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QAD Series

Electrostatics & Magnetism

1. Two charged spheres separated by a distance 'd' exerts a force *f* on each other. If they are immersed in a liquid of dielectric constant 2, then what is the force?
a) F/2 b) F c) 2F d) 4F

2. The electric charge in uniform motion produces:
a) On electric field only b) A magnetic field only
c) Both electric and magnetic field
d) Neither electric field nor magnetic field

3. Two point charges q & 2q are placed at some distance apart. If the electric field at the location of q is $\vec{E}$, then that at the location of 2q will be:
a) $3\vec{E}$ b) $2\vec{E}$ c) $\vec{E}$ d) $\vec{E}/2$

4. Work done in carrying a charge 'q' once round a circle of radius 'r' with a charge 'Q' at the centre is:
a) $\frac{qQ}{4\pi r}$ b) $\frac{qQ}{4\pi\varepsilon_0 \pi r}$ c) $\frac{qQ}{4\pi\varepsilon_0}\frac{1}{(2\pi r)}$ d) 0

5. Eight charged water drops each of radius 1mm and a charge of 10^{-10} C coaleses to form a single drop. What is the potential of big drop?
a) 36v b) 360v c) 3600v d) 1800v

6. A hallow metal sphere of radius 5cm is charged such that the potential on its surface is 10v. The potential at the centre of sphere is:
a) Zero b) 10v c) 2v d) 25v

7. Two charges 4q & – q are placed at a distance 'r' apart. A charge 'Q' is placed exactly mid way between them. What should be the value of Q, so that charge '–q' experiences no net force?
a) q b) – q c) 4q d) – 4q

8. An oil drop of mass 50mg and of charge – 5μc is just balanced in air against the force of gravity. Calculate the strength of the electric field required to balance it:
a) 98 N/C upward b) 98 N/C downward
c) 49 N/C upward d) 49 N/C downward

9. Flux coming out from a unit positive charge placed in air is:
a) ε_0 b) ε_0^{-1} c) $4\pi\varepsilon_0$ d) $(4\pi\varepsilon_0)^{-1}$

10. A small metal ball is suspended in a uniform electric field with the help of insulating thread. If X-ray beam fall on it,
a) The ball will be deflected in the direction of field
b) The ball will be deflected opposite to the direction of field
c) The ball will not deflect at all
d) The ball will fly to infinity

11. Two similar point charges each of 1μc are placed at distance 1m from each other. The potential at a point midway between them will be:
a) 36×10^3v b) 4v c) 36×10^9v d) Zero

12. An electron & proton are situated in a uniform electric field. The ratio of their acceleration will be:
a) Zero b) Unity
c) Ration of masses of proton & electron
d) Ratio of masses of electron & proton

13. How does the maximum voltage (V) that can be given to a spherical conductor vary with its radius R?
a) $V \propto 1/R^2$ b) $V \propto R$ c) $V \propto R^2$ d) $V \propto R^{-1}$

14. Electric flux at a point over a surface in an electric field may be:
a) Positive b) Negative
c) Zero d) Positive, negative, zero

15. Electric field intensity inside a charged solid non-conducting sphere varies as:
a) $E \propto r$ b) $E \propto r^2$ c) $E \propto 1/r$ d) $E \propto 1/r^2$

16. Two charges – 15μc and + 20μc are separated by 2m. At what point from the second charge will the potential be zero?
a) 8/7 m b) 7/8 m c) 0.5 m d) 1.5 m

17. How many electrons should be removed so that a body may have charge of + 1μc?
a) 6.25×10^{15} b) 6.25×10^{12} c) 6.25×10^{18} d) 6.25×10^{17}

18. Two charges 4μc & 36μc are placed 60cm apart. At what distance from the bigger charge the electric field intensity is zero?
a) 15cm b) 45cm c) 25cm d) 35cm

19. If the field is uniform, electric lines of force is:
a) Divergent b) Convergent c) Circular d) Parallel

20. Ratio of electric field due to an electric dipole on its axis and on the perpendicular bisector of the dipole is:
a) 1 : 2 b) 2 : 1 c) 1 : 4 d) 4 : 1

21. Two balls carrying charges + 8μc and – 5μc attract each other with a force 'F'. If a charge – 3μc is added to both, the force between the balls will be:
a) 2F b) F c) F/2 d) Zero

22. Which of the following is correct?
a) If V = 0, E must be zero b) If F = 0, V must be zero
c) If $V \neq 0$, E can't be zero d) None of the above

23. An electric dipole consists of two opposite charges each of magnitude 1.0×10^{-6} Coulomb separated by distance 2cm. The dipole is placed in an external field of 1.0×10^{-5} N/C. The maximum torque on the dipole is:
a) 0.2×10^{-3} Nm b) 1.0×10^3 Nm
c) 2×10^{-3} Nm d) 4.0×10^{-3} Nm

24. Electron are caused to fall through a potential difference of 1500V. If they were initially at rest, their final speed is:
a) 4.6×10^7 m/s b) 2.3×10^7 m/s
c) 0.23×10^2 m/s d) 5.1×10^9 m/s

25. A particle of mass 'm' and charge q is placed at rest in a uniform electric field E and then released. The K.E. attained by the particle after moving a distance 'y' is:
a) qEy^2 b) qE^2y c) qEy d) q^2Ey

26. In bringing an electron towards another electron, the electrostatic potential energy of the system:
a) Decreases b) Increases
c) Becomes zero d) Remains same

26. If a soap bubble is given negative charge, then its radius:
a) Decreases b) Increases c) Unchanged d) Fluctuate

27. Two charges are 40μc & – 20μc are at some distance apart. Now they are touched and kept at the same distance. The ratio of the initial to the final force between them is:
a) 8 : 1 b) 4 : 1 c) 1 : 8 d) 1 : 1

28. Three charges 'Q' are placed at the corner A, B & C of an equilateral triangle. At a circumcentre O, the electric field strength is:
a) $\frac{Q^2}{4\pi\varepsilon_0 r^2}$ b) $\frac{3Q}{4\pi\varepsilon_0 r^2}$ c) $\frac{Q}{4\pi\varepsilon_0 r^2}$ d) Zero

29. If a cube of side 5cm has a charge of 6μc, then the surface charge density is:
a) 4×10^2 μc/m^2 b) 4×10^2 c/m^2
c) 4×10^3 μc/m^2 d) 4×10^3 c/m^2

30. Number of electric lines of force emanating from 1c of positive charge in vaccum is:
a) 3.35×10^{-12} b) 9×10^{3} c) $\frac{1}{4\pi} \times 9 \times 10^{9}$ d) 1.13×10^{11}

31. The energy stored per unit volume in an electric field of strength $\vec{E}$ V/m in a medium of dielectric constant K is:
a) $\frac{1}{2}\varepsilon_0 E^2$ b) $\frac{1}{2}\varepsilon_0 KE^2$ c) $\frac{1}{2}\frac{\varepsilon_0 E^2}{K}$ d) $\frac{1}{2}K^2\varepsilon_0^2 E$

32. Two equally charged pendulum bob having charge 'q' is suspended by a silk thread of equal length '*l*' if taken to space, then the angle between these two bob is:
a) $\frac{\pi}{2}$ b) 0 c) π d) $\frac{3\pi}{6}$

33. Capacity of a parallel plate capacitor may be increased by:
a) Increasing the distance between plates
b) Decreasing the distance between plates
c) Increasing the thickness of the plate
d) Decreasing the thickness of the plate

34. A parallel plate capacitor is made by stacking *n* equally spaced plates connected alternatively. If the capacitance between the two plates is 'C', then the resulting capacitance is:
a) C b) nC c) (n – 1) C d) (n + 1) C

35. Two capacitor of capacitance 2μf & 3μf are in series. The p.d. across 2μf is 20V; the potential across 3μf capacitor will be:
a) 20V b) 30V c) 40/3 V d) 20/3 V

36. The energy of the charged capacitor resides in:
a) The electric field only
b) The magnetic field only
c) Both the electric and magnetic field
d) Neither in electric nor in magnetic field

37. Two conductors, each of capacitance 1f, are charged to potential of 10V & 3V respectively. They are then joined together. Their common potential will be:
a) 16 V b) 8V c) 4V d) 1V

38. A parallel plate capacitor has a capacitance of 45μf in air and 100μf when immersed in an oil. The dielectric constant 'K' of the oil is:
a) 0.45 b) 0.55 c) 1.10 d) 2.22

39. The distance between the plates of a parallel plate capacitor of capacitance 40μf is 20cm. A metal plate, 10mm thick, is inserted between the plates of the capacitor. Its new capacitance is:
a) 40 μf b) 20 μf c) 10 μf d) 80 μf

40. The potentials of the two plates of a capacitor are + 10V and – 10V. The charge on one of the plate is 400. The capacitance of capacitor is:
a) 2F b) 4F c) 0.5 F d) 0.25 F

41. A parallel plate capacitor is charged and then isolated. What is the effect of increasing the plate separation on charge, potential, capacitance respectively?
a) Constant, decreases, decreases
b) Increases, decreases, decreases
c) Constant, decreases, increases
d) Constant, increases, decreases

42. A parallel plate capacitor with plate area 'A' and separation 'd' is filled with two slabs, each of thickness 'd/2' and dielectric constant K_1 & K_2 respectively. The capacitance will be:
a) $\frac{\varepsilon_0 A}{d}(K_1 + K_2)$ b) $\frac{\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{K_1 K_2}\right)$
c) $\frac{2\varepsilon_0 A}{d}\left(\frac{K_1 K_2}{K_1 + K_2}\right)$ d) $\frac{2\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{K_1 K_2}\right)$

43. A parallel plate air capacitor has capacitance C. If the air between the plate is exhausted completely, the new capacitance would become:
a) Zero b) C
c) Slightly less than C d) Slightly more than C

44. A parallel plate capacitor is first charged and then a dielectric slab is introduced between the plates. The quantity that remain unchanged in:
a) Charge b) Potential c) Capacity d) Energy

45. Two spherical conductors each of capacity C are charged to potential V and –V. These are then connected by mean of fine wire. The loss of energy is:
a) Zero b) $\frac{1}{2}$ CV² c) CV² d) 2CV²

46. The energy of a charged capacitor is E. It is allowed to share its charge with an identical capacitor charged to half its potential loss in the energy of the system is:
a) $\frac{E}{2}$ b) $\frac{E}{4}$ c) $\frac{E}{8}$ d) $\frac{3}{4}$ E

47. Three capacitors each of capacitance C and of breakdown voltage V are joined in series. The capacitance and breakdown voltage of the combination will be:
a) 3C, 3V b) $\frac{C}{3}, \frac{V}{3}$ c) 3C, $\frac{V}{3}$ d) $\frac{C}{3}$, 3V

48. The magnet of pole strength *m* but magnetic moment M is cut into two pieces along its axis. Its pole strength and magnetic moment now become:
a) $\frac{m}{2}, \frac{M}{2}$ b) m, $\frac{M}{2}$ c) $\frac{m}{2}$, M d) m, M

49. At a certain place, horizontal component is $\sqrt{3}$ times the vertical component. The angle of dip at this place is:
a) 0 b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{2}$

50. When 2A current is passed through a tangent galvanometer, it gives a deflection of 30° for deflection of 60°, the current must be:
a) 1A b) $2\sqrt{3}$ c) 4A d) 6A

51. Susceptibility is independent of temperature for:
a) ferromagnetic substance b) paramagnetic substance
c) diamagnetic substance d) non-magnetic substance

52. A thin bar magnet of length 2L is bent at the midpoint so that angle between them is 60°. The new magnetic dipole length will be:
a) $\sqrt{2}$ L b) $\sqrt{3}$ L c) $\frac{L}{2}$ d) L

53. A thin bar magnet of length 2L and magnetic moment M is bent at the mid-point so that the angle between them is 60°. The new magnetic moment is:
a) M b) $\frac{M}{2}$ c) 2M d) $M\sqrt{3}$

54. Above Curie temperature, ferromagnetic substance behaves as:
a) ferromagnetic substance b) paramagnetic substance
c) diamagnetic substance d) non-magnetic substance

55. A dip circle lying initially in magnetic meridian is rotated through an angle θ in horizontal plane. The ratio of tangent of angle of dip in the later to initial case equal to:
a) sinθ b) cosθ c) tanθ d) secθ