

SAMPLE PAPER- (unsolved)

PHYSICS (Theory)

Class – XII

Time allowed: 3 hours

Maximum Marks: 70

General Instructions:

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

1. What does $q_1 + q_2 = 0$ signifies in electrostatics?
2. What is the S.I. unit of conductance?
3. Is the source of magnetic field an analogue to the source of electric field?
4. Name the series of hydrogen spectrum which has least wavelength.
5. Why is a semiconductor damaged by a strong current?
6. Give two properties of electric lines of force. Sketch them for an isolated positive point charge.

OR

Sketch the equipotential surfaces for (a) a positive point charge (b) a uniform electric field.

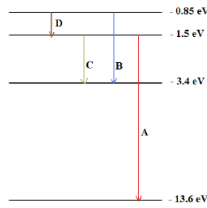
7. A proton and an alpha particle of the same velocity enter inturn a region of uniform magnetic field, acting perpendicular to their directions of motion. Deduce the ratio of the radii of the circular paths described by the particles.
8. Two thin lenses of powers + 8D and – 3D are placed in contact. Calculate the focal length of the lens combination.

9. Radiations of frequency 1015 Hz are incident on two photosensitive surfaces P and Q. Following observations are made:
- (i) Surface P: Photo emission occurs but the photo electrons have zero kinetic energy and
 - (ii) Surface Q: Photo emission occurs but photo electrons have some kinetic energy.
- Which of these have higher work function? If the incident frequency is slightly reduced, what will happen to electron emission in two cases?
10. Distinguish between sky wave and space wave propagation.
11. Two capacitors with capacitances C1 and C2 are charged to potentials V1 and V2 respectively are joined together. Find the common potential and also show that there is a loss of energy on sharing the capacitors.
12. What do you mean by wheat stone bridge? Deduce the condition for the balancing of wheatstone bridge.
13. What is a solenoid? Find the expression for magnetic field well inside the solenoid.
14. State the laws of electromagnetic induction.
15. Write down the frequency range of micro waves. Also write the two uses of microwaves.
16. The oscillating magnetic field in a plane electromagnetic wave is given by:

$$B_y = (4 \times 10^{-6}) \sin (6 \times 10^{11} t + 3000 x) \text{ T}$$

- (a) Calculate the wavelength of the electromagnetic wave.
 - (b) Write down the expression for the oscillating electric field.
17. Define Brewster's angle. Show that the Brewster's angle 'iB' for a given pair of transparent medias is related to the critical angle 'iC', through the relation, $iC = \sin^{-1}(\cot iB)$
18. (a) What do you mean by the work function of a metal.
 (b) The threshold frequency of a metal is f0. When the light of frequency 1.5f0 is incident on the metal plate, the maximum velocity of electrons emitted is v1. When the frequency of incident radiation is increased to 3f0, the maximum velocity of electrons is v2. Find the ratio of v2 to v1.
19. (a) Find the expression for the energy of orbital electrons in hydrogen atom using Bohr's postulates.

(b) The energy level diagram of an element is shown. Which of the transitions corresponds to the emission of spectral line of wavelength 102.7 nm?



OR

(a) State the laws of radioactivity.

(b) A radioactive substance reduces to 25% of its mass in 1000 years. Find the half life period of that substance.

20. What is a p – n junction diode? How is the potential barrier set up in a p – n junction?

21. If the output of a 2 input NAND gate is fed as the input to a NOR gate, find the output by drawing the truth table.

22. The TV transmission tower at a particular station has a height of 180 m.

(a) What is the coverage range?

(b) How much population is covered by the transmission if the average density around the tower is 1500 / km²?

23. Raj complained of a severe stomach pain and started crying. His father took him to a gastroenterologist. The doctor advised for endoscopy and asked him to come tomorrow on an empty stomach. His father explained him that a tube containing a fine glass fibre would be inserted through the food pipe and allows the light to pass through the glass fibre such that the doctor examine the inside of the stomach. The test was done and Raj felt okay after taking medicines for four days.

(a) What is the principle of working of glass fibre in the endoscopy?

(b) What are the necessary conditions for the light to travel along the pipe?

(c) What values of Raj's father impress you?

24. (a) Explain the formation of image in an astronomical telescope for a distant object. Derive the expression for the magnifying power when final image is formed at infinity.

(b) The length of astronomical telescope is 15 cm and the magnifying power is 4. Find the focal length of the objective and eyepiece.

OR

Derive the lens maker's formula.

25. (a) Explain the principle, construction and working of an ac generator.

(b) A coil of an ac generator having n turns, each of area of cross-section A and rotated with a constant angular velocity ω . Find the expression for the alternating emf generated in the coil.

OR

(a) Derive an expression for power in a circuit containing inductor, resistor and capacitor connected in series.

(b) What do you mean by power factor? What is its value in case of resonance.?

26. Explain the principle and working of Van de Graaff generator with diagram.

OR

(a) Find the expression for the electric potential at any point due to an electric dipole.

(b) Twenty seven million small drops, each of radius 1 mm and having a charge of 10^{-10} C , coalesce to form a bigger drop. Find the potential of bigger drop.