Note: Based on the given material, a special test will be conducted in the 1st week of June.

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

2. The lines of force due to charged particles are _____.
    a) always straight   b) always curved   c) sometimes curved
    d) none

3. The electric field at a point situated at a distance d from straight charged conductor is _____.
    a) proportional to d   b) inversely proportional to d   c) none

4. A field line and an equipotential surface are _____.
    a) always parallel   b) always at 90⁰
    c) inclined at any angle 0⁰   d) none

5. The ability of charged bodies to exert force on one another is attributed to the existence of _____.
    a) electrons   b) protons   c) neutrons   d) electric field

6. If three 15μF capacitors are connected in series, the net capacitance is _____.
    a) 5 μF   b) 30 μF   c) 45 μF   d) 50 μF

7. A dielectric material must be _____.
    a) resistor   b) insulator   c) good conductor d) semiconductor

8. Which of the following is not a vector?
    a) Linear momentum   b) Angular momentum
    c) Electric field   d) Electric potential

9. For which of the following parameter variation, the capacitance of the capacitor remains unaffected?
    a) Distance between plates   b) Area of the plates
    c) Nature of dielectric   d) Thickness of the plates

10. Which of the following material has the highest value of dielectric constant?
    a) Glass   b) vacuum   c) ceramics   d) oil

11. The sparking between two electrical contacts can be reduced by inserting a _____.

12. The power dissipated in a pure capacitor is _____.
    a) zero   b) proportional to applied voltage
    c) proportional to value of capacitance

13. When a dielectric slab is introduced in a parallel plate capacitor, the potential difference between plates will _____.
    a) remain unchanged   b) decrease   c) increase
    d) become zero

14. The relative permittivity of free space is given by _____.
    a) 1   b) 10   c) 100   d) 1000

15. Electric field intensity is a _____ quantity.
    a) scalar   b) vector   c) both (a) & (b)   d) none

16. When 4 volts e.m.f is applied across a 1 farad capacitor, it will store energy of _____.
    a) 2 joules   b) 4 J   c) 6J   d) 8J

17. Which of the following material has least value of dielectric constant?
    a) Ceramics b) oil   c) glass   d) paper

18. Dielectric constant for mica is nearly _____.
    a) 200   b) 100   c) 3 to 8   d) 1 to 2

19. The dielectric constant of glass is given by ($\in$r) _____
    a) 0.1 to 0.4 b) 0.5 to 1   c) 2 to 4   d) 5 to 100

20. The relative permittivity has the following units _____.
    a) F/m   b) m/F   c) Wb/m   d) no units

21. Electric intensity at any point in an electric field is equal to the _____ at that point.
    a) electric flux   b) magnetic flux density c) potential gradient
    d) none

22. The unit of dielectric strength is given by_____.
    a) V/m   b) V²/m   c) m/v   d) m/v²

23. One volt is the same as _____.
    a) one joule/ coulomb   b) one coulomb/ joule
    c) one coulomb   d) one joule

24. The bridge used for the measurement of the value of the capacitance is _____.
    a) Wien's bridge   b) Wheatstone bridge

a) capacitor in parallel with contacts
b) capacitor in series with each contact
c) resistance in line   d) none

c) <u>Schering bridge</u>   d) Hay's bridge

25. A region around a stationary electric charge has _____.
    a) <u>an electric field</u>   b) a magnetic field
    c) both a & b   d) none

26. A charge which when placed in vacuum from an equal and similar charge repels with a force of 9×10^9 N, is known as _____.
    a) milli coulomb   b) <u>microcoulomb</u>
    c) pico-coulomb   d) coulomb

27. The protonic charge in 100gm of water is _____C.
    a) 4.8×10^5 b) <u>5.4×10^6</u>   c) 3.6×10^4 d) 4.9×10^6

28. When a piece of polythene is rubbed with wool, a charge of -2×10^{-7} is developed on polythene. The mass transferred to polythene is _____ kg.
    a) <u>11.38×10^{-14}</u> b) 5.69×10^{-19} c) 2.25×10^{-19} d) 9.63×10^{-19}

29. A copper sphere of mass 2gm contains about 2×10^{22} atoms. The charge on the nucleus of each atom is 29e. The fraction of electrons removed _____.
    a) 2×10^{-10} b) 1.19×10^{-12} c) 1.25×10^{-11} d) <u>2.16×10^{-11}</u>

30. Given that $q_1 + q_2 = q$ if the charge between q_1 and q_2 is maximum, q_1/q _____.
    a) 1   b) 0.75   c) 0.25   d) <u>0.5</u>

31. An electric dipole is placed at an angle of 60^0, with an electric field of intensity 10^5 NC^{-1}. It experiences a torque equal to $8\sqrt{3}$Nm. If the dipole length is 2cm then the charge on the dipole is _____.
    a) $-8 \times 10^3 c$ b) $8.54 \times 10^{-4} c$ c) <u>$8 \times 10^{-3} c$</u>   d) $0.85 \times 10^{-6} c$

32. Two charged spheres of radii R_1 and R_2 having equal surface charge density. The ratio of their potential is _____.
    a) $\frac{R_2}{R_1}$ b) $\left(\frac{R_2}{R_1}\right)^2$ c) $\left(\frac{R_1}{R_2}\right)^2$ d) <u>$\frac{R_1}{R_2}$</u>

33. 4 points charge each +q is placed on the circumference of a circle of diameter 2d in such a way that they form a square. The potential at the centre is _____.
    a) 0   b) $\frac{4d}{q}$ c) $\frac{q}{4d}$ d) <u>$\frac{4q}{d}$</u>

34. Two metal plate form a parallel plate capacitor. The distance between the plates is d. A metal sheet of thickness d/2 and of the same area is introduced between the plates. What is the ratio of the capacitance in the two cases?
    a) 4:1   b) 3:1   c) <u>2:1</u>   d) 5:1

35. There is a repulsive force between two charged objects when _____.
    a) <u>charges are of unlike sign</u>
    b) they have the same number of protons
    c) charges are of like sign
    d) they have the same number of electrons

36. What is the electrical potential difference between two places measured in?
    a) amperes   b) <u>volts</u>   c) coulombs d) joules

37. Current is the rate at which charges move through (n) _____.
    a) <u>conductor</u>   b) insulator   c) voltage   d) amperes

38. The energy stored in a capacitor of capacitance C and potential V is given by _____.
    a) $\frac{1}{2}c^2v$ b) $\frac{1}{2}cv^2$ c) $\frac{1}{2}cv$ d) $\frac{1}{2}c^2v^2$

39. Watt-hour meter measures _____.
    a) electrical energy   b) current   c) voltage   d) <u>power</u>

40. In S.I unit of electric field is _____.
    a) Am^{-1} b) <u>NC^{-1}</u>   c) cm^{-1} d) cm^{-2}

41. Kilowatt-hour is the unit of _____.
    a) potential difference   b) <u>electric power</u>
    c) electrical energy   d) charge

42. Charging the objects through rubbing is called _____.
    a) Electrostatics   b) <u>tribo electric charging</u>
    c) Potential difference   d) elastic potential

43. Which among the following is the fundamental conservation laws in physics?
    a) <u>Conservation of charges</u>   b) Electric charge
    c) Quartisation of charge

44. The magnitude of the electrostatic force between two charges each of one coulomb and separated by a distance of 1m is _____.
    a) <u>9×10^9N</u>   b) 10×10^9N   c) 9×10^{-9}N   d) None

45. The unit of gravitational constant is _____.
    a) <u>Nm^{2}Kg^{-2}</u>   b) Nm^{-1}Kg^{-1} c) Nm^{3}Kg^{-2} d) Nm^{-2}Kg^{-2}

46. The value of relative permittivity of water is _____.
    a) <u>$\varepsilon_r = 80$</u>   b) $\varepsilon_r = 70$ c) $\varepsilon_r = 60$ d) $\varepsilon_r = 65$

47. The superposition principle explains the interaction between _____ charges.
    a) single   b) double   c) <u>multiple</u>   d) none

48. _____ found that the value of $e = 1.6 \times 10^{-19}$c.
    a) Benjamin Franklin   b) <u>Robert Millikan</u>
    c) J.J.Thomson   d) Rutherford

49. Coulomb's law was deduced in the year _____.
    a) <u>1786</u>   b) 1787   c) 1876   d) 1780

50. If the distance of a point from a positive charge increases, the value of the potential at the point _____.
    a) increases b) <u>decreases</u>   c) may increase or decrease
    d) remain the same

51. A proton is brought towards another proton. The electrostatic potential energy of the system will _____.
    a) <u>increase</u>   b) decrease   c) may increase or decrease
    d) none of these

52. Two conducting charge spheres of radius R and 2R lying far apart, are connected by a conducting wire. If a charge Q is given to the system, the common potential will be
    a) $\frac{1}{4\pi\epsilon_0}\frac{Q}{R}$ b) $\frac{1}{4\pi\epsilon_0}\frac{Q}{3R}$ c) $\frac{1}{4\pi\epsilon_0}\frac{Q^2}{R}$ d) $\frac{1}{4\pi\epsilon_0}\frac{Q}{5R}$

53. A charge Q is distributed over two hollow concentric spheres of radii R and r (R>r) such that the surface densities are equal. The potential at the common centre is
    a) $\frac{Q}{4\pi\epsilon_0}\left(\frac{R^2+r^2}{R+r}\right)$ b) $\frac{Q}{4\pi\epsilon_0(R+r)}$ c) $\frac{1}{4\pi\epsilon_0}\frac{(r+R)}{(r^2+R^2)}$ d) 0

54. The work done in carrying a charge 'Q' once round the circle of radius 'r' with another charge Q at the centre of the circle is
    a) $\frac{1}{4\pi\epsilon_0}\frac{Q}{r}$ b) $\frac{Q}{4\pi\epsilon_0}\frac{Q}{r}$ c) <u>zero</u>   d) $\frac{Q.Q}{2r}$

55. A charge of -1μc is kept at a point where the potential is 100V. The electric potential energy of the charge is
    a) 10^{-4}J   b) 10^4J   c) <u>-10^{4}J</u>   d) -10^{-8}J

56. A point charge q is located at the centre of a cube of side L, then the electric flux emerging from the cube is
    a) <u>$\frac{q}{\epsilon_0}$</u>   b) $\frac{q}{\alpha L^2\epsilon_0}$ c) $\frac{6qL^2}{\epsilon_0}$ d) zero

57. In a charged capacitor, energy is stored in
    a) the positive charge   b) the negative charge
    c) both the positive and negative charge
    d) <u>the electric field between the plates</u>

58. The capacity of an isolated conducting sphere of radius 'R' is proportional to
    a) R^2 b) $\frac{1}{R^2}$ c) $\frac{1}{R}$ d) <u>R</u>

59. The plates of a charged parallel plate capacitor are brought closer after disconnecting the battery, the energy stored will
    a) <u>decrease</u>   b) increase   c) remain the same d) first increase

60. The electric potential at the surface of an atomic nucleus (Z=50) of radius 9×10^{-15}m is
    a) 80V   b) <u>8×10^6V</u>   c) 9V   d) 9×10^5V

61. A hollow metallic sphere of radius 5cm is charged such that the potential on its surface is 10V. The potential at the centre of the sphere is
    a) zero   b) <u>10V</u>   c) same as at a point 5cm away from the surface

62. A hollow metal sphere fixed on an insulating stand is charged positively. The electric potential inside the sphere is
    a) zero   b) <u>everywhere same as on the surface</u>
    c) higher than that on the surface
    d) lower than that on the surface

63. If the surface density of charge is s, electric field near the surface would be
    a) $\frac{2\sigma}{\epsilon_0}$ b) $\frac{\sigma}{\epsilon_0}$ c) $\frac{\sigma}{2\epsilon_0}$ d) $\frac{1}{r^2}$

64. A metal foil of negligible thickness is introduced between the two plates of a capacitor at the centre. The capacitance of the capacitor will be
    a) <u>same</u>   b) double   c) half   d) k times

1. Define one volt.

   The unit of potential difference is volt. The potential difference between two points is 1 volt if 1 joule of work is done in moving 1 coulomb of charge from one point to another against the electric force.

2. Principle of capacitor.

   Consider an insulated conductor (plate A) with a positive charge 'q' having potential V. The capacitance of A is C=q/v. When another insulated metal plate B is brought near A, negative charges are induced on the side of B near A. An equal amount of positive

charge is induced on the other side of B. The negative charge in B decreases the potential of A. The positive charge in B increases the potential of A. But the negative charge on B is nearer to A than the positive charge on B. So the net effect is that, the potential of A decreases. Thus the capacitance of A is increased. If the plate B is earthed, positive charges get neutralized. Then the potential of A decreases further. Thus the capacitance of A is considerably increased.

3. Define electric polarisation.

The alignment of dipole moments of the permanent or induced dipoles in the direction of applied electric field is called electric polarisation.

4. What are the applications of the property of attraction and repulsion between charged bodies?

They have many applications such as electrostatic paint spraying, powder coating, fly-ash collection in chimneys, ink-jet printing and Photostat copying etc.,

5. Distinguish between electric potential and potential difference.

The electric potential in an electric field at a point is defined as the amount of workdone in moving a unit positive charge from infinity to that point against the electric forces.

The potential difference between two points in an electric field is defined as the amount of work done in moving a unit positive charge from one point to the other against the electric force.

6. Define one coulomb.

One coulomb is defined as the quantity of charge, which when placed at a distance of 1 metre in air or vacuum from an equal and similar charge, experiences a repulsive force of 9×10^9N.

7. Define the unit of capacitance.

The unit of capacitance is farad. A conductor has a capacitance of one farad, if a charge of one coulomb given to it, rises its potential by 1 volt.

8. What is permittivity and relative permittivity? How are they related?

Permittivity is analogus to dielectric constant of the medium in which the charges are located. Permittivity is the capacity of a medium to accommodate electric charges in it at a particular location. It is denoted by ϵ. It is the product of permittivity of free space (ϵ_0) and relative permittivity (ϵ_r). $\epsilon = \epsilon_0 \epsilon_r$. Its unit is $C^2N^{-1}m^{-2}$. Relative permittivity is defined as the ratio of permittivity of a medium to the permitt

65. A dielectric medium is placed in an electric field (ϵ_0). The field induced inside the medium is _____.
    a) acts in the direction of electric field ϵ_0
    b) <u>acts opposite to ϵ_0</u>   c) acts perpendicular to ϵ_0
    d) is zero

66. A lightning arrestors works on the principle of _____.
    a) <u>Corona discharge</u>   b) Diffusion of charge
    c) discharge of electricity   d) separation of charges

67. The total flux over a closed surface enclosing a charge 'q' (in Nm^2C^{-1}) _____
    a) $8\pi q$ b) $9 \times 10^9 q$ c) <u>$36\pi \times 10^9 q$</u>   d) $8.854 \times 10^{-12} q$

68. When the charge given to the capacitor is doubled, its capacitance _____.
    a) increases twice   b) decreases twice
    c) increases four times   d) does not charge

69. The work done in moving $4\mu c$ charges from one point to another in an electric field is 0.012J. The potential difference between them is _____.
    a) <u>3000V</u>   b) 6000V   c) 30V   d) $48 \times 10^3 V$

70. A capacitor of capacitance $6\mu F$ is connected to a 100V battery. The energy stored in the capacity is _____.
    a) 30J   b) 3J   c) <u>0.03J</u>   d) 0.06J

71. The effective capacitance of two capacitors connected in series is $1.5\mu F$. If the capacitance of one capacitor is $4\mu F$, then the capacitance of the other is _____.
    a) <u>$2.4\mu F$</u>   b) $0.24\mu F$ c) $0.417\mu F$ d) $4.17\mu F$

72. Torque on a dipole in a uniform electric field is maximum when the angle between P and E is _____.
    a) 0^0 b) <u>90^0</u>   c) 45^0 d) 180^0

73. The work done in moving $500\mu c$ charge between two points on equipotential surface is _____.
    a) <u>zero</u>   b) finite +ve c) finite –ve d) infinite

74. A hollow metallic spherical shell carrying electric charge produce no electric field at points _____.
    a) on the surface of the sphere   b) <u>inside the sphere</u>
    c) at infinite distance from the centre of the sphere
    d) outside the sphere

75. The electric field outside the two oppositely charged plane sheets each of charge density σ is _____.
    a) $\frac{\sigma}{\epsilon}$ b) $\frac{-\sigma}{2\epsilon}$ c) $\frac{2\sigma}{\epsilon}$ d) <u>zero</u>

76. The torque (τ) experienced by an electric dipole placed in a uniform electric field (E) at an angle θ with the field is _____.
    a) pE $\cos\theta$ b) –pE $\cos\theta$ c) <u>pE $\sin\theta$</u>   d) 2pE $\sin\theta$

77. The negative gradient of potential is _____.
    a) electric force   b) torque   c) electric current
    d) <u>electric field intensity</u>

78. If a point lies at a distance 'x' from the midpoint of the dipole, the electric potential at this point is proportional to _____.
    a)