

CBSE Board
Class XII Physics
Sample Paper - 10

Time: Three Hours
Maximum Marks: 70
General Instructions

- (a) All questions are compulsory.
- (b) There are 29 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 16 carry two marks each, questions 17 to 25 carry three marks each and questions 27 to 29 carry five marks each.
- (c) Question 26 is a value based question carrying four marks.
- (d) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choices in such questions.
- (e) Use of calculator is not permitted.
- (f) You may use the following physical constants wherever necessary.

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$c = 3 \times 10^8 \text{ m s}^{-1}$$

$$h = 6.6 \times 10^{-34} \text{ J s}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T ma}^{-1}$$

$$K_B = 1.38 \times 10^{23} \text{ J K}^{-1}$$

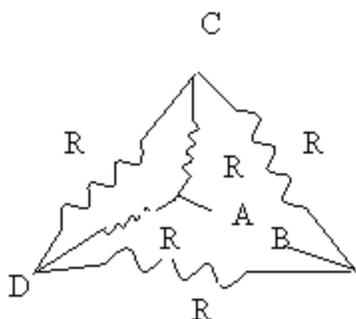
$$N_A = 6.023 \times 10^{23} \text{ /mole}$$

$$m_n = 1.6 \times 10^{-27} \text{ kg}$$

1. Cyclotron is not suitable for accelerating electrons. Why? (1)
2. What do you understand by Foucault currents? (1)
3. 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? (1)
4. What happens, when the impact parameter of an alpha particle in Rutherford experiment is minimum? (1)
5. Can we have resonance in RL or RC circuit? Also give reason. (1)

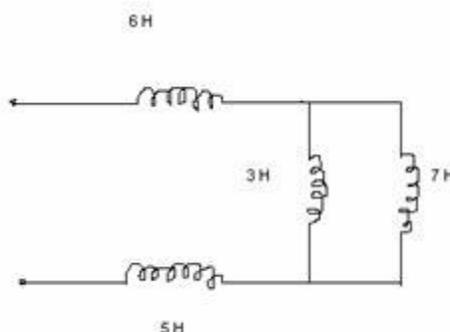
6. Why do long distance radio broadcast use short wave bands? (1)
7. If the base region of a transistor is made large as compared to a usual transistor, how does it affect (i) the collector current (ii) current gain of this transistor? (1)
8. Frequency of input voltage of a half wave rectifier is 50 Hz. What will be the frequency of the output voltage? (1)
9. 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. (2)
10. Two coils connected in series have a resistance of $18\ \Omega$ and when connected in parallel have a resistance of $4\ \Omega$. Find the value of individual resistances of the coils. (2)
11. 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. (2)
12. Calculate the time period of visible light for which the human eye is most sensitive. (2)
13. What do you mean by sensitivity of potentiometer? How can we increase the sensitivity of potentiometer? (2)
14. 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? (2)
- OR**
- Why is it that the images formed by total internal reflection are brighter than those formed by mirrors or lenses? (2)
15. Why does photoelectric emission not take place if the frequency of incident radiation is less than threshold value? (2)
16. 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 1.5×10^6 m. The radius of sun is taken 7×10^8 m. (2)
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. (3)

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



(3)

19.



Calculate total inductance.

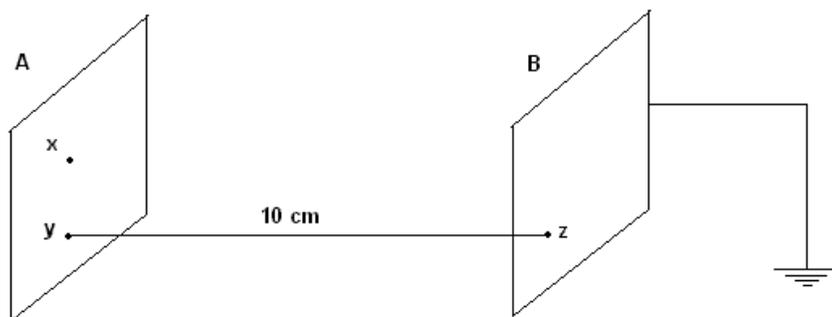
(3)

OR

The expression for magnetic flux is given by $\phi = 4t^2 + t + 5$ milliweber. Calculate the emf induced at $t = 3$ s.

(3)

20. Two identical plane metallic surfaces A and B are kept parallel to each other in air, separated by distance of 10 cm,



A is given a positive potential of 10 V, and the other surface of B is earthed.

- 1) What is the magnitude and direction of the uniform electric field between Y and Z?
- 2) What is the work done in moving a charge of $10 \mu\text{C}$ from X to Y? (3)

21. A pure inductive circuit does not consume any power in a complete cycle. Prove it. (3)
22. Prove that apparent depth is $\frac{3}{4}$ of real depth. (3)
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? (3)
24. 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? (3)
25. What is satellite communication? Explain its working. (3)
26. Ruchi's uncle who was a kabadiwala was getting weak day by day. His nails were getting blue, he started losing his hair. This happened immediately after he purchased a big container of heavy mass from Delhi University Chemistry Department. Doctors advised him hospitalization and suspected he has been exposed to radiation. His uncle didn't know much about radiations but Ruchi immediately convinced her uncle to get admitted and start treatment.
 (i) What according to you are the values utilized by Ruchi to convince her uncle to get admitted in hospital?
 (ii) Name the radioactive radiations emitted from a radioactive element. Arrange them in the order of increasing ionizing power. (4)
27. Explain how a bar magnet can be considered as a solenoid and also deduce the formula for magnetic field of a bar magnet? (5)

OR

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? (5)

28. 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. (5)

OR

Draw a ray diagram to show the formation of image of an object placed between the optical centre and focus of the convex lens. Write the characteristics of image formed. Using this diagram, derive the relation between object distance, image distance and focal length of the convex lens. Write the assumptions and convention of signs used. (5)

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

OR

Draw a circuit diagram to obtain the characteristics of a n-p-n transistor in common emitter configuration. Describe how you will obtain input and output characteristics. Give shape of the curves. (5)