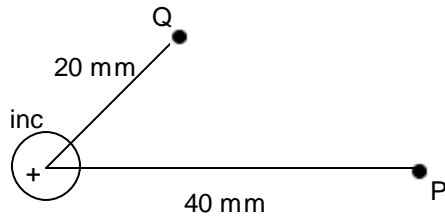


1. A point charge of + 1 nC is placed in a space with permittivity of  $8.85 \times 10^{-12}$  F/m as shown in figure. The potential difference  $V_{PQ}$  between two points P and Q at distances of 40 mm and 20 mm respectively from the point charge is



- a. 0.22 kV      b. -225 V      c. -2.24 kV      d. 15 V
2. The inductance of a long solenoid of length 1000 mm wound uniformly with 3000 turns on a cylindrical paper tube of 60 mm diameter is
- a. 3.2  $\mu$ H      b. 3.2 mH      c. 32.0 mH      d. 3.2 H
3. If  $\vec{E}$  is the electric field intensity,  $\nabla(\nabla \times \vec{E})$  is equal to
- a.  $\vec{E}$       b.  $|\vec{E}|$       c. null vector      d. zero
4. Divergence of the vector field  $V(x,y,z) = -(x \cos xy + y)j + (y \cos xy)j + (\sin z^2 + x^2 + y^2)k$  is
- a.  $2z \cos z^2$       b.  $\sin xy + 2z \cos z^2$       c.  $x \sin xy - \cos z$       d. none of these
5. A solid sphere made of insulating material has a radius R and has a total charge Q distributed uniformly in its volume. What is the magnitude of the electric field intensity, E, at a distance r ( $0 < r < R$ ) inside the sphere?
- a.  $\frac{1}{4\pi\epsilon_0} \frac{Qr}{R^3}$       b.  $\frac{3}{4\pi\epsilon_0} \frac{Qr}{R^3}$       c.  $\frac{1}{4\pi\epsilon_0} \frac{Q}{r^2}$       d.  $\frac{1}{4\pi\epsilon_0} \frac{QR}{r^3}$
6. The electric field on the surface of a perfect conductor is 2 V/m. The conductor is immersed in water with  $\epsilon = 80\epsilon_0$ . The surface charge density on the conductor is
- a. 0 C/m<sup>2</sup>      b. 2 C/m<sup>2</sup>      c.  $1.8 \times 10^{-11}$  C/m<sup>2</sup>      d.  $1.41 \times 10^{-9}$  C/m<sup>2</sup>
- ( $\epsilon = 10^{-9} / (36 \pi)$  F/m)
7. The unit of  $\nabla \times \vec{H}$  is
- a. Ampere      b. Ampere/meter      c. Ampere/meter<sup>2</sup>      d. Ampere-meter
8. If the electric field intensity is given by  $E = (xu_x + yu_y + zu_z)$  volt/m the potential difference between X(2,0,0) and Y(1,2,3) is
- a. +1 volt      b. -1 volt      c. +5 volt      d. +6 volt
9. If a vector field  $\vec{V}$  is related to another vector field  $\vec{A}$  through  $\vec{V} = \nabla \times \vec{A}$ , which of the following is true? Note: C and  $S_C$  refer to any closed contour and any surface whose boundary is C
- a.  $\oint_C \vec{V} \cdot d\vec{l} = \int_{S_C} \int \vec{A} \cdot d\vec{S}$       b.  $\oint_C \vec{A} \cdot d\vec{l} = \int_{S_C} \int \vec{V} \cdot d\vec{S}$
- c.  $\oint_C \nabla \times \vec{V} \cdot d\vec{l} = \int_{S_C} \int \nabla \times \vec{A} \cdot d\vec{S}$       d.  $\oint_C \nabla \times \vec{A} \cdot d\vec{l} = \int_{S_C} \int \vec{V} \cdot d\vec{S}$
10. For a Hertz dipole antenna, the half power beam width (HPBW) in the E-plane is
- a.  $360^\circ$       b.  $180^\circ$       c.  $90^\circ$       d.  $45^\circ$
11. Match List-I(Laws) with List-II(applications) and select the correct answer :

List-I	List-II
A. Ampere's law B. Biot's law C. Coulomb's law D. Gauss's law	To find the 1. Force on a charge 2. Force due to a current carrying 3. Electric flux density at a point 4. Magnetic flux density at a point

Codes:

	A	B	C	D
(a)	3	2	1	4
(b)	4	2	1	3
(c)	4	1	2	3
(d)	3	1	2	4

12. Gauss law relates the electric field intensity  $\vec{E}$  with the volume charge density  $\rho$  at a point as

a.  $\Delta \times \vec{E} = \epsilon_0 \rho$     b.  $\Delta \cdot \vec{E} = \epsilon_0 \rho$     c.  $\Delta \times \vec{E} = \rho / \epsilon_0$     d.  $\Delta \cdot \vec{E} = \rho / \epsilon_0$

13. A dipole produces an electric field intensity of 1 mv/m at a distance of 2 km. The field intensity at a distance of 4 km will be

a. 1 mv/m    b. 0.75 mv/m    c. 0.50 mv/m    d. 0.25 mv/m

14. For an electric field  $E = E_0 \sin \omega t$ , what is the phase difference between the conduction current and the displacement current ?

a.  $0^\circ$     b.  $45^\circ$     c.  $90^\circ$     d.  $180^\circ$

15. What is the electric flux density (in  $\mu\text{C}/\text{m}^2$ ) at a point (6,4, -5) caused by a uniform surface charge density of  $60 \mu\text{C}/\text{m}^2$  at a plane  $x=8$  ?

a.  $-30\vec{a}_x$     b.  $-60\vec{a}_x$     c.  $30\vec{a}_x$     d.  $60\vec{a}_x$

16. Assertion(A): When there is no charge in the interior of a conductor the electric field intensity is infinite

Reason(R): As per Gauss's law the total outward electric flux through any closed surface constituted inside the conductor must vanish

a. both A and R are true and R is the correct explanation of A    b. both A and R are true but R is NOT the correct explanation of A    c. A is true but R is false    d. A is false but R is true

17. A solid cylindrical conductor of radius 'R' carrying a current 'I' has a uniform current density. The magnetic field intensity 'H' inside the conductor at the radial distance 'r' ( $r < R$ ) is

a. zero    b.  $I/2\pi r$     c.  $Ir/2\pi R^2$     d.  $IR^2/2\pi r^3$

18. The relation between electric intensity E, voltage applied V and the distance d between the plates of a parallel plates of a parallel plate condenser is

a.  $E = V/d$     b.  $E = V \times d$     c.  $E = V/(d)^2$     d.  $E = V \times (d)^2$

19. Point charges of -10nC and 10 nC are located in free space at (-1,0,0) m and (1,0,0)m respectively . What is the energy stored in the field ?

a. zero    b. 450 nJ    c. -450 nJ    d. -900 nJ

20. A long straight wire carries a current  $I = 10$  A. At what distance is the magnetic field  $H = 1 \text{ Am}^{-1}$  ?

a. 1.19 m    b. 1.39 m    c. 1.59 m    d. 1.79 m

**Answers:**

1.b	2.c	3.d	4.a	5.a	6.d	7.c	8.c	9.b	10.c	11.b	12.d	13.c
	14.c	15.a	16.d	17.c	18.a	19.a	20.c					