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# Electricity & Magnetism

## Chapter No.12 (MCQs)

1. The branch of physics that deals with the study of charges at rest is called:
   a) Electromagnetism.
   b) Electrodynamics.
   c) Electrostatics.
   d) Current electricity.

2. The force per unit charge is known as:
   a) Electric flux.
   b) Electric field intensity.
   c) Electric potential.
   d) Electric current.

3. With the introduction of a dielectric between the plates of capacitor, it's capacitance:
   a) Decreases.
   b) Increases.
   c) Becomes zero.
   d) Remains constant.

4. Force between two point charges due to the presence of a dielectric medium (an insulator) between them always:
   a) Increase.
   b) Decreases.
   c) Remains constant.
   d) Always becomes zero.

5. If the distance between two point charges is doubled, the force between them decreases by:
   a) Two times.
   b) Four times.
   c) Eight times.
   d) Sixteen times.

6. Parallel lines of electric (or magnetic) force represent:
   a) Uniform field.
   b) A strong field.
   c) A weak field.
   d) A bib-uniform field.

7 .Electric intensity (or strength of electric field) due to positive point charge is always directed:
   a) Away from the field producing positive charge.
   b) Away from the positive test charge.
   c) Towards a positive charge.
   d) Towards the field producing positive charge.

8. Dot or scalar product of electric intensity E and vector area $\triangle A$
   a) Electric potential.
   b) Potential difference.
   c) Electric flux.
   d) Magnetic flux.

9. The electric flux through a closed surface depends on:
   a) Position of the charge enclosed by the surface.
   b) Magnitude of the charge enclosed by the surface.
   c) Size and shape of the surface.
   d) Angle between the surface and the electric field.

10. When a surface is held perpendicular to a uniform electric field, the angle between $\rightarrow_E$ and $\triangle\rightarrow_A$ is:

a) $0^o$
b) $90^o$
c) $\Lambda$ radian
d) $2\Lambda$ radian

11. Electric flux through a surface is maximum when the angle between $\rightarrow_E$ and $\triangle\rightarrow_A$ is:

a) $0^o$
b) $90^o$
c) $\Lambda$ radian
d) $2\ \Lambda$ radian.

12. Electric intensity or strength of electric field close to a large sheet which is positively charged only on one side is given by:

a) $2^{o-}/\varepsilon_{oo}$
b) $^{o-}/\varepsilon_o$
c) $^{o-}/2\ \varepsilon_o$
d) $\varepsilon o/o^-$

13. The magnitude of electric intensity of electric field close to a large sheet charged on both sides (positively) is given by:

a) $E = 2\ ^{o-}/\varepsilon_o$
b) $E = ^{o-}/2\ \varepsilon_o$
c) $E = ^{o-}/\varepsilon_o$
d) $E = \varepsilon_o/^{o-}$

14. Strength of electric field or electric intensity between two oppositely charged plates separated by a small distance having an insulator between them is given by:

a) $E = 2^{o-}/\varepsilon_o\varepsilon_r$
b) $E = ^{o-}/2\ \varepsilon_o\varepsilon_r$
c) $E = ^{o-}/\varepsilon_o\varepsilon_r$
d) $E = \varepsilon_o\varepsilon_r/^{o-}$

15. If a positive point charge is taken to different points in a hollow charged sphere, force experienced by it is:

a) Different at different points.
b) Zero everywhere.
c) Maximum at the center.
d) Minimum at the center.

16. If the surface charges density (or charge per unit area of the surface) is increased. The strength of electric field close to a large charged sheet

a) Also increase.
b) Also decreases.
c) Remains constant.
d) Becomes zero.

17. If the absolute potential at a point in an electric field is "V" volts then the potential energy of an electron at that point is given by:

a) V e
b) V/e
c) - V/e
d) - V e

18. When an electron is accelerated through potential difference of 1 colt its kinetic energy increases by:

a) 1 Joule
b) 1 electron volt.
c) 1 erg.
d) 1 ft – pound.

19. Capacitor is a device for:

a) Storing charge.
b) Storing current.
c) Storing potential difference.
d) Storing neither charge, current nor potential difference.

Q.No.2 if the separation of plates of a parallel capacitor is halved; its capacitance increases by:

a) Two times.
b) Four times.
c) Eight times.
d) Sixteen times.

21. Capacitance of a parallel capacitor without any medium between its plates (or with vacuum) is given by:

a) $C = A/\varepsilon_o\ d$
b) $C = A\ \varepsilon_o/d$
c) $C = A\ \varepsilon_o\ \varepsilon_R/d$
d) $C = A\ d\ \varepsilon_o/\varepsilon_R$

22. Capacitance of a parallel capacitor with a medium (insulator) between its plates other air or vacuum is given by:

a) $C = A/\varepsilon_o\, d$
b) $C = A\, \varepsilon_o/d$
c) $C = A\, \varepsilon_o\, \varepsilon_R/d$
d) $C = A\, d\, \varepsilon_o/\varepsilon_R$

23. When three capacitors are joined in series, the net capacitance is:

a) Equal to the sum of individual capacitance.
b) Less than the least individual capacitance.
c) Between lowest and highest individual capacitance.
d) Greater than the maximum individual capacitance.

24. When three capacitors are joined in parallel, the net capacitance is:

a) Equal to the sum of reciprocals of individual capacitance.
b) Less than the least individual capacitance.
c) Between lowest and highest individual capacitance.
d) Greater than the maximum individual capacitance.

25. When three capacitors each of 4μF are joined in parallel across a battery of 20 volts, the charge stored by each will be:

a) 26.6 μC
b) 80 μC
c) 5 μC
d) 1.7 μC

26. The magnitude of electric intensity does not depend upon:

a) Nature of medium between its plates.
b) The distance between its plates.
c) The area of its plates.
d) The nature of charge causing the electric field.

27. Two parallel beams of electrons moving in the same direction will.

a) Since like charges in motion produce such a magnetic field that they appear to attract each other.
b) Since the charges are like they repel each other.
c) Neither attracts nor repels each other.

28. The S.I unit of Capacitance is "farad" it is equivalent to:

a) Volt/coul.
b) Coul. /m.
c) N/coul.
d) Coul. /volt.

29. When a dielectric medium is introduces between the plates of a capacitor, the atoms of the medium are polarized. This results in an increase in capacitance of the capacitor, because.

a) Some charge on each plate is neutralized by the opposite charge on polarized atoms of him medium.
b) The presence of an insulator between the plates decreases the Coulomb force between charges.
c) Potential of each plate decreases because of the presence of opposite charge close to it.

30. The potential difference is zero.

a) Midway between any two point charges of opposite sign.
b) Midway between any two equal point charges of the same sign.
c) Inside a conductor.
d) On the surface of a charged conductor.

31. The S.I unit of electric intensity is:

a) Volt t– meter.
b) Volt/meter.
c) Coulomb – Newton.

32. Three capacitors each of 4 μF are connected in series to each other and a potential of 20 volts is applied across the combination. The charge on each of them will be:

a) 1.7 μC
b) 0.6 μC
c) 26.7 μC
d) 15 μC

33. Three capacitors each of 5 μF are connected in series, their net capacitance is:

a) 0.6 μ F
b) 1.7 μ F
c) 5 μ F
d) 15 μ F

34. The S.I unit of potential difference is "volt". It is equivalent to:

a) J/coul.
b) Erg. /coul.
c) N/coul.
d) J/m

35. When capacitors of different values are connected in parallel to each other, their net capacitance is:

a) Equal to the sum of their reciprocals.
b) Higher than the highest individual value.
c) Less than the least individual value.

36. When a positive charge is moved from one point to another in an equi-potential plane, the work done on it is:

a) Positive.
b) Negative.
c) Maximum.
d) Zero.

37. The electric flux though a closed surface which does not contain any charge is:

a) Positive.
b) Negative.
c) Maximum.
d) Zero.

38 .Electric fields are directed:

a) Towards a positive and away from a negative charge.
b) Away from a positive and towards a negative charge.
c) None of the above.

39 .The ratio of capacitance of a capacitor with a medium completely filling the space between its plates to its capacitance without any medium is called:

a) Absolute permittivity of the medium.
b) Polarization of the medium.
c) Dielectric constant of the medium.
d) Space constant of the medium.

40. If a positively charged body is brought close to a negatively charged body the potential of the positively charged body:

a) Increases.
b) Decreases
c) Remains constant.

41. If the electrons are removed from a body it becomes positively charged, it's potential:

a) Increases.
b) Decreases.
c) Remains constant.

42 .Potential differences are a:

a) Vector quantity.
b) Scalar quantity.
c) Neither a vector nor a scalar quantity.

43 .The earths are taken at a potential of:

a) Very high value.
b) Very low value.
c) Infinite value.
d) Zero value.

44 .The direction of $\triangle \underset{A}{\rightarrow}$ while calculating electric flux is taken as:

a) Always parallel to the surface.
b) Along the outward drawn normal to the surface.
c) Along the inward drawn normal to the surface.

45. Choose the correct statement:

a) Electric lines of force start from a positive charge and end on a negative charge.
b) Electric lines of force start from a negative charge and end on a positive charge.
c) The normal drawn at any point on the line of force gives the direction of the force acting on a positive charge at that point.

46. The electric intensity at a point due to a point charge q at a distance r is:

a) Inversely proportional to the square of distance r.
b) Independent of distance r.
c) Directly proportional to the charge q.
d) Inversely proportional to the charge q.

47 .Electric potential at a point whose distance is r due to a point charge q is:

a) Inversely proportional to distance r.
b) Independent to distance r.
c) Directly proportional to the charge q.
d) Inversely proportional o the charge q.

48 .Choose the correct statement, electric lines of force:

a) Due to an isolated positive charge goes straight into infinity.
b) Due to charged sphere straight and radial.
c) Due to a charged sphere emerge from the center of the sphere.

49 .The S.I units of electric field (electric intensity) are:

a) Volt/ampere.
b) Ampere/meter.
c) Newton/coulomb.
d) Ampere/ $(\text{meter})^2$.

50. S.I unit of electromotive force is:
   a) Volt.
   b) Newton.
   c) Joule.
   d) Dyne.

51. S.I unit of permittivity of free space $\varepsilon_o$ is:
   a) $Coul.^2/N\text{-}m^2$
   b) $N\text{-}m^2/Coul^2$.
   c) No unit.

52. Tesla (web. $/m^2$) is unit of:
   a) Magnetic flux density.
   b) Magnetic flux.
   c) Magnetic moment.
   d) Permittivity of a medium.

53 .The unit of magnetic flux is:
   a) Tesla.
   b) Weber.
   c) Weber/m.
   d) $Weber/m^2$.

54. Which of the following pairs have the same units?
   a) Stress and pressure.
   b) Stress and young's modulus.
   c) Capacitance and voltage.
   d) Stress and Strain.

55. Which of the following pairs have the same units?
   a) Electric potential and electromotive force.
   b) Electric voltage and electric potential.
   c) Resistivity and resistance.
   d) Capacitance and electric intensity.

56. One nano meter is equal to:
   a) $10^{-3}$ m.
   b) $10^{-6}$ m.
   c) $10^{-9}$ m.
   d) $10^{-12}$ m.

57. Electron volt is the unit of energy commonly used in modern physics; one electron volt is equal to:
   a) $1.6021 \times 10^{-19}$ J
   b) $9.11 \times 10^{-27}$ J
   c) $9.11 \times 10^{-31}$ J
   d) $6.67 \times 10^{-11}$ J

58. Free electron in an electric field: (3-a, 1998)
   a) Remains stationary.
   b) Moves from the higher potential to lower potential.
   c) Moves from the lower potential to higher potential.

59 .The magnitude of an electric field does not depend upon (3-a, 1997)
   a) The distance from the charged particle.
   b) The nature of the charges causing the field.
   c) The magnitude of the charges causing the field.

60 .The electric potential is zero: (3-a, 1998)
   a) Inside a conductor.
   b) Midway between two charges of the opposite signs.
   c) Midway between two equal charges of the same sign.

61. The electric intensity at any point between two oppositely charged plane sheets is (3-a, 1999)
   a) $^{o-}/3\ \varepsilon_o$
   b) $^{o-}/\varepsilon_o$
   c) $^{o-}/2\ \varepsilon_o$
   d) $2\ ^{o-}/\varepsilon_o$

62. Dielectric always……..the electrostatic force between two point charges. (3-a, 2000)
   a) Decreases.
   b) Increases.
   c) Does not charge.

63. One Joule per Coulomb is called: (5-a, 2000)
   a) Ampere.
   b) Volt.
   c) Farad.
   d) Tesla

64. The electric flux through a closed surface depends on the: (3-a, 2001)
   a) Magnitude of the charge enclosed by the surface.
   b) Position of the charge enclosed by the surface.
   c) The shape of the surface.
   d) None of the above options.

65. When three capacitors are joined in series, the total capacitance (3-a, 2001)
   a) Less than the value of the minimum capacitance.
   b) Equal to the sum of the capacitances.
   c) Greater than the value of the maximum capacitance.
   d) None of the above.

66. The unit of electric intensity is: (3-a, 2001)
   a) Newton-Coulomb.
   b) Volt x meter.
   c) Newton x coulomb.
   d) Volt/meter.

67. The force per unit charge is known as: (3-a, 2002, P.M)
   a) Electric flux.
   b) Electric field intensity.
   c) Electric potential.
   d) Electric current.

68. If 4 µF and 2 µF capacitors are connected in series, the equivalent capacitance is: (1-a, 2002, P.M)

a) 0.76 µF.
b) 6 µF.
c) 2 µF.
d) 1.33 µF

69. with the introduction of a dielectric between the plates of a capacitor, its capacitance: (66-a, 02, P.M)

a) Increased.
b) Decreases.
c) Remains the same.
d) Becomes zero.

70. The electric field intensity between two similar charged plates is: (3-a, 2002, P.E)

a) $^{o-}/\varepsilon_o$
b) $^{o-}/2\ \varepsilon_o$
c) zero
d) $2\ ^{o-}/\varepsilon_o$

71. The electric flux through a surface will be minimum when the angle between $\underset{E}{\rightarrow}$ and $\triangle\underset{A}{\rightarrow}$ is: (3-a, 2002, P.E)

a) $90^o$
b) zero
c) $45^o$
d) $60^o$

72. Which of the following cannot be the units of electric intensity: (4-a, 02, P.E)

a) N/C
b) V/m
c) J/C-m
d) J/C

73. Electron volt is a unit of: (5-a, 2002, P.E)

a) Energy.
b) Force.
c) Current.
d) Potential difference.

74. One Joule per coulomb is called: (6-a, 2002, P. E)

a) Ampere.
b) Volt.
c) Farad.
d) Tesla.

75. If two capacitors of 5µF and 7µF are connected in parallel, their equivalent capacitance will be:

a) 0.12 µF.
b) 12 µF.
c) 0.34 µF.
d) 2.9 µF.

76. If a dielectric slab is introduced between the plates of a parallel plate capacitor, kept at constant potential difference, the charge on the capacitor. (3-a, 2003 PM)

a) Decreases.
b) Increases.
c) Remains unchanged.
d) None of these.

77 One kilowatt Hour is equal to: (5-a, 2003 PM)

a) $3.6 \times 10^5$ Joules.
b) $36 \times 10^5$ Joules.
c) $36 \times 10^6$ Joules.
d) $3.6 \times 10^4$ Joules.

78. One electron volt is equal to: (6-a, 2003 PM)

a) $1.6 \times 10^{-11}$ Joule.
b) $1.6 \times 10^{-19}$ Joule.
c) $1.6 \times 10^{-19}$ volt.
d) $3.1 \times 10^{-13}$ volt.

79. When three capacitors each of 4µF are joined in parallel across a battery of 20 volts, the charge stored by this combination will be:

a) 26.6 µC.
b) 80 µC.
c) 240 µC.
d) 1.7 µC.

80. Three capacitors each of 4 µF are connected series to each other and a potential of 20 volts is applied across the combination. The potential difference across each of them will be:

a) 6.7 volts.
b) 5volts.
c) 26.7volts.
d) 80volts.

81. The resistors of $3\Omega$, $5\Omega$ and $7\Omega$ are connected in parallel. If 0.3V be the p.d between the ends of $3\Omega$ resistor, the potential difference across the other resistors is:

a) 0.5V.
b) 0.7V.
c) 1.2V.
d) 0.3V.

82. One joule per coulomb is called: (5-a, 2004)

a) Farad.
b) Gauss.
c) Ampere.
d) Volt.

83. The change in potential energy of a unit charge between two points in an electrical field is called:

a) Intensity.
b) Permittivity.
c) Potential difference.
d) Flux.

(5-an ii, 2004)

84. The force on a proton placed between two parallel plates having equal positive charge is:

a) $P^{o-} / \varepsilon_o$
b) $p\varepsilon_o / \varepsilon_o$
c) $p^{o-}\ 2\varepsilon_o$
d) zero

85. A dielectric k = 2 is inserted between the plates of a 19.8 µF capacitor. Its capacitance will become:

a) 10 µF
b) 18 µF
c) 22 µF
d) 40 µF

86. The commercial unit of electrical energy is:

a) Joule.
b) Kilowatt.
c) Kilo watt hour.
d) Megawatt.

87. A parallel plate capacitor with air between its plates is charged, the voltage source is then disconnected. A dielectric medium is then introduced between its plates.

a) The capacitance of the capacitor increases.
b) Charge on its plates increases.
c) The potential difference across its plates decreases.
d) Electric field between the plates increases.

88. Which of the following cannot be a scalar quantity (1-I 2010?)

a) Electric potential.
b) EMF.
c) Electric flux.
d) Electric intensity.

89. Decreasing the separation of two positive charges by one-half will cause electrostatic force of repulsion to change by:

a) 4 times.
b) 2 times.
c) ½ times.
d) ½ times.

90. Two capacious of 3 µF and 6 µF are connected in series, their equivalent capacitance is:

a) 9 µF.
b) 2 µF.
c) ½ µF.
d) 3 µF.

# Answers.

(1) Electrostatics.
(2) Electric field intensity.
(3) Increases.
(4) Decreases.
(5) Four times.
(6) Uniform field.
(7) Away from the field producing positive charge.
(8) Electric flux.
(9) Magnitude of the charge enclosed by the surface.
(10) $0^{o}$
(11) $0^{o}$
(12) $^{o-}/2\varepsilon_o$
(13) $E = {}^{o-}/\varepsilon_o$
(14) $E = {}^{o-}/\varepsilon_o\varepsilon_r$
(15) Zero everywhere
(16) Also increases
(17) – V e
(18) 1 electron volt
(19) Storing charge
(20) Two times
(21) $C = A\ \varepsilon_o/d$
(22) $C = A\ \varepsilon_o\varepsilon_R/d$
(23) Less than the less individual capacitance.
(24) Greater than the' maximum individual capacitance.
(25) 80 μC
(26) The nature of charge causing the electric field.
(27) Since like charges in motion produce such a magnetic field that they appear to attract each other.
(28) Coul ./volt
(29) Potential of each plate decreases because of the presence of opposite charge close to it.
(30) Midway between any two equal point charges of the same sign.
(31) Volt/meter.
(32) 26.7 μC
(33) 1.7 μ F
(34) J/coul.
(35) Higher than the highest individual value.
(36) Zero.
(37) Zero.
(38) Away from a positive and towards a negative charge.
(39) Dielectric constant of the medium.
(40) Decreases.
(41) Increases.
(42) Scalar quantity.
(43) Zero value.
(44) Along the outward drawn normal to the surface.
(45) Electric lines of force start from a positive charge and end on a negative charge. The tangent drawn at any point on the line of force gives the direction of the force acting on a positive charge at that point.
(46) Inversely proportional to the square of distance r.
(47) Inversely proportional to distance r.
(48) Due to a charged sphere appear to emerge from the center of the sphere.
(49) Newton/coulomb.
(50) Volt.
(51) $Coul.^2/N\text{-}m^2$.
(52) Magnetic flux density.
(53) Weber.
(54) Stress and pressure. Stress and young's modulus.
(55) Electric potential and electromotive force. Electric voltage and electric potential
(56) $10^{-9}$ m.
(57) $1.6021 \times 10^{-19}$ J
(58) Moves from the lower potential to higher potential.
(59) The nature of the charges causing the field.
(60) Midway between two equal charges of the same sign.
(61) $^{o-}/\varepsilon_o$.
(62) Decreases.
(63) Volt.
(64) Magnitude of the charge enclose by the surface.
(65) Less than the value of the minimum capacitance.
(66) Volt/meter.
(67) Electric field intensity.
(68) 1.33 μF.
(69) Increases.
(70) Zero.
(71) $90^{o}$.
(72) J/C.

(73) Energy.
(74) Volt.
(75) 12 µF
(76 increases.
(77) $36x10^{-5}$ Joule.
(78) $1.6x10^{-19}$ Joule.
(79) 240 µC.
(80) 6.7 volt.
(81)0.3volts.
(82 volt.
(83) Potential difference.
(84) Zero.
(85) 40 µF.
(86) Kilo watt hour.
(87) The capacitance of the capacitor increases.
(88) Electric intensity.
(89) ½ times.
(90) 2.