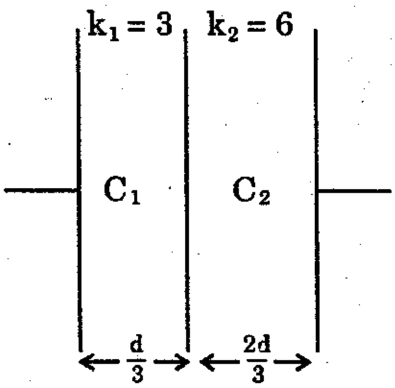
$\therefore 1.21 = \left(\frac{Q+2}{Q}\right)^2$

$\therefore \frac{Q+2}{Q} = \sqrt{1.21}$

$\therefore Q + 2 = 1.1Q$

$\therefore Q = 20C$

5. (D) 40.5 pf



In air $C = \frac{A\varepsilon_0}{d} = 9$ pF

$$C_1 = \frac{k_1 A\varepsilon_0}{d/3} = \frac{3A\varepsilon_0}{d/3} = 9\frac{A\varepsilon_0}{d} = 81 \text{ pF}$$

$$C_2 = \frac{k_2 A\varepsilon_0}{2d/3} = \frac{6A\varepsilon_0}{2d/3} = \frac{9A\varepsilon_0}{d} = 81 \text{ pF}$$

Both are in series so,

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} = \frac{1}{81} + \frac{1}{81} = \frac{2}{81} = \frac{1}{40.5}$$

$\therefore C = 40.5$ pF

6. (A) 2.15

➢ For aluminum $R_1 = \rho_1 \frac{l_1}{A_1}$

Similarly for copper $R_2 = \rho_2 \frac{l_2}{A_2}$

But $R_1 = R_2$ and $l_1 = l_2$

$$\frac{\rho_1}{A_1} = \frac{\rho_2}{A_2} \Rightarrow \frac{A_2}{A_1} = \frac{\rho_2}{\rho_1}$$

Multiplying both sides by the respective desnities

$$\frac{d_2 A_2}{d_1 A_1} = \frac{d_2 \rho_2}{d_1 \rho_1} = \frac{8.9 \times 10^3 \times 1.72 \times 10^{-8}}{2.7 \times 10^3 \times 2.63 \times 10^{-8}}$$

$$\frac{d_2 A_2}{d_1 A_1} = \frac{m_2}{m_1} = 2.15$$

m_1 being less then m_2, the aluminum wire is lighter.

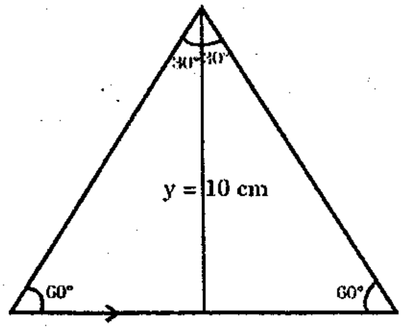
7. (A) $\frac{E^2}{4r}$ V

➢ When R = r power is maximum

i.e. $P = \frac{\varepsilon^2 \cdot R}{(R+r)^2} = \frac{\varepsilon^2 \cdot r}{(r+r)^2} = \frac{\varepsilon^2}{4r}$

8. (C) 20×10^{-7} T

➢



$$B = \frac{\mu_0 I}{4\pi y}(\sin\theta_1 + \sin\theta_2)$$

$$= \frac{4\pi \times 10^{-7} \times 2}{4\pi \times 10 \times 10^{-2}}(\sin 30° + \sin 30°)$$

$$= 2 \times 10^{-6}\left(\frac{1}{2} + \frac{1}{2}\right)$$

$$= 2 \times 10^{-6} = 20 \times 10^{-7} \text{ T}$$

9. (B) $\frac{R_1^2}{R_2^2}$

➢ Here both equal electric charges are accelerated through same p.d. for 1st charge,

$V.q = \frac{1}{2}M_1 v_1^2$ ...(1)

For 2nd charge $Vq = \frac{1}{2}M_2 v_2^2$ ...(2)

From (1) and (2)

$\frac{1}{2}M_1 v_2^2 = \frac{1}{2}M_2 v_2^2$

$\therefore M_1 v_1^2 = M_2 v_2^2$ ...(3)

Also both charges are move under same magnetic field then

$\frac{M_1 v_1^2}{R_1} = qBv_1 \quad \therefore qB = \frac{M_1 v_1}{R_1}$

and $\frac{M_1 v_2^2}{R_2} = qBv_2 \quad \therefore qB = \frac{M_2 v_2}{R_2}$

So, $\frac{M_1 v_1}{R_1} = \frac{M_2 v_2}{R_2} \quad \therefore \frac{M_1^2 v_1^2}{R_1^2} = \frac{M_2^2 v_2^2}{R_2^2}$

but from (3) $M_1 v_1^2 = M_2 v_2^2$

$\therefore \frac{M_1}{R_1^2} = \frac{M_2}{R_2^2}$

$\therefore \frac{M_1}{M_2} = \left(\frac{R_1}{R_2}\right)^2$

10. (A) 0.628 J

➢ $W = mB(\cos\theta_1 - \cos\theta_2)$

$= NIAB(\cos 0° - \cos 180°)$

$NI\pi r^2 B(1 + 1) = 2NI\pi r^2 \cdot B$

$= 2 \times 50 \times 3.14 \times (5 \times 10^{-2})^2 \times 0.2 \times 4$

$= 0.628$ J

11. (B) $\frac{IL^2}{4\pi}$

➢ $L = 2\pi r$

$\therefore r = \frac{L}{2\pi}$ also $m = IA = \pi r^2 \cdot I$

$\therefore m = \pi \frac{L^2 I}{4\pi^2} = \frac{IL^2}{4\pi}$

12. (B) 12.5 cm, 8D

➢ Focal length of first lens,

$f_2 = \frac{1}{5} = 0.2$ m $= 20$ cm

Focal length of second lens,

$f_2 = \frac{1}{4} = 0.25$ m $= 25$ cm

Distance between two lenses, d = 5 cm

Now, equivalent focal length of this combination is

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}$$

$$f = \frac{f_1 \cdot f_2}{(f_1 + f_2) - d} = \frac{20 \times 25}{(20+25) - 5}$$

$= 12.5$ cm

And equivalent power is given by,

$P = (P_1 + P_2) - d.P_1P_2$

$= (5 + 4) - (0.05) \times (5)(4)$

(d is written in meter)

$\therefore P = 8$ D or $P = \frac{1}{f} = \frac{1}{0.125}$

$= 12.5$ cm $= 8$D

13. (D) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

➢ $n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\therefore (1) \sin\theta = \frac{2}{\sqrt{3}} \sin 90°$

$\therefore \sin\theta = \frac{2}{\sqrt{3}} \quad \therefore \theta = \sin^{-1}\frac{2}{\sqrt{3}}$

14. (A) 2.74 Å

➢ Here V = change in p.d. = 50 – 30 = 20V

Now

$$\lambda = \frac{h}{\sqrt{2mqV}}$$

$$= \frac{6.625 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 1.6 \times 10^{-19} \times 20}}$$

$$= \frac{6.625 \times 10^{-34}}{\sqrt{582.4 \times 10^{-30}}}$$

$$= \frac{6.625 \times 10^{-34}}{24.13 \times 10^{-15}}$$

$= 0.2745 \times 10^{-9}$

$= 2.745 \times 10^{-10} = 2.745$ Å

15. (A) 10^{19}

➢ Here, $\lambda = 6625 \times 10^{-10}$ m,

$c = 3 \times 10^8$ m/s, n = ?

nhf = 3 joule/sec

$\therefore \frac{nhc}{\lambda} = 3$

$\therefore n = \frac{3\lambda}{hc} = \frac{3 \times 6625 \times 10^{-10}}{6.625 \times 10^{-34} \times 3 \times 10^8}$

$\therefore n = 10^{19}$ per second.

16. (C) 2

➢ $\rho' = \frac{\rho k}{k-1}$

$\therefore 1600 = \frac{800k}{k-1}$

$\therefore 2(k - 1) = k$

$\therefore 2k - 2 = k$

$\therefore k = 2$

17. (C) $\frac{9}{7} : 5 : \frac{49}{3}$

➢ $m_1 : m_2 : m_3 = 7 : 5 : 3$,

$l_1 : l_2 : l_3 = 3 : 5 : 7$

$R = \frac{\rho l}{A} = \frac{\rho l^2}{V} = \frac{\rho l^2 d}{m} \quad \therefore R \propto \frac{l^2}{m}$

$R_1 : R_2 : R_3 = \frac{l_1^2}{m_1} = \frac{l_2^2}{m_2} = \frac{l_3^2}{m_3}$

$= \frac{9}{7} : \frac{25}{5} : \frac{49}{3} = \frac{9}{7} : 5 : \frac{49}{3}$

18. (A) $100\hat{i}$ Vm^{-1}

➢ Lorentz force

$\vec{F} = q[\vec{E} + \vec{v} \times \vec{B}]$

Here, $q = 2\ c$, $\vec{v} = 25\hat{j}\ ms^{-1}$,

$\vec{B} = 4\hat{k}T$, $\vec{F} = 400\hat{i}$

$\therefore 400\vec{F} = 2[\vec{E} + (25)(4)(\hat{j} \times \hat{k})]$

$= 2\vec{E} + 200\hat{i}$

$\therefore 2\vec{E} = 200\hat{i}$

$\therefore \vec{E} = 100\hat{i}\ Vm^{-1}$

19. (A) 843.75

➢ N = 5000

Average radius $r = \frac{13+14}{2} = 13.5$ cm

$= 13.5 \times 10^{-2}$ m

$n = \frac{N}{l} = \frac{N}{2\pi r}$, $I_f = 0.4$ A, B = 2.5 T,

$k_m = \frac{\mu}{\mu_0} = (?)$

$B = \mu N = \mu n I_f$

$\therefore \frac{B}{\mu_0} = \frac{\mu}{\mu_0} I_f = k_m n I$

$\therefore k_m = \frac{B}{\mu_0 n I_f} = \frac{B 2\pi r}{\mu_0 N I_f}$

58. $= \frac{2.5 \times 2\pi \times 13.5 \times 10^{-2}}{4\pi \times 10^{-7} \times 5000 \times 0.4}$

$= 0.0084375 \times 10^5$

ha $= 843.75$ ...ter is ....

20. (B) 13.53 mm

➢ From Snell's law $n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\therefore (1) \sin 53° = 1.6 \sin\theta_2$

$\therefore \sin\theta_2 = \frac{0.8}{1.6} = \frac{1}{2} = \sin 30°$

$\therefore \theta_2 = 30°$

Now, $x = \frac{t\sin(\theta_1 - \theta_2)}{\cos\theta_2}$

$= \frac{30\sin(53° - 30°)}{\cos 30°}$

$= \frac{30\sin 23°}{\cos 30°} = \frac{30 \times 0.3907 \times 2}{\sqrt{3}}$

$= 13.53$ mm

21. (C) 6.94×10^{-15}M

➢ P.E. of electron

$U = \frac{k(q)(e)}{r}$

$= -\frac{9 \times 10^9 \times 10 \times 1.6 \times 10^{-19}}{5}$

$= -28.8 \times 10^{-10}$ J

Total energy = K.E. + P.E.

$\therefore K = E - U$

$= 21.2 \times 10^{-10} + 28.8 \times 10^{-10}$

$= 50 \times 10^{-10}$ J

Now $\lambda = \frac{h}{\sqrt{2mK}}$

$= \frac{6.625 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 50 \times 10^{-10}}}$

$= \frac{6.625 \times 10^{-34}}{\sqrt{910 \times 10^{-41}}} = \frac{6.625 \times 10^{-34}}{\sqrt{91 \times 10^{-40}}}$

$= \frac{6.625 \times 10^{-34}}{9.53 \times 10^{-20}} = 0.695 \times 10^{-14}$

$= 6.95 \times 10^{-15}$ m

22. (C) $\frac{9(\sqrt{2}-1)}{\sqrt{2}} \times 10^9$J

➢ $W = \frac{q(Q_1 - Q_2)}{4\pi\varepsilon_0 R}\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$

$= \frac{kq(Q_1 - Q_2)}{R}\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$

$= \frac{9 \times 10^9 \times 1(5-3)}{2}\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$

$= 9 \times 10^9 \left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$ J

23. (A) $4.5 \times 10^{-8}\ \Omega$m

➢ We have $(\rho_{20})_2 = \frac{(\rho_{20})_1 \alpha_1}{\alpha_2}$

$= +\frac{3 \times 10^{-8} \times 9 \times 10^{-4}}{6 \times 10^{-4}}$

$= 4.5 \times 10^{-8}\ \Omega \cdot$m

24. (C) – 0.5D

➢ $P = \frac{1}{f} = \left(\frac{n_g}{n_a} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$P' = \frac{1}{f} = \left(\frac{n_l}{n_c} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$$\therefore \frac{P'}{P} = \frac{\left(\frac{n_l}{n_e} - 1\right)}{\left(\frac{n_g}{n_a} - 1\right)} = \frac{\left(\frac{1.5}{1.6} - 1\right)}{\left(\frac{1.5}{1} - 1\right)} = \frac{\frac{-0.1}{1.6}}{0.5}$$

$$\therefore P' = \frac{-1 \times 2}{16 \times 1} P = -\frac{1}{8} P$$

$$= \frac{-1}{8} \times 4 = \frac{-1}{2} = -0.5D$$

25. (C) 150 Nm^2c^{-1}

➢ $\vec{E} = 5\hat{i} + 2\hat{j} + 3\hat{k}\ \frac{N}{C}$,

A = 50m^2 in XY plane

$$\therefore \vec{A} = 50\hat{k}\ m^2$$

$$\phi = \vec{E} \cdot \vec{A}$$

$$= (5\hat{i} + 2\hat{j} + 3\hat{k}) \cdot (50\hat{k})$$

$$= 150\ Nm^2C^{-1}$$

26. (C) $M^1L^1T^{-3}A^{-1}$

➢ $E = \frac{F}{q} = \frac{N}{C} = \frac{M^1L^1T^{-2}}{A^1T^1} = M^1L^1T^{-3}A^{-1}$

27. (B) $\frac{\lambda_0 L^5}{5}$

➢ $Q = \int_0^L \lambda(x)\,dx = \lambda_0 \int_0^L x^4\,dx$

$$= \lambda_0 \left(\frac{x^5}{5}\right)_0^L = \frac{\lambda_0 L^5}{5}$$

28. (D) $\frac{F}{4}$

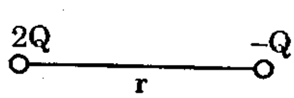
➢ $F' = \frac{F}{k} = \frac{F}{4}$

29. (B) 2

➢ $|\vec{E}(z)| = \frac{2kp}{z^3}$, $|\vec{E}(y)| = \frac{kp}{y^3}$

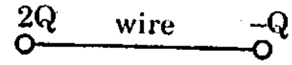
at $z = y >> a$, $\frac{|\vec{E}(z)|}{|\vec{E}(y)|} = 2$

30. (C) $\frac{F}{8}$

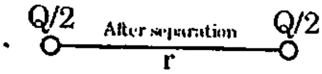
➢ 

$$F = \frac{k(2Q)(Q)}{r^2} = \frac{2kQ^2}{r^2} \qquad ...(1)$$

(only magnitude)



$\therefore$ Charge on each sphere $= \frac{2Q - Q}{2} = \frac{Q}{2}$

After separation, 

$$\therefore F_1 = \frac{k\left(\frac{Q}{2}\right)\left(\frac{Q}{2}\right)}{r^2} = \frac{kQ^2}{4r^2} \qquad ...(2)$$

$$\therefore \frac{F}{F_1} = \frac{2kQ^2}{r^2} \times \frac{4r^2}{kQ^2} = 8$$

$$\therefore F_1 = \frac{F}{8}$$

31. (C) $\frac{R_1}{R_2}$

➢ Electric field on the surface a charged sphere is,

$$E = \frac{kQ}{R^2} = \frac{\left(\frac{kQ}{R}\right)}{R} = \frac{V}{R}$$

After bringing in contact, electric potential on the surface of both spheres become equal.

$$\therefore E \propto \frac{1}{R}$$

$$\therefore \frac{E_1}{E_2} = \frac{R_2}{R_1}$$

32. (A) $\frac{4\varepsilon_0 l^2}{3d}$

➢ Area of each plate = A = l^2. Capacitance formed by plates 1 and 2 is $C_1 = \frac{\varepsilon_0 A}{d}$

Capacitance formed by plates 3 and 4 is zero because effective parallel area between two plates = 0.

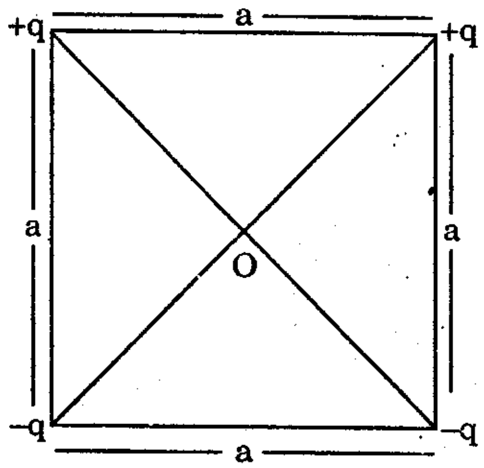
Capacitance formed by plates 5 and 6 is $C_3 = \frac{\varepsilon_0 A}{3d}$.

Now C_1 and C_3 are in parallel,

$$\therefore C = C_1 + C_3 = \frac{\varepsilon_0 A}{d} + \frac{\varepsilon_0 A}{3d}$$

$$= \frac{4}{3}\frac{\varepsilon_0 A}{d} = \frac{4}{3}\frac{\varepsilon_0 l^2}{d}$$

33. (D) zero

➢ 

Distance between vertices and centre of square is $r = \frac{a}{\sqrt{2}}$

Total electrical potential at the centre

$V = V_1 + V_2 + V_3 + V_4$

$$= \frac{kq}{\frac{a}{\sqrt{2}}} + \frac{kq}{\frac{a}{\sqrt{2}}} - \frac{kq}{\frac{a}{\sqrt{2}}} - \frac{kq}{\frac{a}{\sqrt{2}}} = 0$$

34. (B) 3 : 1

➢ Volume of big drop = 27 (volume of small drops)

$\frac{4}{3}\pi R^3 = 27\left(\frac{4}{3}\pi R^3\right)$

$\therefore R = 3r$

Now $C = 4\pi\varepsilon_0 R = \frac{C_R}{C_r} = \frac{R}{r} = \frac{3r}{r} = \frac{3}{1}$

$\therefore C_R : C_r = 3 : 1$

35. (C) 20 unit

➢ $E_x = -\frac{dv}{dx} = -10xy + 0 + 2z^2$

$= -10xy + 2z^2$

Substitute $x = 1, y = 2, z = 0$

$E_x = -10(1)(2) + 2(0)^2 = -20$

$\therefore |E_x| = 20$ unit

36. (D) 8×10^6 V

➢ $V = \frac{kQ}{r} = \frac{k(ne)}{r}$

$= \frac{9 \times 10^9 \times 50 \times 1.6 \times 10^{-19}}{9 \times 10^{-15}}$

$= 80 \times 10^{+5} = 8 \times 10^6$ V

37. (C) 200 V/m

➢ $d = 10$ cm $= 10 \times 10^{-2}$ m, $V = 20V$

$E = \frac{V}{d} = \frac{20}{10^{-1}} = 200$ V/m

38. (D) $2 \times 10^5 \Omega m$

➢ $E = J \cdot \sigma = \frac{J}{\rho}$

$\therefore \rho = \frac{J}{E} = \frac{3}{15 \times 10^{-6}} = \frac{1}{5 \times 10^{-6}}$

$= 0.2 \times 10^{+6} = 2 \times 10^5 \Omega m$

39. (A) 22A

➢ $Q = 4t^2 + 6t + 4$, $\frac{dQ}{dt} = 8t + 6$

I (at t = 2 sec) = 8(2) + 6 = 22A

40. (B) $\frac{v_d}{q}$

➢ $I = Av_d ne \quad \therefore v_d \propto \frac{1}{A} \quad \therefore v_d \propto \frac{1}{r^2}$

So, $\frac{v'_d}{v_d} = \left(\frac{r}{r^1}\right)^2 = \left(\frac{r}{3r}\right)^2 = \frac{1}{9}$

$\therefore v'_d = \frac{v'_d}{q}$

41. (B) $\frac{L}{2}$, 2D

➢ $R = \frac{\rho l}{A} = \frac{\rho l^2}{A \cdot l} = \frac{\rho l^2}{V} = \frac{\rho l^2}{\frac{4}{3}\pi D^2}$

$\therefore R \propto \frac{l^2}{D^2}$

Resistance should be minimum for smaller value of length and higher value of diameter.

i.e. $l' = \frac{L}{2}$, $d' = 2D$

42. (C) 4Ω

➢ $R \propto l^2$

So, $\frac{R_2}{R_1} = \left(\frac{l_2}{l_1}\right)^2 = \left(\frac{5l_1}{l_1}\right)^2 = 25$

$\therefore R_1 = \frac{R_2}{25} = \frac{100}{25} = 4\Omega$

43. (C) $\sqrt{\frac{JH}{R}}$

➢ $H = \frac{I^2Rt}{J}$; at t = 1, $H = \frac{I^2R}{J}$

$I^2 = \frac{HJ}{R}$; $I = \sqrt{\frac{HJ}{R}}$

44. (B) $M^1L^3T^{-3}A^{-2}$

➢ $R = \frac{\rho l}{A} \therefore \rho = \frac{RA}{e} = \Omega m$

$[\rho] = M^1L^2T^{-3}L^1 = M^1L^3T^{-3}A^{-2}$

(B) inversely proportional

$B \propto \frac{1}{r}$

46. (B) 0

➢ K.E. = const $\Delta K \cdot E = 0$

$\therefore W = DK \cdot E = 0$

47. (D) remain stationary

➢ Here velocity of electron = 0.

So $F = qvB\sin\theta = 0$

48. (A) 11 Ω

➢ $S = \frac{4I_4}{I - I_4} = \frac{99 \times 0.11}{1 - 0.11} = 11\ A$

49. (C) 1T

➢ $B \propto \frac{1}{y} \quad \therefore \frac{B'}{B} = \frac{y}{y'} = \frac{r}{r/2} = 2$

$\therefore B' = 2B = 2(0.5) = 1.0\ T$

50. (C) 25

➢ $B = \frac{\mu_0 NI}{2r}$

$\therefore N = \frac{2Br}{\mu_0 I} = \frac{2 \times 3.14 \times 10^{-3} \times 5 \times 10^{-2}}{4\pi \times 10^{-7} \times 10}$

$= 0.25 \times 10^2 = 25$

51. (B) Voltmeter

52. (A) 0.075

➢ $\mu_r = 1 + XXX_m$

$\mu_r = 1 - 0.925 = 0.075$

53. (C) $\frac{p}{2}, \frac{\vec{m}}{2}$

➢ When magnetic is cut in to two pieces along its axi then its magnetic moment and pole strength, both are half.

54. (C) Two times

➢ $T = \frac{2\pi m}{qB}$

For α–particle $T_\alpha = \frac{2\pi m\alpha}{q_\alpha B}$ and for proton $T_P = \frac{2\pi m_P}{q_P B}$

$\therefore \frac{T_\alpha}{T_P} = \frac{m_\alpha}{q_\alpha} \times \frac{q_P}{m_P} = \frac{(4m_P)}{(2e)} \times \frac{e}{m_P} = 2$

$\therefore T_\alpha = 2T_P$

55. (A) $\frac{T}{3}$

➢ $m_1 = m,\ m_2 = 9m$

$T = 2\pi\sqrt{\frac{I}{mB}} \Rightarrow \frac{T_2}{T_1} = \sqrt{\frac{m_1}{m_2}} = \sqrt{\frac{m}{9m}} = \frac{1}{3}$

$\therefore T_2 = \frac{T_1}{3} = \frac{T}{3}$

56. (C) 20 cm

➢ $n = 1.5,\ R_1 = 200m,\ R_2 = -20\ cm$

$\frac{1}{f} = (n - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$= (1.5 - 1)\left(\frac{1}{20} + \frac{1}{20}\right) = (0.5)\left(\frac{2}{20}\right)$

$\therefore f = 20\ cm$

57. (D) $2.25 \times 10^8 m$

➢ $t = \frac{d}{V}$ but $n = \frac{C}{V} \quad \therefore V = \frac{C}{n}$

$\therefore t = \frac{n \cdot d}{c}$

$\therefore d = \frac{t \cdot C}{n} = \frac{3 \times 3 \times 3 \times 10^8}{4}$

$= 2.25 \times 10^8\ m$

58. (A) +0.5D

➢ $f = 200\ cm = 200 \times 10^{-2}\ m$

$\therefore P = \frac{1}{f} = \frac{1}{200 \times 0^{-2}} = \frac{100}{200} = 0.5D$

59. (B) infinite

➢ $\frac{1}{f} = \left(\frac{n_2 - n_1}{n_1}\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ here $n_1 = n_2$

So, $\frac{1}{f} = 0 \therefore f = \frac{1}{0}$ = infinite

60. (C) frequency

➢ Frequency is characteristic of source, not medium.

61. (C) they will become positively charged

62. (A) $M^1L^2T^{-1}$

$[h]$ = Joule–sec. = $M^1L^2T^{-2}T^1 = M^1L^2T^{-1}$

63. (A) 6×10^{-29} nm

➢ $p = 1.1 \times 10^4 \frac{kgm}{s}$, $\lambda = (?)$

$$\lambda = \frac{h}{p} = \frac{6.6 \times 10^{-34}}{1.1 \times 10^4} = 6 \times 10^{-38}$$

$$= 6 \times 10^{-29} \times 10^{-9} m$$

$$= 6 \times 10^{-29} nm$$

64. (A) $\lambda > \frac{hc}{\phi}$

➢ For photoelectric effect to be observed, energy of each photon should be at least equal to or more than work function of metal.

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