NAGALAND
Class XII
Physics
Sample Paper-2

Time allowed: 3 hours **Maximum Marks: 70**

General Instructions:

i. Approximately 15 minutes is allotted to read the question paper and revise the answers.
ii. The question paper consists of 30 questions. All questions are compulsory.
iii. Marks are indicated against each question.
iv. Internal choice has been provided in some questions.

N.B: Check that all pages of the question paper is complete as indicated on the top left side.

1. Through which of the ac circuit elements both the e.m.f. and current are in phase? [1Mark]
(i) Impedance
(ii) Inductive reactance
(iii) Capacitive reactance
(iv) Resistance

2. Which region in the electromagnetic spectrum will have the highest speed? [1Mark]
(i) Radio
(ii) Visible
(iii) Microwaves
(iv) All the regions have same speed

3. The extent of polarization depends on [1Mark]
(i) Dipole potential energy
(ii) Thermal energy
(iii) Dipole potential energy and Thermal energy
(iv) Kinetic energy of bound charges

4. Find the odd one out [1Mark]
(i) Copper
(ii) Nickel
(iii) Silver
(iv) Gold

5. Light from a bulb is falling on a wooden table but no photo electrons are emitted as [1Mark]
(i) Work function of wood is less
(ii) It is independent of work function
(iii) Work function of wood is more
(iv) It depends on frequency

6. Why do long distance radio broadcast use short wave bands? [1Mark]

7. Can we measure the potential difference of a p-n junction by putting a sensitive voltmeter across its terminals? [1Mark]

8. Why is nuclear fusion not possible in laboratory? [1Mark]

9. Are matter waves electromagnetic in nature? [1Mark]

10. State the reason, why two independent sources of light cannot be considered as coherent sources. [1Mark]

11. Why do we need amplification of modulated signal in a transmitter and again need amplification before detection? [2Mark]

12. The mass of the nucleus is less than the sum of the masses of the nucleons forming it, why? [2Mark]

13. Which gate is called as an inverter?
Or [2Mark]
What is a zener diode? Why is it also known as breakdown diode?

14. The mass of the nucleus is less than the sum of the masses of the nucleons forming it, why? [2Mark]

15. How are infrared waves produced? Why are these referred to as 'heat waves'?
Or [2Mark]
Find the ratio of the speeds of infra red rays and gamma rays in vacuum?

16. Why is it difficult to remove a free electron from copper than sodium? Which has higher threshold wavelength?
Or [2Mark]
Why is interference pattern not detected when the two coherent sources are far apart?

17. There are two capacitors A and B. Frequency of A is double than that of B but the capacitance is same. Find the ratio of there rectances. [3Mark]

18. A metallic rod of length l is rotated at a constant angular speed ω, normal to a uniform magnetic field B. Derive an expression for the current induced in the rod, if the resistance of the rod is R.

19. Prove that the current density of a metallic conductor is directly proportional to the drift speed of electrons. [3Mark]

20. A beam of protons passes undeflected with a horizontal velocity v, through a region of electric and magnetic fields, mutually perpendicular to each other and normal to the direction of the beam. If the magnitudes of the electric and magnetic fields are 50 kV/m and 100 mT respectively ; calculate the
(i) velocity v of the beam.
(ii) force with which it strikes a target on the screen, if the proton beam current is equal to 0.80 mA.

Or

Discuss the nature of the paths executed by the charge particle moving in a uniform magnetic field? [3Mark]

21. How does a polar dielectric develop a net dipole moment in an external field?[3Mark]

22. How can we find the net electric field at a point due to a charge distribution?

Or [3Mark]

What is a digital signal? Write two advantages of digital communication. Give any one difference between Fax and E-mail systems of communication

23. Define the terms threshold frequency and stopping potential in relation to the phenomenon of photoelectric effect. How is the photoelectric current affected on increasing the (i) frequency (ii) intensity of the incident radiations and why?

Or

Define decay constant of a radioactive sample. Which of the following radiation α-rays, β-rays and y-rays, (i) Are similar to x - rays? (ii) Are easily absorbed by matter? [3Mark]

24. What would change in the gold foil experiment if it was beta not alpha particles? Would the negatively charged particles be attracted to the positive nucleus?[3Mark]

25. Define decay constant of a radioactive sample. Which of the following radiation α-rays, β-rays and y-rays, (i) Are similar to x - rays? (ii) Are easily absorbed by matter? [3Mark]

26. Define the term modulation. Name three different types of modulations used for a message signal using a sinusoidal continuous carrier wave. Explain the meaning of any one of these. [3Mark]

27. Using Gauss's law to obtain the expression for the electric field due to a uniformly charged thin spherical shell of radius R at a point outside the shell. Draw a graph showing the variation of electric field with r, for r > R and r < R.[3Mark]

28. What is the frequency of radiation emitted when a hygrogen atom de-excites from level x to level (x-1)? For large x, show that this frequency equals the classical frequency of revolution of the electron in the orbit.

Or [5Mark]

Rutherford atom model is based on the classical concept that electrons are revolving around a central positive nucleus.

(a) Mention the drawback of Rutherford atom model and how it is rectified in Bohr's atom model?

(b) From Bohr's theory obtain the de Broglie wavelength of an electron orbiting around the nucleus.

(c) Give the statement of Heisenberg's uncertainty principle and express it mathematically.

29. State Huygen's principle. Show, with the help of a suitable diagram, how this principle is used to obtain the diffraction pattern by a gingle slit. Draw a plot of intensity distribution and explain clearly why the secondary maxima become weaker with increasing order (n) of the secondary maxima.

Or

Describe briefly, with the help of a labelled diagram, the basic elements of an A.C. generator. State its underlying principle. Show diagrammatically how an alternating emf is generated by a loop of wire rotating in a magnetic field. Write the expression for the instaneous value of the emf induced in the rotating loop. [5Mark]

30. Five charges each of magnitude 10 μC are placed in a line at x = 0, x = 2 cm, x = 4 cm, x = 8 cm and x = 16 cm. Find the force experienced by the charge placed at x = 0 cm.

Or

What is the frequency of radiation emitted when a hygrogen atom de-excites from level x to level (x-1)? For large x, show that this frequency equals the classical frequency of revolution of the electron in the orbit. [5Mark]