

# Delhi Public School, Jammu

Class 12<sup>th</sup>

Sub-Physics

Assignment (Half-Yearly Exams)

## Section A (1 mark each)

- Q01. Why do the electrostatic field lines not form closed loops?
- Q02. How does the random motion of free electrons in a conductor get affected when a potential difference is applied across its ends ?
- Q03. Depict the trajectory of a charged particle moving with velocity  $v$  as it enters in a uniform magnetic field perpendicular to the direction of its motion.
- Q04. What are wattles current
- Q05. State Huygens' principle of diffraction of light.

## Section B (2Marks each)

- Q06. What is the area of the plates of 2F parallel plate capacitor having separation between the plates is 0.5 cm?
- a) You are required to select a carbon resistor of resistance  $47 \text{ kW} \pm 10\%$  from a large collection. What should be the sequence of colour bands used to code it ?
- b) Write the characteristics of manganin which make it suitable for making standard resistance.
- Q07. State Biot-Savart law in vector form expressing the magnetic field due to an element  $dl$  current ( $I$ ) at a distance ' $r$ ' from the element.
- Q08. Show that mean value of AC in full cycle is zero.
- Q09. A parallel beam of light of 500 nm falls on a narrow slit and the resulting diffraction pattern is observed on a screen 1m away. It is observed that the first minimum is at a distance of 2.5 mm from the center of the screen. Calculate the width of the slit.
- Q10. Write the conditions for observing a rainbow. Show by drawing suitable diagrams, how one understands the formation of a rainbow.

**Section C** (3 marks each)

- Q11. Define an equipotential surface. Draw equipotential surfaces:
- in the case of a single point charge and
  - in a constant electric field in Z-direction. Why the equipotential surface about a single charge is not equidistant?
  - Can electric field exist tangential to an equipotential surface? Give reason.
- Q12. An electric dipole is kept in a uniform electric field. Derive an expression for the net torque acting on it and write its direction. State the conditions under which the dipole is in (i) stable equilibrium and (ii) unstable equilibrium.
- Q13. Write any two factors on which internal resistance of a cell depends. The reading on a high resistance voltmeter, when a cell is connected across it, is 2.2 V. When the terminals of the cell are also connected to a resistance of 5  $\Omega$  as shown in the circuit, the voltmeter reading drops to 1.8 V. Find the internal resistance of the cell.
- Q14. With the help of the circuit diagram, explain the working principle of Meter Bridge. How is it used to determine the unknown resistance of a given wire? Write the necessary precautions to minimize error in the result.
- Q15. Two long straight parallel conductors carry steady current  $I_1$  and  $I_2$  separated by a distance  $d$ . If the currents are flowing in the same direction, show how the magnetic field set up in one produces an attractive force on the other. Obtain the expression for this force. Hence define one ampere.
- Q16. Draw a labeled diagram of a moving coil galvanometer and explain its working. What is the function of radial magnetic field inside the coil?
- Q17. State Lenz's law. Using this law indicate the direction of the current in a closed loop when a bar magnet with North Pole is brought close to it. Explain briefly how the direction of the current predicted wrongly results in the violation of the law of conservation of energy.
- Q18. What are eddy currents? How can they be minimized? Explain any of its 2 applications.
- Q19. Explain Transformer. Give its principle, construction & working.
- Q20. An object of 3 cm height is placed at a distance of 60 cm from a convex mirror of focal length 30 cm. Find the nature, position and size of the image formed.
- Q21. State the necessary conditions for producing total internal reflection of light. Draw ray diagrams to show how specially designed prisms make use of total internal reflection to obtain inverted image of the object by deviating rays (i) through  $90^\circ$  and (ii) through  $180^\circ$ .
- Q22. Explain the construction & working of a compound microscope with a labeled diagram.

**Section D**<sup>(4 marks)</sup>

Q23. Father and a son returned home completely drenched due to heavy rain. Father advised his son not touch any electrical units with wet hands for he may get a shock; In spite of this, on immediately entering the house, the son switches on the light (supply voltage is 220 V and gets a severe shock; He was fortunate not to get electrocuted. Father, who is a Biologist, told that when the skin is dry, resistance of a human body is  $10\Omega$ ; and when the skin is wet the body resistance is  $1500\Omega$ . (p)What is the lesson learnt by you?(q)Calculate the current that flow thro' (i) a wet body and (ii) a dry body.(r)Dry skin or wet skin? - When will we have serious consequences and why?

**Section E**<sup>(5 marks each)</sup>

Q24. Differentiate between ferromagnetic, paramagnetic and diamagnetic materials.

OR

Explain

- a) Bohr's Magneton.
- b) Explain Magnetic elements of earth.

Q25. In Young's double slit experiment, deduce the condition for (a) constructive and (b) destructive interference at a point on the screen. Draw a graph showing variation of intensity in the interference pattern against position 'x' on the screen.

OR

Explain Diffraction. Find necessary condition for Minima & Maxima. Find the width of central Maxima

Q26. Using Gauss's law,

- a) derive an expression for the electric field intensity at any point outside a uniformly charged thin spherical shell of radius R and charge density  $s\text{ C/m}$ . Draw the field lines when the charge density of the sphere is (i) positive, (ii) negative.
- b) A uniformly charged conducting sphere of 2.5 m in diameter has a surface charge density of  $100\text{ mC/m}$ . Calculate the (i) charge on the sphere. (ii) total electric flux passing through the sphere.

OR

Find the electric potential at any point due to the electric dipole