

CLASS XII GUESS PAPER PHYSICS

TIME: 2:00 Hr

MM: 63

1. A proton is placed in a uniform electric field along the positive X- axis. In which direction will it tend to move? (1)
2. Sketch the pattern of electric field lines due to (i) a conducting sphere having negative charge on it and (ii) An electric dipole. (1)
3. Why does the electric field inside a dielectric decreases, when it is placed in an external electric field? (1)
4. Magnetic field lines can be entirely confined within the core of a toroid , but not within a straight solenoid. Why? (1)
5. Out of an ammeter and voltmeter, which of the two has higher resistance and why? (1)
6. The susceptibility of a magnetic material is 1.91×10^{-5} . Name the type of material it represents. (1)
7. Why do we use steel or alnico for making permanent magnets. (1)
8. Two identical loops, one of copper and another of aluminium are rotated with the same speed in the same magnetic field. In which case, the

- (a) induced e.m.f. and (b) induced current will be more and why?
(1)
9. What is wattless current? (1)
10. Explain briefly with the help of a labelled diagram, the basic principle of the working of an a.c. generator. (3)
11. In the given diagram, an electric lamp having coil of negligible inductance connected in series with a capacitor and an a.c. source is glowing with a certain brightness. How does the brightness of the lamp change on reducing (i) the capacitance and (ii) the frequency? Justify your answer. (3)
12. With the help of a labelled diagram, describe briefly the underlying principle and working of a step-up transformer. (3)
13. Identify the type of the electromagnetic waves, whose method of propagation is associated with (a) a klystron valve, (b) vibration of atoms and molecules and (c) decay of atomic nuclei. Also give the approximate range of wavelength of each of the waves. (3)
14. An element $\Delta l = \Delta x \hat{i}$ is placed at the origin and carries a current $I = 2 \text{ A}$ as shown in fig.
Find the magnetic field at a point P on Y- axis at a distance 1 m due to the element $\Delta x = 1 \text{ m}$.
Give also the direction of the field produced. (3)

15. Using Kirchhoff's laws, derive the condition for balance of a Wheatstone Bridge circuit? (3)
16. Three cells of e.m.f. E , $2E$ and $5E$ having internal resistances r , $2r$ and $5r$ respectively are connected across a variable resistance as shown in fig. Find the expression for the current. Plot a graph for the variation of current with R . (3)
17. Two conductors X and Y of same diameter but of different metals are joined in series across a battery. If the number density of electrons in X is twice that in Y / Find the ratio of drift velocity of electron in two metals. (3)
18. A point charge Q is placed at a point O as shown
Is the p.d. $V_A - V_B$ is positive, negative or zero,
if Q is (i) positive (ii) Negative (3)
19. A parallel plate capacitor of capacity C is charged to a p.d. of V and then the battery is disconnected. Now a dielectric slab of dimensions equal to spacing between the plates of the capacitor is inserted between the plates. What are the changes, If any, in the capacitance, charge, p.d., electric field and the stored energy. (3)
20. Two point charges $+5\mu\text{C}$ and $-5\mu\text{C}$ are placed at a distance 5 cm apart. (i)

Draw the equipotential surface of the system (ii) Why do the equipotential surfaces closer to each other near the point charge? (3)

21. Two circular coils, one of radius r and the other of radius R are placed coaxially with their centres coinciding. For $R \gg r$, obtain an expression for the mutual inductance of the arrangement. (3)
22. The electric field E due to a point charge at any point near it is defined as $E = F / q_0$, where q_0 is a test charge and F is the force acting on it. What is the physical significance of E in this expression. (3)
23. State Gauss' theorem. Show by using suitable example, that this theorem is based on Coulomb's inverse square law. (3)
24. Deduce an expression for the electric field E due to a system of two charges q_1 and q_2 with position vectors r_1 and r_2 at a point ' r ' w.r.t. the common origin O . (5)
25. State Biot- Savart law, giving the mathematical expression for it. Use this law to derive the expression for the magnetic field due to circular coil carrying current at a point along its axis. How does a circular loop carrying current behave as a magnet? (5)
26. With the help of the diagram, explain the principle and working of a moving coil galvanometer. What is the importance of a radial magnetic field and how is it produced. Why is that while using a a moving coil galvanometer as

voltmeter, a high resistance in series is required, where as in an ammeter,
a shunt is used? (5)

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