

NAGALAND
Class XII
Physics
Sample Paper-1

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.

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1. When a charged rod is brought near the disc of a negatively charged gold leaf electroscope, it is observed that the divergence of leaves decreases. What reference do you draw about the charge on the rod? [1Mark]
 - (i) Rod is positively charged
 - (ii) Rod is negatively charged
 - (iii) Rod has no charge
 - (iv) None of these

 2. Kirchhoff's second law is applicable only to [1Mark]
 - (i) Open loops
 - (ii) Open and closed loops
 - (iii) Closed loops
 - (iv) Mechanical systems

 3. Declination is the angle between [1Mark]
 - (i) horizontal and vertical components of earth's magnetic field
 - (ii) geographic and magnetic meridian
 - (iii) geographic meridian and horizontal component of earth's magnetic field
 - (iv) horizontal component and total magnetic field of the earth

 4. In Faraday's experiment if the magnet is moved towards the coil, it results in _____ in magnetic field at any point on the wire loop. The _____ shows deflection. Thus emf is induced by changing the magnetic field. [1Mark]
 - (i) increase, ammeter
 - (ii) decrease, ammeter
 - (iii) increase, galvanometer
 - (iv) decrease, galvanometer

- 5.** For transistor action, which of the following statements are correct [1Mark]
 (i) Base, emitter and collector regions should have similar size and doping concentrations
 (ii) The base region must be very thin and lightly doped
 (iii) Both the emitter junction and collector junction are reversed biased
 (iv) Both the emitter junction as well as the collector junction are forward biased
- 6.** Cyclotron is not suitable for accelerating electrons. Why? [1Mark]
- 7.** What do you understand by Foucault currents? [1Mark]
- 8.** In a Young's double slit experiment, monochromatic source is replaced by a source of white light. How are the interference fringes effected by this? [1Mark]
- 9.** What happens, when the impact parameter of an alpha particle in Rutherford experiment is minimum? [1Mark]
- 10.** Can we have resonance in RL or RC circuit? Also give reason. [1Mark]
- 11.** If $\vec{E} = 6\hat{i} + 3\hat{j} + 4\hat{k}$, calculate the electric flux through a surface of area 20 units in y-z plane. [2Mark]
- 12.** Two coils connected in series have a resistance of 18Ω and when connected in parallel have a resistance of 4Ω . Find the value of individual resistances of the coils [2Mark]
- 13.** Suppose a lens has different radii of curvature, it forms an image of an object placed on its axis. If we reverse the lens will the position of the image of the object change? [2Mark]
- Or**
- Why is it that the images formed by total internal reflection are brighter than those formed by mirrors or lenses?
- 14.** A short bar magnet placed with its axis at 30 degrees with a uniform magnetic field of 0.35 T. A torque of 0.055 J is experienced by the magnet. Find the magnetic moment. [2Mark]
- 15.** In the Rutherford's nuclear model of the atom, the nucleus (radius about 10^{-5}) in analogous to the sun about which the electron moves in orbit (radius $\sim 10^{-10}$ m) like the earth orbits around the sun. If the dimensions of the solar system had the same proportions as those of atom, would the earth be closer to or farther away from sun than actual it is? The radius of earth is about 1.5×10^{11} m. The radius of sun is taken as 7×10^8 m.

Or [2Mark]

Find the ratio of the speeds of infra red rays and gamma rays in vacuum?

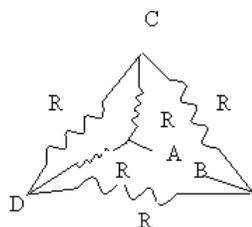
- 16.** Calculate the time period of visible light for which the human eye is most sensitive.

Or [2Mark]

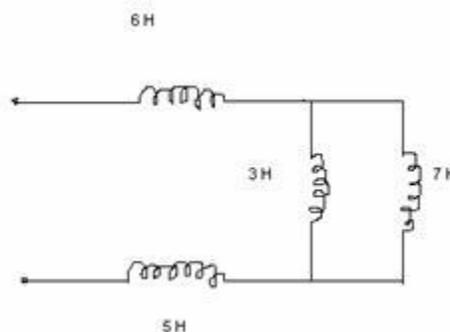
What do you mean by sensitivity of potentiometer? How can we increase the sensitivity of potentiometer?

- 17.** How many electrons should be removed from a coin of mass 3.2 g, so that it just float in an electric field of intensity 10^{10} NC^{-1} , directed upward [3Mark]

- 18.** What is the equivalent resistance between the terminals A and B in the figure below:



- 19.** [3Mark]



Calculate total inductance.

- 20.** What is an unpolarized light? Explain with the help of suitable ray diagram how an unpolarized light can be polarized by reflection from a transparent medium. Write the expression for Brewster angle in terms of the refractive index of denser medium.

Or [3Mark]

Two polaroids are placed 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. Take intensity of unpolarised light I_0 . How will the intensity of transmitted light vary on further rotating the third polaroid?

21. A pure inductive circuit does not consume any power in a complete cycle. Prove it. [3Mark]

22. Prove that apparent depth is $\frac{3}{4}$ of real depth.

Or

[3Mark]

What is satellite communication? Explain its working

23. In a Young's double slit experiment the interval between the slits is 0.200 mm. For the light of wavelength 6000\AA , interference fringes are formed on a screen at a distance of 0.800m.

(a) What is the distance of second dark fringe from the central fringe?

(b) What is the distance of second bright fringe from the central fringe?

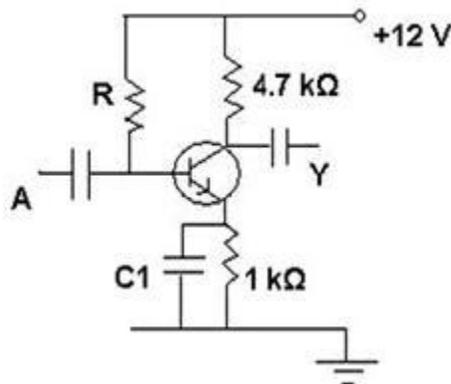
Or

[3Mark]

What do you mean by bandwidth of a signal? How much bandwidth is considered adequate for (i) speech signal (ii) music signal (iii) video and TV signals?

24.

[3Mark]



The adjoining figure shows a common emitter transistor amplifier which uses a silicon transistor. If the quiescent emitter current is 1 mA what is the base biasing voltage?

25. 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]

26. If the frequency of light falling on a metal is doubled, what will be the effect on photocurrent and the maximum kinetic energy of emitted photoelectrons? Explain. [3Mark]

27. An object is placed 15 cm in front of a convex lens of focal length 10 cm. Find the nature and position of the image formed. Where a concave mirror of radius of curvature 20 cm should be placed so that the final image is formed at the position of the object itself? [3Mark]

- 28.** Explain how a bar magnet can be considered as a solenoid and also deduce the formula for magnetic field of a bar magnet?

Or [5Mark]

A z-axis directed very long wire of radius "a" carries a total z-axis directed current I. What is the magnetic field distribution, both inside and outside the wire, if the current is evenly distributed throughout the wire?

- 29.** What is meant by interference of light? What are two types of interference? In a double slit experiment with monochromatic light, fringes are observed on a screen placed at some distance from the slits. If the screen is moved by 5×10^{-2} m towards the slits, the change in fringe width is 3×10^{-5} m. If the distance between the slits is 10^{-3} m, calculate the wavelength of light used.

Or

Write the logic symbol and truth table of an AND gate. Explain how this gate is realised in practice by using two diodes. [5Mark]

30.

(i) With the help of a labelled diagram, describe briefly the underlying principle and working of a step up transformer.

(ii) Write any two sources of energy loss in a transformer.

(iii) A step up transformer converts a low input voltage into a high output voltage. Does it violate law of conservation of energy? Explain.

Or

Derive an expression for the impedance of a series LCR circuit connected to an AC supply of variable frequency.

Plot a graph showing variation of current with the frequency of the applied voltage.

Explain briefly how the phenomenon of resonance in the circuit can be used in the tuning mechanism of a radio or a TV set. [5Mark]