Physics
Sample Question Paper
Class XII

Class:12 **Max Mks:70**
Time 3hrs **No of pages:5**

General Instructions:

- All questions are compulsory.
- Questions 1 to 5 are one mark questions.
- Questions 6 to 10 are two marks questions.
- Questions 11 to 22 are three marks questions.
- Question 23 is four marks question.
- Question 24 to 26 are five marks questions.
- There is no overall choice in the question paper, but internal choice is there.
- Use of calculator is not permitted.

1. What is the SI unit of magnetic flux?
2. Write any two characteristics of nuclear forces.
3. Write two applications of eddy currents.
4. Why it is not possible to charge just one end of metal rod?
5. How are X-rays produced?
6. Of the metals and alloys, which have greater value of temperature coefficient of resistivity?
7. What do you mean by critical angle? Give one practical application of total internal reflection.

   or

   Write down the three differences between inference and diffraction.

8. What do you mean by modulation and demodulation?
9. Write down the function of (i) transducer and (ii) antenna?
10. What is the principle of working of transformer? Describe. Does a transformer violate the principle of energy conservation? Explain. Can a transformer be used to step up d.c? Explain.
11. Derive the expression for the force between two parallel current carrying conductors and hence define one ampere.
12. Draw a labelled diagram to show the image formation in a refracting type astronomical telescope.
13. State Coulomb's law in electrostatics. The electrostatic force between two charges of 200 μC and 500 μC placed in free space is 5 gf. Find the distance between the two charges. $(g = 10m/s^2)$
14. What are the limitations of Coulomb's law in electrostatics? Is it valid in all the situations? Three charges +q, +q and -2q are placed at the vertices of an equilateral triangle. What is the dipole moment of the system?
15. State de Broglie's hypothesis. Write the expression for the de Broglie wave. State Bohr's postulate on angular momentum of a revolving electron and use the same to show that the nth Bohr orbit has an integral number of de Broglie waves.
16. Two wires A and B have the same length equal to 44 cm and carry a current of 10 A each. Wire A is bent into a circle and wire B is bent into a square.

17. Derive the expression for the equivalent emf and internal resistance for the parallel combination of two cells with emf's E1 and E2 and internal resistances r1 and r2 respectively. What is the corresponding formula for the series combination?
18. A motor car is fitted with a convex mirror of focal length 20 cm. Another car is 10 m away from this car.

    a) Calculate the position of the 2nd car as seen in the rear view mirror of the 1st car.

    b) If the 2nd car is overtaking the 1st car at a relative speed of 20 m/s, then how fast will the image move and in what direction?
19. Define the coefficient of self induction. A coil has an inductance of 0.03H. Calculate the emf induced when current in the coil changes at a rate of 200 A/s.
20. Find the frequency of LCR series resonant circuit. Define Q factor and show that

$$Q = \frac{1}{R}\sqrt{\frac{L}{C}}$$

21. Light of wavelength 2000 A falls on aluminium surface. In aluminium 4.2 eV are required to remove an electron. What is the kinetic energy of: (i) the fastest, (ii) the slowest emitted photo electrons and (iii) what is the stopping potential?
22. Discuss refraction through a glass slab. Show that the emergent ray is parallel to the incident ray but displaced.
23. Define the term 'Activity' of a radioactive substance. State its SI unit.

    Two different radioactive elements with half lives T1 and T2 have N1 and N2 (undecayed) atoms respectively present at a given instant. Determine the ratio of their activities at this instant.

24. (a) Draw the labelled diagram of moving coil galvanometer. Prove that in a radial magnetic field, the deflection of the coil is directly proportional to the current flowing in the coil.

(b) A galvanometer can be converted into a voltmeter to measure up to

(i) 'V' volts by connecting a resistance R1 in series with coil.

(ii) $\frac{V}{2}$ volts by connecting a resistance R2 in series with its coil

Find the resistance (R), in terms of R1 and R2 required to convert it into a voltmeter that can read up to '2V' volts.

OR

(a) Draw diagrams to depict the behaviour of magnetic field lines near a ' bar' of:

(i) copper

(ii)Aluminium

(iii) Mercury, cooled to a very low temperature (4.2K)

25. (a) Discuss Young's double slit experiment to demonstrate the interference of light. What are the conditions of bright and dark fringes?

(b) Two sources of intensities I1 and I2 undergo interfere in Young's double slit experiment. Find the ratio of maximum intensity to the minimum intensity of light after interference.

OR

(a) Show that with the monochromatic light, the interference patterns shown by thin film when viewed by reflected and transmitted light are complementary.

(b) Two polaroids are placed at 90° to each other and the transmitted intensity is zero. What happens when one more polaroid is placed between these two bisecting the angle between them?

26. Describe Davisson-Germer experiment to establish the wave nature of electrons. Draw labeled diagram of the apparatus used and show the necessary calculations.

OR

(a) Establish photoelectric equation and use this to explain the laws of photoelectric effect.

(b) What is the lowest frequency of light that will cause the emission of photoelectrons from a surface whose nature is such that 1.65eV is required to eject an electron?