Chapter 12

ELECTROSTATICS

Each question has four possible answers, tick (✓) the correct answer:

1. The Coulomb force is:

(a) $F = K\frac{q_1 q_2}{r^2}$ **(b)** $F = K\frac{q_1 q_2}{r}$

(c) $F = K\frac{q_1 q_2}{r^3}$ **(d)** $F = K\frac{q_1 r^2}{q_2}$

2. The value of K depends upon:

(a) Charges **(b)** System of units and medium

(c) The distance between charges **(d)** Nature of medium

3. The value of K in SI system of units:

(a) $9 \times 10^9\ Nm^2/c^2$ **(b)** $9 \times 10^{10}\ Nm^2/c^2$

(c) $9 \times 10^{-9}\ Nm^2/c^2$ **(d)** $9 \times 10^9\ NC/m^2$

4. The branch of physics which deals with the charges at rest:

(a) Current electricity **(b)** Electromagnetism

(c) Electrostatics **(d)** Nuclear physics

5. The value of permitivity of free space:

(a) $8.85 \times 10^{-12}\ C^2/Nm^2$ **(b)** $8.85 \times 10^{-12}\ C^2m^2/N$

(c) $8.85 \times 10^{-12}\ Nm^2/C$ **(d)** $8.85 \times 10^{-11}\ Nm^2/C^2$

6. When the medium is insulator the electrostatic force between the charges is:

(a) Decreased **(b)** Zero

(c) Increased **(d)** None of above

7. What is standard to measure the relative permitivity:

(a) Water **(b)** Vacuum

(c) Air **(d)** Atmosphere

8. Which of the following statement is correct:

(a) Similar charges attract each other **(b)** Similar charges attract and repel each other

(c) Similar charges repel each other **(d)** Similar charges neither attract nor repel

9. Metals are good conductors of electricity because they have:

(a) Large number of bounded electrons **(b)** Small number of electrons

(c) Large number of free electrons **(d)** Small number of free electrons

10. Free electrons are:

(a) Fixed **(b)** Loosely bounded

(c) Strongly fixed **(d)** Tightly bound

11. The SI unit of charge is:

(a) Coulomb **(b)** Calorie

(c) Ampere **(d)** Joule

12. The number of electrons in one coulomb charge is equal to:

(a) 6.2×10^{18} electrons **(b)** Zero electrons

(c) 1.6×10^{-22} electrons **(d)** 6.2×10^{21} electrons

13. The electrostatic force of repulsion between two electrons at 1 metre is:

(a) 9×10^{9} N **(b)** 1.44×10^{-9} N

(c) 2.30×10^{-28} N **(d)** 1 N

14. A charge of 10μC and 14.4 μC are 12 cm apart, the force between them is:

(a) 9×10^{5} N **(b)** 9×10^{7} N

(c) 90 N **(d)** 108×10^{7} N

15. A substance contains:

(a) Only positive charge **(b)** Only negative charge

(c) Both +ve and –ve charge **(d)** None of above

16. If the distance between the two charge bodies is halved, the force between them becomes:

(a) Half **(b)** Four time

(c) One fourth **(d)** Doubled

17. The SI units of permitivity are:

(a) $N.m/C^2$ **(b)** $C^2/N.m^2$

(c) $N.m^2/C^2$ **(d)** N.m/C

18. The minimum charge on any electron be less than:

(a) $1.6\times10^{-19}C$ **(b)** $3.2\times10^{-19}C$

(c) $1.8\times10^{-19}C$ **(d)** $9.1\times10^{-19}C$

19. The force in a medium of relative permitivity $\in_r$ is given by:

(a) $F' = \frac{F}{\in_r}$ **(b)** $F' = \frac{\in_r}{F}$

(c) $F' = \in_r . F$ **(d)** $F' = \frac{F}{\in_0 \in_r}$

20. When current of one ampere is flowing across any cross-section of wire in one second, then the quantity of charge is said to be:

(a) One coulomb **(b)** Three coulomb

(c) One micro-coulomb **(d)** None of above

21. The electric force between two charges placed in air is 2 Newton. When placed in a medium of $\in_r = 80$, the force reduced to:

(a) 0.029 N **(b)** 0.025 N

(c) 0.03 N **(d)** 0.04 N

22. The value of $\in_r$ for various dielectrics is always:

(a) Larger than unity **(b)** Less than unity

(c) Equal to unity **(d)** None of above

23. A metallic hallow sphere of 8cm diameter is charged with 4×10^{-8}c. The potential on its surface will be:

(a) 90 volts **(b)** 9 volts

(c) 9000 volts **(d)** 900 volts

24. Origin of the gravitational and electric forces:

(a) is still unknown **(b)** was known in 1611 A.D

(c) was known in 1712 A.D **(d)** was known in 1911 A.D

25. Michael Faraday was known by his work on:

(a) Electric force **(b)** Weak nuclear force

(c) Strong nuclear force **(d)** Gravitational force

26. The SI unit of charge is:

(a) Meter **(b)** Ampere

(c) Coulomb **(d)** Volt

27. In case of two identical charges placed at certain distance, the electric lines of force are:

(a) Curved **(b)** Straight lines

(c) Both (a) and (b) **(d)** None of these

28. An example of photoconductor is:

(a) Iron **(b)** Aluminum

(c) Carbon **(d)** Selenium

29. Selenium is:

(a) Conductor

(b) Insulator in the dark are becomes conductor when exposed to light

(c) An insulator

(d) None of these

30. The inkjet printer ejects a thin stream of:

(a) Ink **(b)** Water

(c) Oil **(d)** None of these

31. An important part of inkjet printer is:

(a) Deflection plates **(b)** Toner

(c) Drum **(d)** None of these

32. An inkjet printer uses in its operation:

(a) Positrons **(b)** Neutrons

(c) An electric charge **(d)** Photons

33. The photo copying process is called:

(a) Xerography **(b)** Inkjet printer

(c) Both (a) and (b) **(d)** None of these

34. An important port of a photocopier is:

(a) Deflation plates **(b)** Toner

(c) Charging electrode **(d)** Printed head

35. Xerography means:

(a) Dry writing **(b)** Wet writing

(c) Both (a) and (b) **(d)** None of these

36. The number of electric field lines passing through a certain element of area is called:

(a) Electric lines of force **(b)** Electric intensity

(c) Electric flux **(d)** None of these

37. The concept of electric field theory was introduced by:

(a) Kepler **(b)** Newton

(c) Dalton **(d)** Michael Faraday

38. The space around the charge within which other charges are influenced by it is called:

(a) Electric field **(b)** Magnetic field

(c) Electric flux **(d)** Electric intensity

39. The force per unit charge is called:

(a) Electric field **(b)** Electric field intensity

(c) Electric potential energy **(d)** Electric potential

40. The electric field exist around:

(a) Charges **(b)** On the left side

(c) At the –ve charge **(d)** At the +ve charge

41. The practical application of electrostatic is:

(a) Photocopier **(b)** X-rays machines

(c) Laser **(d)** All of above

42. The electric field lines emerge from the charges in:

(a) Three dimensions **(b)** Two dimensions

(c) One dimension **(d)** All of above

43. The direction of electric intensity is:

(a) Normal to the field **(b)** Tangent to the field

(c) Parallel to the field **(d)** None of above

44. When the field is strong, the lines of force are:

(a) Closer **(b)** Parallel

(c) Farther **(d)** All of above

45. The electric lines of force determine the strength of an:

(a) Gravitational field **(b)** Constant field

(c) Magnetic field **(d)** Electric field

46. The electric intensity is a:

(a) Scalar quantity **(b)** Vector quantity

(c) Physical quantity **(d)** None of above

47. The unit of electric intensity is:

(a) C/m^2 **(b)** N/C

(c) Volt – meter **(d)** Both (b) and (c)

48. A charge of 2 coulomb is in a field of intensity 2 N/C. The force on charge is:

(a) 4π N **(b)** 4 N

(c) 0 N **(d)** 1 N

49. The electric intensity at a distance of 1m from the point charge is 1μC is:

(a) 9×10^9 N/C **(b)** 9×10^6 N/C

(c) 9×10^3 N/C **(d)** 9 N/C

50. The total number of lines of force passing out of any closed surface is equal to:

(a) $4\pi\in_0$ **(b)** $\frac{1}{4\pi\in_0}$

(c) $\frac{1}{\in_0} \times Q$ **(d)** $\frac{1}{\in_0 Q}$

51. Another term used to mean electric lines of force is:

(a) Electric field **(b)** Permitivity

(c) Electric flux **(d)** Equipotentials

52. The electric flux is given by the expression:

(a) $\phi = \vec{E} \cdot \vec{A}$ **(b)** $q = \vec{E} \cdot \vec{A}$

(c) $\phi = \vec{E} \cdot \vec{Q}$ **(d)** $V = \vec{E} \cdot \vec{d}$

53. Electric flux is a:

(a) Vector quantity **(b)** Scalar quantity

(c) Both (a) and (b) **(d)** None of above

54. The SI unit of electric flux is:

(a) Nm^2/C^2 **(b)** Nm/C^2

(c) Nm^2/C **(d)** Nm/C

55. The formula $\phi = \vec{E} \cdot \vec{A}$ is applied when the area is:

(a) Flat **(b)** Curve

(c) Rounded **(d)** Spherical

56. The electric lines of force are directed away from:

(a) Positive charge **(b)** Negative charge

(c) Both +ve and –ve **(d)** None of above

57. The magnitude of electric intensity due to a point charge q at a distance r in free space is given by:

(a) $E = \frac{1}{4\pi\epsilon_o} \frac{q}{r^2}$ **(b)** $E = 4\pi\epsilon_o \frac{q}{r^2}$

(c) $E = \frac{1}{4\pi\epsilon_o} \frac{q^2}{r^2}$ **(d)** $E = \frac{1}{4\pi\epsilon_o} \frac{q}{r}$

58. The electric intensity at infinite distance from the point charge is:

(a) Infinite **(b)** Zero

(c) Positive **(d)** Negative

59. The number of electric lines of force passing through certain area is known as:

(a) Electric intensity **(b)** Electric field

(c) Electric flux **(d)** All of above

60. The electric flux through any surface depends upon:

(a) Area of surface **(b)** Direction of surface

(c) Electric intensity **(d)** All of above

61. In $\phi_e = EA \cos\theta$, the angle θ is the angle between the field lines and:

(a) Vector Area **(b)** Electric intensity

(c) Potential **(d)** None of these

62. The surface charge density is defined as:

(a) Charge per unit volume **(b)** Charge per unit mass

(c) Mass per unit area **(d)** Charge per unit area

63. If σ is the surface charge density and A is the area of Gaussian surface then charge enclosed by it is:

(a) $\frac{A}{\sigma}$ **(b)** $\frac{\sigma}{A}$

(c) σA **(d)** σ-A

64. If $\vec{E} = \frac{\sigma}{2\epsilon_o}\hat{r}$, the unit vector $\hat{r}$ is:

(a) Shows the direction of electric intensity **(b)** Directed from negative to positive plate

(c) Directed towards the positive plate **(d)** None of these

65. The electric intensity due to two oppositely charged plates is:

(a) $\vec{E} = \frac{\sigma}{\varepsilon_0}\hat{r}$ **(b)** $\vec{E} = \frac{\varepsilon_0}{\sigma}\hat{r}$

(c) $\vec{E} = \sigma\,\sigma_0\hat{r}$ **(d)** None of these

66. The interior of a hollow charged metal sphere is a region which is:

(a) Full of electric field lines **(b)** Field free region

(c) Both (a) and (b) **(d)** None of these

67. Gauss's Law can only be applied to:

(a) Surface of any shape **(b)** Plane surface

(c) Closed surface **(d)** A curved surface

68. According to Gauss's law, the flux through the closed surface is:

(a) $\frac{Q}{\epsilon_0}$ **(b)** $\frac{E}{\epsilon_0}$

(c) $\frac{E}{\epsilon_0}$ **(d)** $\frac{A}{\epsilon_0}$

69. Intensity of field inside a Hallow charged sphere is:

(a) Minimum **(b)** Maximum

(c) Zero **(d)** All of above

70. The electric intensity due to infinite sheet of charge is:

(a) $E = \frac{\sigma}{2\epsilon_0}$ **(b)** $E = \frac{\sigma}{\epsilon_0}$

(c) $E = \frac{\sigma}{2\epsilon_0\epsilon_r}$ **(d)** $E = \frac{2\sigma}{\epsilon_0}$

71. Which one of the following is taken as the measure of electric intensity?

(a) $E = \frac{\phi}{A}$ **(b)** $E = \frac{\phi \in_0}{A}$

(c) $E = \frac{q}{\in_0 A}$ **(d)** $E = \frac{F}{A}$

72. Work done in moving a charge (unit positive charge) from one point to another against the electric field is measure of:

(a) Electric potential **(b)** Potential difference

(c) Electric intensity **(d)** Absolute potential

73. The SI unit of potential difference is:

(a) Volt **(b)** Ampere

(c) Joule **(d)** $\frac{\text{Volt}}{\text{Metre}}$

74. Another name for electric potential energy per unit charge is:

(a) Electric intensity **(b)** Electric potential

(c) Electric force **(d)** Electric flux

75. Work done in bringing a unit positive charge from infinity to that point in an electric field is:

(a) Resistance **(b)** Capacitance

(c) Absolute potential difference **(d)** Electric potential

76. If an electron of charge "e" is accelerated a potential difference V it will acquire energy:

(a) Ve **(b)** $\frac{v}{e}$

(c) $\frac{e}{v}$ **(d)** Ve^2

77. Electric potential is:

(a) Vector quantity **(b)** Neither scalar non vector

(c) Scalar quantity **(d)** None of above

78. Another unit of electric intensity can be expressed as:

(a) $\frac{\text{Volt}}{\text{Meter}}$ **(b)** $\frac{\text{Ampere}}{\text{Meter}}$

(c) $\frac{\text{Meter}}{\text{Volt}}$ **(d)** $\frac{\text{Volt}}{\text{Coulomb}}$

79. In a region where the electric field is zero the electric potential is always:

(a) Negative **(b)** Positive

(c) Zero **(d)** Constant

80. An electron volt is the unit of a:

(a) Potential **(b)** Electric potential energy

(c) Charge **(d)** Power

81. The negative of the potential gradiant is:

(a) Electric intensity **(b)** Potential energy

(c) Voltage **(d)** Electrostatic force

82. The change of potential w.r.t displacement is called:

(a) Electric potential **(b)** Electric intensity

(c) Potential gradient **(d)** None of these

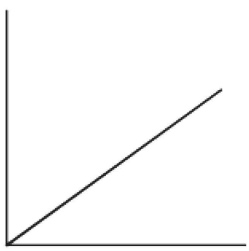
83. Coulomb multiplied by volt gives the unit called:

(a) Ohm **(b)** Bolt

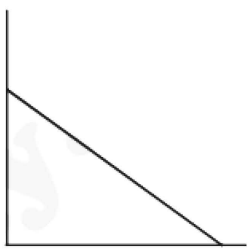
(c) Ampere **(d)** Joule

84. The variation of electric potential due to a point charge with distance is represented by the graph:

(a)



(b)



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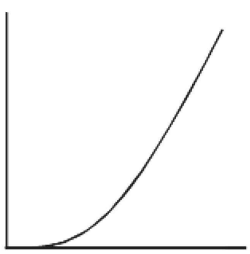

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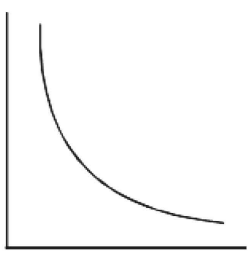


85. Which of the following forces are conservative:

(a) Electric force **(b)** Gravitational force

(c) Frictional force **(d)** Both (a) and (b)

86. Which of the following forces is only repulsive:

(a) Electrostatic force **(b)** Gravitational force

(c) Storing nuclear force **(d)** None of these

87. The unit of F_e/F_g is:

(a) No unit **(b)** Coulomb

(c) Newton **(d)** None of these

88. The Millikan's experiment apparatus also contains:

(a) An atomizer **(b)** Lens

(c) Microscope **(d)** All of above

89. If a oil droplet between two oppositely charged parallel plates is suspended then:

(a) $F_g > F_e$ **(b)** $F_g < F_e$

PROBLEM 12.5

Two point charges, $q_1 = -1.0 \times 10^{-6}$ C and $q_2 = +4.0 \times 10^{-6}$ C, are separated by a distance of 3.0 m. Find and justify the zero-field location.

Data

Charge = q_1 = -1.0×10^{-6} C

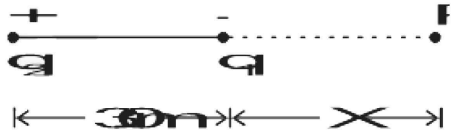
Charge = q_2 = $+4.0 \times 10^{-6}$ C

Distance between the charges = r = 3.0 m

To Find

Distance where the electric intensity is zero = x = ?

SOLUTION



Let P be the any point at a distance x from the charge q_1. So the electric intensity E_1 due to the charge q_1 is

$$E_1 = \frac{1}{4\pi\epsilon_o}\frac{q_1}{x^2}$$

$$E_1 = 9 \times 10^9 \times \frac{1.0 \times 10^{-6}}{x^2}$$

And the electric intensity due to the charge q_2 is

$$E_2 = \frac{1}{4\pi\epsilon_o}\frac{q_2}{(3+x)^2}$$

$$E_2 = 9 \times 10^9 \times \frac{4.0 \times 10^{-6}}{(3+x)^2}$$

Since at point P, the two electric intensities are equal and opposite in direction therefore

$$E_1 = E_2$$

$$\frac{1}{4\pi\epsilon_o}\frac{1.0 \times 10^{-6}}{x^2} = \frac{1}{4\pi\epsilon_o}\frac{4.0 \times 10^{-6}}{(3+x)^2}$$

$$\frac{1}{x^2} = \frac{4}{(3+x)^2}$$

Taking square root

$$\sqrt{\frac{1}{x^2}} = \sqrt{\frac{4}{(3+x)^2}}$$

$$\frac{1}{x} = \frac{2}{3+x}$$

$$2x = 3 + x$$

$$2x - x = 3$$

$$x = 3\text{m}$$

Result

Distance where electric intensity is zero = x = 3.0m.

(a) Positively charged **(b)** Negatively charged

(c) Neutral on the average **(d)** None of these

100. The voltage across the capacitor at any instant can be obtained by:

(a) Dividing q by C **(b)** Dividing C by q

(c) Multiply q by C **(d)** None of these

101. The unit of time constant is the product of:

(a) Farad and ohm **(b)** Coulomb and joule

(c) Farad and watt **(d)** Coulomb and watt

102. A radio tunning capacitor is a:

(a) Cylindrical capacitor **(b)** Spherical capacitor

(c) Parallel plate capacitor **(d)** None of these

103. The potential at a point situated at a distance of 50 cm from a charge of 5μc is:

(a) 9×10^4 volts **(b)** 9×10^2 volts

(c) 9×10^{-2} volts **(d)** 9×10^{-4} volts

104. The earth's potential is considered as:

(a) Negative **(b)** Positive

(c) Zero **(d)** Infinite

105. The interior of a hollow charged sphere is a:

(a) Strong field region **(b)** Field free region

(c) Week field region **(d)** None of above

106. One electron volt is:

(a) 1.6×10^{-19}J **(b)** 1.6×10^{-18}J

(c) 1.6×10^{20}J **(d)** 1.6×10^{15}J

107. A charge of 0.10 C accelerated through a potential difference of 1000 volt acquires K.E.

(a) 100 J **(b)** 200 J

(c) 100 eV **(d)** 400 J

108. The absolute potential at a point distant 20 cm from a charge of 2 μc is:

(a) 9×10^2 V **(b)** 9×10^3V

(c) 9×10^4 V **(d)** 90 V

109. Capacitor is a device used for:

(a) Storing charge **(b)** Storing direct current

(c) Storing alternating current **(d)** Storing voltage

110. The capacitance of a capacitor is given by the relation:

(a) $C = \frac{Q}{V}$ **(b)** $C = \frac{QV}{2}$

(c) $C = \frac{V}{Q}$ **(d)** $C = \frac{1}{2} QV^2$

111. Farad is the unit of:

(a) Capacitance **(b)** Conductance

(c) Current **(d)** Electric flux

112. The value of capacitance depends upon:

(a) Charge on the plates **(b)** Thickness of the plates

(c) Geometry of the capacitor **(d)** All of above

113. The capacitance of a parallel plate capacitor is given by:

(a) $C = \frac{A}{\in_0 d}$ **(b)** $C = \frac{A \in_0}{d}$

(c) $C = \frac{\in_0 d}{A}$ **(d)** $C = \in_0 Ad$

114. Which one of the following is correct:

(a) $1\mu F = 10^{-6} F$ **(b)** $1PF = 10^{-12} F$

(c) $1\ PF = \mu\mu F$ **(d)** All of above

115. Energy density of a capacitor is equal to:

(a) $\frac{1}{2} \in_0 \in_r E^2$ **(b)** $E \in_0 \in_r$

(c) $\frac{\in_0 \in_r}{E}$ **(d)** None of above

116. A capacitor's capacitance can be increased by:

(a) Increasing the area **(b)** Decreasing the distance

(c) Placing the dielectric **(d)** All of above

117. Faraday is a scientist:

(a) English **(b)** French

(c) American **(d)** Spanish

118. Capacitance and potential difference are:

(a) Directly proportional **(b)** Equal

(c) Constant **(d)** Inversely proportional

119. If we increase the charge, the capacitance:

(a) Decrease **(b)** Constant

(c) Increase **(d)** None of these

120. When dielectric is placed between the plates it decrease the:

(a) Electric intensity **(b)** Electric force

(c) Surface charge density **(d)** Potential difference

121. The charges on the parallel plates of capacitor possess:

(a) K.E **(b)** Chemical energy

(c) Electric potential energy **(d)** None of above

122. When capacitor arises, the potential from $0 \rightarrow V$ its average potential difference is:

(a) $\frac{V}{2}$ **(b)** $-V$

(c) V **(d)** Zero

123. Energy stored in capacitor is:

(a) $\frac{1}{2}CV^2$ **(b)** $\frac{1}{4}CV^2$

(c) $\frac{1}{2}C^2V$ **(d)** $\frac{1}{2}CV^4$

124. The circuit having combined components resistance and capacitor is called:

(a) R-L circuit **(b)** R-C circuit

(c) R-L.C circuit **(d)** R.I circuit

125. The charging time of the capacitor depends open:

(a) $R \times C$ **(b)** $\frac{R}{C}$

(c) $R \times L$ **(d)** $\frac{RL}{C}$

126. When dielectric material is placed in an electric field it:

(a) Conducts **(b)** Exhibit electric charge

(c) Undergoes electrolysis **(d)** Becomes polarized

127. The energy supplied in charging a capacitor resides after the charging in:

(a) The battery **(b)** The electric field

(c) The magnetic field **(d)** None of these

128. A system of two equal and opposite charges separated by a small distance is called:

(a) A dipole **(b)** Inductance

(c) A capacitor **(d)** A condenser

129. An electric field that will balance a weight of an electron should act:

(a) In the downward **(b)** In the upward

(c) Along surface of sphere **(d)** None of these

130. If a charge body moved against the electric field it will gain:

(a) Potential energy **(b)** K.E

(c) Mechanical energy **(d)** Electric potential energy

131. Charge on electron was determined by:

(a) Ampere **(b)** Maxwell

(c) Milikan **(d)** Bohr

132. In the xerographic machine, the heart of the machine drum is made of:

(a) Ceramic **(b)** Semi-conductor

(c) Strong plastic **(d)** Aluminum

133. Electric field intensity at a point is defined the equation:

(a) $E = \frac{q}{F}$ **(b)** $E = \frac{F}{q}$

(c) $E = qF$ **(d)** $E = \frac{q^2}{F}$

134. If a dielectric is placed between the plates of a capacitor, its capacitance will:

(a) Increase **(b)** Decrease

(c) Becomes double **(d)** None of these

135. The number of electrons in one coulomb charge:

(a) Zero **(b)** 1.6×10^{-19}

(c) 6.2×10^{-19} **(d)** 6.2×10^{18}

136. If the distance between two charges is doubled, the force between them:

(a) Four times **(b)** One fourth

(c) Half **(d)** Remain same

137. An electric field cannot deflect:

(a) X-rays **(b)** α-particles

(c) β-particles **(d)** None of these

138. When a dielectric is placed in an electric field, it is:

(a) Change **(b)** Polarized

(c) Remain unchanged **(d)** None of these

139. $\in_o$ is permittivity of free space it can be given as:

(a) $\in_o = \frac{1}{\in_r}$ **(b)** $\in_o = \frac{1}{K}$

(c) $\in_o = \frac{1}{4\pi K}$ **(d)** None of these

140. A force of 0.01 N is exerted on a charge 1.2×10^{-5} C at a certain point. The electric field at that point is:

(a) 1.2×10^4 N/C **(b)** 1.2×10^4 C/N

(c) 8.3×10^2 N/C **(d)** 8.3×10^{-2} N/C

141. A charge -4 μC is at origin and $+16$ μC is at a distance 3 m on positive x-axis. The zero field is located at:

(a) 3 m along y-axis **(b)** 3 m along negative x-axis

(c) 3 m along positive x-axis **(d)** None of these

142. Electric intensity between two same charged parallel plates is:

(a) $\frac{\sigma}{\in_o}$ **(b)** $\frac{2\sigma}{\in_o}$

(c) Zero **(d)** None of these

143. Capacitance of a capacitor is increases by decreasing:

(a) Area of plates **(b)** Medium

(c) Distance between plates **(d)** None of these

144. Two metallic sphere of radius 2 cm and 4 cm get equal quantity of charge. Which has greater surface charge density?

(a) 2^{nd} sphere **(b)** Both have same

(c) First sphere **(d)** None of these

145. The apparatus used by coulomb is:

(a) Cavendish **(b)** Torsion balance

(c) Physical balance **(d)** Gold leaf electroscope

146. The number of lines per unit area passing perpendicular through an area is called:

(a) Flux **(b)** Electric intensity

(c) Both (a), (b) **(d)** None of these

ANSWERS

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(c)	**5.**	(a)
6.	(a)	**7.**	(b)	**8.**	(c)	**9.**	(c)	**10.**	(b)
11.	(a)	**12.**	(a)	**13.**	(c)	**14.**	(c)	**15.**	(c)
16.	(c)	**17.**	(b)	**18.**	(a)	**19.**	(a)	**20.**	(a)
21.	(b)	**22.**	(a)	**23.**	(c)	**24.**	(a)	**25.**	(a)
26.	(c)	**27.**	(a)	**28.**	(d)	**29.**	(b)	**30.**	(a)
31.	(a)	**32.**	(c)	**33.**	(a)	**34.**	(b)	**35.**	(a)
36.	(c)	**37.**	(d)	**38.**	(a)	**39.**	(b)	**40.**	(a)
41.	(a)	**42.**	(d)	**43.**	(b)	**44.**	(a)	**45.**	(d)
46.	(b)	**47.**	(b)	**48.**	(b)	**49.**	(c)	**50.**	(c)
51.	(a)	**52.**	(a)	**53.**	(b)	**54.**	(c)	**55.**	(a)
56.	(a)	**57.**	(a)	**58.**	(b)	**59.**	(c)	**60.**	(a)
61.	(a)	**62.**	(d)	**63.**	(c)	**64.**	(a)	**65.**	(a)
66.	(b)	**67.**	(a)	**68.**	(a)	**69.**	(c)	**70.**	(a)
71.	(a)	**72.**	(a)	**73.**	(a)	**74.**	(b)	**75.**	(c)
76.	(a)	**77.**	(c)	**78.**	(a)	**79.**	(c)	**80.**	(b)
81.	(a)	**82.**	(c)	**83.**	(d)	**84.**	(b)	**85.**	(d)
86.	(d)	**87.**	(a)	**88.**	(d)	**89.**	(c)	**90.**	(a)
91.	(b)	**92.**	(d)	**93.**	(b)	**94.**	(c)	**95.**	(b)
96.	(d)	**97.**	(a)	**98.**	(d)	**99.**	(c)	**100.**	(a)
101.	(a)	**102.**	(c)	**103.**	(a)	**104.**	(c)	**105.**	(b)
106.	(a)	**107.**	(a)	**108.**	(c)	**109.**	(a)	**110.**	(a)
111.	(a)	**112.**	(d)	**113.**	(b)	**114.**	(d)	**115.**	(a)
116.	(d)	**117.**	(b)	**118.**	(d)	**119.**	(c)	**120.**	(a)
121.	(c)	**122.**	(a)	**123.**	(a)	**124.**	(b)	**125.**	(a)
126.	(d)	**127.**	(b)	**128.**	(a)	**129.**	(a)	**130.**	(b)
131.	(c)	**132.**	(d)	**133.**	(b)	**134.**	(a)	**135.**	(d)
136.	(b)	**137.**	(a)	**138.**	(b)	**139.**	(c)	**140.**	(c)
141.	(b)	**142.**	(c)	**143.**	(c)	**144.**	(c)	**145.**	(b)
146.	(b)								