The Bodwad Sarvajanik Co-Op Education Society Ltd. Bodwad

Arts, Commerce and Science College, Bodwad

Question Bank

Class: - F.Y.B.Sc.   **Sem.:-** II

Subject: - Physics   **Paper Name: -** Electricity and Electrostatics

PHY 201
Electricity and Electrostatics

Unit 1 vector Analysis

Multiple choice Questions

1. Gradient of scalar function ϕ can be written as:.

   a) $\Delta\phi$

   b) $\phi\Delta$

   c) $\Delta^2\phi$

   d) none of these

2. The divergence of $\overline{V}$ can be written as:

   a) $\Delta^2\overline{V}$

   b) $\nabla\cdot\overline{V}$

   c) $\nabla\times\overline{V}$

   d) none of these

3. The curl of a vector $\overline{V}$ can be written as:

   a) $\Delta^2\overline{V}$

   b) $\nabla\cdot\overline{V}$

   c) $\nabla\times\overline{V}$

   d) none of these

4. Solenoidal vector is a vector field for which:

   a) $\Delta \times \overline{V} = 0$

   b) $\nabla \cdot \overline{V} = 0$

   c) $\nabla \times \overline{V} = 0$

   d) none of these

5. In the Cartesian coordinate system the Laplacian operator ∇^2 is given by

   a) $\nabla^2 = i \dfrac{\partial}{\partial x} + j \dfrac{\partial}{\partial y} + k \dfrac{\partial}{\partial z}$

   b) $\nabla^2 = i \dfrac{\partial^2}{\partial^2 x} + j \dfrac{\partial^2}{\partial^2 y} + k \dfrac{\partial^2}{\partial^2 z}$

   c) $\nabla^2 = \left(i \dfrac{\partial}{\partial x} + j \dfrac{\partial}{\partial y} + k \dfrac{\partial}{\partial z} \right) \times \left(i \dfrac{\partial}{\partial x} + j \dfrac{\partial}{\partial y} + k \dfrac{\partial}{\partial z} \right)$

   d) none of these

6. Vector field is said to be irrotational vector field if:

   a) $\Delta \times \overline{V} = 0$

   b) $\nabla \cdot \overline{V} = 0$

   c) $\nabla \times \overline{V} = 0$

   d) none of these

7. The diversion of the curl of vector is:
   a) One
   b) Infinity
   c) Zero
   d) none of these

8. The curl of gradient of scalar function is:
   a) Zero
   b) One
   c) Infinity
   d) none of these

9. Vector field which has a curl is said to be:
   a) Solenoidal vector field
   b) Rotational vector field
   c) Irrotational vector field
   d) none of these

10. If curl $= 0$ then the vector field $\overline{V}$ is said to be:
    a) Solenoidal vector field
    b) Rotational vector field
    c) Irrotational vector field
    d) none of these

11. Any vector field for which $div.\overline{V} = 0$ is called:

    a) Solenoidal vector field

    b) Rotational vector field

    c) Irrotational vector field

    d) none of these

12. The vector differential operator is written as:

    a) $\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y}$

    b) $\dfrac{\partial^2}{\partial^2 x} + \dfrac{\partial^2}{\partial^2 y} + \dfrac{\partial^2}{\partial^2 z}$

    c) $i\dfrac{\partial}{\partial x} + j\dfrac{\partial}{\partial y} + k\dfrac{\partial}{\partial z}$

    d) none of these

13. If $\overline{r}$ is position vector i.e $\overline{r} = xi + yj + zk$ then $curl\,\overline{r} = ?$

    a) Zero

    b) One

    c) Two

    d) Three

14. If $\overline{r}$ is position vector i.e $\overline{r} = xi + yj + zk$ then $div.\overline{r} = ?$

    a) Zero

    b) One

    c) Two

    d) Three

15. If $\overline{A} = (x + y)i + (y - z)j(x + 2az)k$ is solenoidal vector field then the value of constant a is:

    a) 0

    b) 1

    c) -1

    d) ∞

16. Stokes theorem states the relation between…………………

    a) surface and line integral

    b) volume and surface integral

    c) line and surface integral

    d) None of these

17. Gauss's divergence theorem states the relation between…………………

    a) surface and volume integral

    b) surface and line integral

    c) line and volume integral

    d) None of these

Unit 2 Network theorems in current electricity

Multiple choice Questions

1. Kirchhoff's laws are used calculate current in ………………………..circuits.
   a) simple
   b) complicated
   c) parallel
   d) none of these

2. $\sum IR = \sum E$ is the mathematical equation of ………………………..
   a) Kirchhoff's current law
   b) Kirchhoff's voltage law
   c) Newton's law
   d) Ohm's law

3. $\sum I = 0$ is the mathematical equation of
   a) Kirchhoff's current law
   b) Kirchhoff's voltage law
   c) Newton's law
   d) Ohm's law

4. Thevenin's equivalent circuit is………………………..
   a) Series combination of equivalent voltage source and equivalent resistance.
   b) Series combination of equivalent current source and equivalent resistance.
   c) Parallel combination of equivalent voltage source and equivalent resistance.
   d) Parallel combination of equivalent current source and equivalent resistance.

5. Norton's equivalent circuit is ………………………..
   a) Series combination of equivalent voltage source and equivalent resistance.
   b) Series combination of equivalent current source and equivalent resistance.
   c) Parallel combination of equivalent voltage source and equivalent resistance.
   d) Parallel combination of equivalent current source and equivalent resistance.

6. The maximum power is transferred by a d. c. source of internal resistance (r) to an external resistance (R) if …………..
   a) $R = r^2$
   b) $R = r$
   c) $r = R^2$
   d) $R = \sqrt{r}$

7. Under maximum power transfer condition, efficiency of circuit is ………………………..
   a) 50 %
   b) 25 %
   c) 75 %
   d) 100 %

8.   1 kilo watt hour = ………………………..
a) 36×10^4 Joule
b) 36×10^{-5} Joule
c) 36×10^5 Joule
d) 36×10^{-4} Joule

9.   Joule's law is given by………………………..; where symbols have their usual meanings.
a) $H = I^2Rt$
b) $H = IR^2t$
c) $H = IRt^2$
d) $H = \dfrac{IR}{t^2}$

10.   Electric power is P =………………………..
a) V I
b) I R
c) I C
d) none of these

11.   The unit of electrical energy………………………..
a) joule
b) Watt-second
c) kilowatt-hour
d) All of these

12.   The unit of electric power is……….
a) watt
b) volt
c) ohm
d) meter

13.   Select the Correct statement:
a) Kirchhoff's junction law is conservation of charge and momentum.
b) Kirchhoff's junction law is conservation of energy and momentum.
c) Kirchhoff's junction law is conservation of charge and energy.
d) None of these.

14.   The maximum power drawn out of the battery is ………………………..
a) $E^2/2r$
b) $E^2/3r$
c) $E^2/4r$
d) E^2/r

15. A lead-acid battery of a car has an e.m.f. of 12 V. If the internal resistance of the battery is 0.5 Ω, the maximum current that can be drawn from the battery will be……………………….
    a) 30A
    b) 20A
    c) 6A
    d) 24 A

16. The maximum power is delivered by any dc circuit when the internal and external resistance are……………………….
    a) equal
    b) zero
    c) maximum
    d) minimum

17. Electric bills are measured as per……….energy consumed
    a) no. of kilo/watt/hrs
    b) no. of watt hrs
    c) no. of kilo watt hrs
    d) no. of watt/hrs

18. Specific resistance is reciprocal of……….
    a) conductivity
    b) resistivity
    c) both (a) and (b)
    d) None of these

19. The produced heat H is proportional to ……….. if current I flowing through resistance R for time t.
    a) t^2
    b) t
    c) t/2
    d) 1/t

20. The power spent to overcome internal resistance is dissipated as……..
    a) vapour
    b) heat
    c) temperature
    d) None of these

Unit 3 Electrostatics

Multiple choice Questions

1. Which one of the following represents correct units for electric field strength?
   a) T
   b) N/C
   c) J/C
   d) Nm^2C^{-2}

2. The flow of charge per unit time defines ....
   a) Power
   b) Current
   c) Voltage
   d) Resistance

3. The electric field 2.0 m form a point charge has a magnitude of 8.0×10 N/C. What is the strength of the electric field at a distance of 4.0 m?
   a) 2.0×10^4 N/C
   b) 4.0×10^4 N/C
   c) 1.6×10^5 N/C
   d) 3.2×10^5 N/C

4. The force between the two charges is 120N. if the distance between the charges is doubled, the force will be ....
   a) 60N
   b) 30N
   c) 40N
   d) 15N

5. The electric field intensity at a point situated 4 metres form a point charge is 200 N/C. If the distance is reduced to 2 metres, the field intensity will be ....
   a) 400 N/C
   b) 600 N/C
   c) 800 N/C
   d) 1200 N/C

6. The lines of force due to charged particle are ......
   a) always strength
   b) always curve
   c) sometimes curve
   d) none of the above

7. A field line and an equipotential surface are always ....
    a) parallel
    b) at 90°
    c) inclined at an angle
    d) none of the above

8. The ability of charged particles to exert a force on one another is attributed due to the existence of ....
    a) electron
    b) protons
    c) neutrons
    d) electric field

9. "The total electric flux through any closed surface surrounding charges is equal to the amount of charge enclosed". This statement is associated with ....
    a) Coulomb's Inverse Square Law
    b) Gauss's law
    c) Maxwell's first law
    d) Maxwell's second law

10. Which of the following materials has the highest value of dielectric constant?
    a) Glass
    b) Vacuum
    c) Ceramics
    d) Oil

11. The unit of electric intensity is ....
    a) N/C²
    b) Wb/m²
    c) N/C
    d) N²/C

12. The value of E within the field due to a point charge can be found with the help of ....
    a) Faraday's law
    b) Kirchhoff's law
    c) Coulomb's law
    d) none of the above

13. .... at a point may be defined as equal to the lines of force passing normally through a unit cross section at that point .
    a) Electrical intensity
    b) Magnetic flux
    c) Electric flux
    d) None of the above

14. Electric displacement is a ....
    a) scalar
    b) vector
    c) both of the above
    d) none of the above

15. Electric field is expressed in ....
    a) N/C
    b) C/meter
    c) C/N
    d) N/C-^{2}

16. Which medium has the least dielectric strength?
    a) Paraffin wax
    b) Quartz
    c) Glass
    d) Air

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