

PHYSICS ASSIGNMENT

ES/CE/MAG

Class XII

MM : 70

1. What is dielectric strength of a medium? Give its value for vacuum. 1
2. What is the physical importance of the line integral of an electrostatic field? 1
3. What is the work done in moving a test charge q through a distance of 1 cm along the equatorial axis of an electric dipole? 1
4. A uniform electric field E exists between two charged plates as shown in the figure. What would be the work done in moving a charge ' q ' along the closed rectangular path ABCDA? 1
5. Derive an expression for the electric potential at a point along the axial line of an electric dipole. 1
6. Two parallel wires carrying current in same direction attract each other. What about two beams of electrons travelling parallel, and in same direction to each other? 1
7. Give two factors by which voltage sensitivity of a moving coil galvanometer can be increased. 1
8. What kind of material is used to make core of an electric transformer? Justify your answer. 1

9. Two point charges q_1 and q_2 at a separation r in vacuum produce a force F on each other. What will be their separation in an oil of a relative permittivity 16 so that the force between them remains F only? 2
10. Derive an expression for the total work done in rotating an electric dipole through an angle θ in a uniform electric field. 2
11. Two dielectric slabs of dielectric constants K_1 and K_2 have been filled in between the plates of a capacitor as shown in Figure. What will be the capacitance of the capacitor? 2
12. State Ohm's Law. The sequence of bands marked on a carbon resistor is brown, black, brown, gold. What is the value of the resistance? 2
13. Find the value of the unknown resistance X , in the following circuit, if no current flows through the section AO . Also calculate the current drawn by the circuit from the battery of emf 6 V and negligible internal resistance. 2
14. Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current carrying solenoid of length l and having N number of turns. 2
15. The given figure shows tracks of three charged particles 1, 2 and 3 in a uniform electric field. Give the signs of the three charges. Which particle has highest charge to mass ratio? 2

16. If the dip circle is set at 45° to the magnetic meridian, then the apparent dip is 30° . Calculate the true dip. 2
17. A galvanometer has a resistance of 5 ohm and a full scale deflection is produced by 15 mA. What resistance must be connected to enable the galvanometer to read 1.5 V? 2
18. N identical resistors, each having a resistance R , when connected in series have an effective resistance of $X \Omega$. When these resistors are connected in parallel, their effective resistance is $Y \Omega$. What is the relation between R , X and Y ? 2
19. A capacitor of capacitance C is charged fully by connecting it to a battery of e.m.f. It is then disconnected from the battery. If the separation between the plates of the capacitor is doubled, what will be effect on 3
- (a) charge stored by the capacitor,
 - (b) potential difference across it,
 - (c) field strength between the plates,
 - (d) energy stored by the capacitor?
20. Find the equivalent capacitance of the combination of capacitors between the points A and B as shown. Also calculate the total charge that flows in the circuit when a 100 V battery is connected between the points A and B. 3
21. State gauss's law in electrostatics. Using this law derive an expression for the electric field due to a uniformly charged infinite plane sheet. 3

22. Using Kirchhoff's drawn a cell of emf 1 V and internal resistance $\frac{2}{3} \Omega$ connected to the network. 3
23. AB is 2 meter long uniform wire of 20 ohm resistance. The other data are given as shown in the figure B. calculate 9i) potential gradient along AB, and (ii) length AO of the wire, when the galvanometer shows no deflection. 3
24. To increase the current sensitivity of a moving coil galvanometer by 50%, its resistance is increased so that the new resistance becomes twice its initial resistance. By what factor does its voltage sensitivity change? 3
25. Name and define the elements of earth's magnetic field at a place. Derive an expression for the angle of dip in terms of the horizontal component and the resultant magnetic field of the earth at a given place. 3
26. Define relaxation time of electrons in a conductor. Explain how it varies with increase in temperature of a conductor. State the relation between resistivity and relaxation time. 3
27. Find the total energy stored in the capacitors in the given network. 3
28. With help of labeled diagram, describe the construction and working of a van de Graff generator. 5
29. Draw a labelled diagram of a moving coil galvanometer. State the principle on which it works. Deduce an expression for the torque acting on a rectangular current carrying loop kept in a uniform magnetic field. Write two factors on which the current sensitivity of a moving coil galvanometer depends. 5

30. Derive a mathematical expression for the force per unit length experienced by each of the two long current carrying conductors placed parallel to each other in air. Hence define one ampere of current.

Explain why two parallel straight conductors carrying current in the opposite direction kept near each other in air repel?

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