

Sub Code- 210

HISSAN KASKI Grade XII

Pre- Board Examination – 2071

Physics

Programme: Science

Full Marks: 75

Time: 3hrs

Pass Marks: 27

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Shift : Morning

Group ' A'

1. Attempt any Four Questions: 2x4=8

- (a) What are the factors on which the internal resistance of a cell depends?
- (b) What happens if the galvanometer and cell are interchanged at balanced point of a Wheatstone bridge?
- (c) How many emfs appear in a thermocouple? Name them.
- (d) What is Hall Effect?
- (e) Give any two differences between diamagnetic and ferromagnetic substances.
- (f) 220 V A.C. is more dangerous than 220 V D.C. Why?

2. Attempt any Four questions: 2x4=8

- (a) If the discharge tube is filled with various gases in turn, will the electric discharge take place at the same electrode potential?
- (b) How crystalline solid can differ from amorphous solid?
- (c) Can X-rays be deflected by the electric field or magnetic field? Give reasons.
- (d) Write down the decay schemes separately for alpha and gamma decays from a nucleus.
- (e) What is meant by acid rain?

- (f) How can Hubble's law be used to explain that the universe is expanding?

3. Attempt any One question: 2x1=2

- (a) How does a stationary wave differ from progressive wave?
- (b) Why holes are made in wooden box of the sonometer? Explain.

4. Attempt any One question: 2x1=2

- (a) What are the significances of measurement of velocity of light?
- (b) State various conditions for sustained interference.

Group 'B'

5. Attempt any Three questions: 4x3=12

- (a) Discuss the method to convert a galvanometer into a voltmeter.
- (b) State Faraday's law of electrolysis. How will you verify the second law experimentally?
- (c) State and apply Biot-Savart law to find magnetic field due to a current carrying circular coil at any point on the axis of the coil.
- (d) Discuss the phase relationship between the current and voltage in the A.C. circuit containing inductor and resistor in series and hence derive an expression for the impedance of the circuit.

6. Attempt any Three questions: 4x3=12

- (a) What is photoelectric effect? Give an account of Einstein's explanation on the basis of quantum theory.
- (b) What are logic gates? Describe with truth tables about the compound logic gates.
- (c) Write down the postulates of Bohr's model of hydrogen atom and obtain expression for the radius of Bohr's orbit.
- (d) Define half life and decay constant of a radioactive substance. Establish a relation between them.

7. Attempt any One question: 4x1=4

- (a) Write down the factors on which the velocity of sound in air depends with necessary explanation.

- (b) What are harmonics? Prove giving necessary diagrams, that only odd harmonics can be produced in an organ pipe open at one end and closed at other end.

8. Attempt any One question: 4x1=4

- (a) Define Huygen's principle and prove laws of reflection of light on the basis of wave theory of light.
- (b) What is meant by polarization of light? Discuss the phenomenon of polarization by reflection and prove Brewster's law.

Group 'C'

9. Attempt any Two questions: 4x2=8

- (a) A cell of emf 2 V and internal resistance 1 ohm is connected in series with an ammeter of resistance 1 ohm and a variable resistor of R ohm. A voltmeter of resistance 100 ohm is connected across R. Find the value of R and the ammeter reading when the voltmeter reads 1 V. Find also the power delivered to the external circuit.
- (b) The value of dip at a place is found to be 48° . If the dip circle is turned through an angle of 45° from the magnetic meridian, what will be the apparent dip?
- (c) Calculate the current which flows in resistance 3 ohm connected to a secondary coil of 60 turns if the primary has 1200 turns and is connected to a 240 V a.c. supply, assuming that all the magnetic flux in the primary passes through the secondary and that there are no other losses.

10. Attempt any Two questions: 4x2=8

- (a) An alpha particle of mass 6.64×10^{-27} kg travelling horizontally at 35.6 km/s enters a uniform vertical magnetic field of 1.10 T. What is the diameter of the path followed by this alpha particle? What is the magnitude and direction of the acceleration of the alpha particle while it is in the magnetic field? ($e = 1.6 \times 10^{-19}$ C)

- (b) An X-ray tube operates at 30 kV and the current through it is 2 mA. Calculate the number of electrons striking the target per second and the speed of the electrons when they hit the target. ($e = 1.6 \times 10^{-19}$ C , $m_e = 9 \times 10^{-31}$ kg)

- (c) What mass of ${}_{92}\text{U}^{238}$ has to undergo fission each day to provide 3000 MW of thermal power? (Assume that the fission of uranium liberates about 200 MeV per atom)

11. A car travelling normally towards a cliff at a speed of 30 m/s sounds its horn which emits a note of frequency 100 Hz. What is the apparent frequency of the echo as heard by the driver? (Given: speed of sound in air = 330 m/s) **4**

12. A monochromatic source of light of wavelength 5893 \AA illuminates a 0.03 mm wide slit. Find out the position of the first minima on a screen kept at a distance of 1 m. **3**