

INTERNATIONAL INDIAN SCHOOL, DAMMAM
SECOND TERMINAL EXAMINATION, 2017

PHYSICS – Class XII

TIME: 3 HRS

Set A

General Instructions:

- i. All questions are compulsory.
- ii. Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and section E contains three questions of five marks each.
- iii. 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 questions of five marks. You have to attempt only one of the choices in such questions.
- iv. Use of calculator is not permitted. However you may use log tables if necessary.

SECTION A

- 1 At what angle of incidence should a light beam strike a glass slab of refractive index of $\sqrt{3}$, such that the reflected ray and refracted rays are perpendicular to each other ?
- 2 Debroglie wavelength associated with an electron accelerated through a potential difference V is λ . What will be its wavelength when the accelerating potential is increased to $4V$?
- 3 When is a Wheastone's bridge most sensitive ?
- 4 Why does acceleration of a bar magnet decreases, while falling through a solenoid connected to a closed circuit ?
- 5 A convex lens made of glass of refractive index n_r is immersed in a medium of refractive index n_m . How will the lens behave when $n_r < n_m$

SECTION B

- 6 State the condition under which the phenomenon of resonance occurs in a series of LCR circuit. Plot a graph showing variation of current with frequency of AC source in a series LCR circuit.
- 7 Draw a labelled diagram to show the image formation in an astronomical telescope for normal adjustment position. Write down the expression for its magnifying power.

OR

Draw a schematic labelled diagram of a reflecting type telescope. Write two important advantages that a reflecting telescope has over a refracting telescope.

- 8 Two metals X and Y have work functions 2 eV and 5 eV respectively. Which metal will emit electrons, when it is radiated with light of wavelength 400 nm and why?

- 9 In a certain region of space electric field E and magnetic field B are perpendicular to each other. An electron enters in the region perpendicular to the directions of both B and E and moves undeflected. Find the velocity of the electrons.
- 10 The ratio of intensities at minima to maxima in the Young's double slit experiment is 9:25. Find the ratio of the widths of the slits.

SECTION C

- 11 Define diffraction. Explain the formation of a pattern of fringes obtained on the screen.
- 12 Draw a graph showing the variation of stopping potential with frequency of incident radiations in relation to photo electric effect. Deduce an expression for the slope of this graph using Einstein's photo electric equation.
- 13 Derive the mirror formula. What is the corresponding formula for a thin lens?
- 14 State Lenz's law. Does it violate law of conservation of energy? Explain.
- 15 An alternating emf is applied across a capacitor. Show mathematically that current in it leads the applied emf by phase angle $\pi/2$. What is capacitive reactance of such a circuit. Write the SI unit of capacitive reactance.
- 16 A bar magnet of magnetic moment 1.5 J/T lies aligned with the direction of uniform magnetic field of 0.22 T . What is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment
- Normal to the field direction.
 - Opposite to the field direction
- What is the torque on the magnet in each case?
- 17 State Huyghen's principle. Derive law of refraction using this.
- 18 Define matter wave. Using Debroglie hypothesis, explain Bohr's second postulate of quantisation of energy levels in a hydrogen atoms.
- 19 When an inductor L and a resistor R in series are connected across a 12 V , 50 Hz supply, a current of 0.5 A flows in the circuit. The current differs in phase from applied voltage by $\pi/3$ radian. Calculate the value of R .
- 20 A circular coil of N turns and a diameter d carries a current I . It is unwound and rewound to make another coil of diameter $2d$, current I remaining the same. Calculate the ratio of magnetic moments of the new coil and the original coil.
- 21 Using Bohr's postulates, derive the expression for total energy of the electron in the stationary states of the Hydrogen atom.
- 22 Name the three elements of the earth's magnetic field. Define each term.

OR

What are dia, para and ferro magnetic substance. Give at least 3 points of distinction of these substances.

SECTION D

- 23 Sruthi and Surekha both are sistres, went to market to buy sunglasses for surekha. Surekha wanted to save money by buying any coloured glasses with fancy look but sruthi asked her to look for good quality polaroid glasses and also explained her the reason for it.
- What values are displayed by Sruthi ?
- What are polaroid glasses ?
- Define angle of polarisation.

SECTION E

- 24 a) Draw a labelled diagram of a moving coil galvanometer. State the principle working and theory of moving coil galvanometer.
b) What is the magnitude of magnetic force per unit length on a wire carrying a current of 8A and making an angle of 30° with the direction of a uniform magnetic field of 0.15 T.

OR

- 24 a) Derive an expression for the force per unit length between two long straight parallel current carrying conductors. Hence define SI unit of current.
b) A straight horizontal conducting rod of length of 0.45m and mass 60g is suspended by two vertical wires at its ends. A current of 5A is setup in the rod through the wires. What magnetic field should be set up normal to the conductor in order that tension in the wires is zero?
- 25 a) Draw a ray diagram to show the formation of image of a point object placed in a medium of refractive index n_1 on the principal axis of a convex spherical surface of radius of curvature R and refractive index n_2 . Hence derive a relation between u , v and R .
b) A converging lens of focal length 50 cm is placed coaxially in contact with another lens of unknown focal length. If the combination behaves like a diverging lens of focal length 50 cm, find the power and nature of the second lens.

OR

- 25 a) Draw a graph to show the variation of angle of deviation with angle of incidence for a monochromatic light passing through a prism of refracting angle A . Hence deduce a relation for refractive index of the material of the prism.
b) A ray of light passes through equilateral glass prism such that angle of incidence is equal to angle of emergence and each of these angles is equal to $3/4$ of angle of prism. What is the value of angle of deviation?
- 26 State the principle of potentiometer. Draw the circuit diagram of a potentiometer which can be used to determine the internal resistance of a given cell of emf. Explain with the help of this diagram describe a method to find internal resistance of primary cell. How can the sensitivity of a potentiometer can be increased?

OR

- 26 State the principle of meter bridge. Draw a circuit diagram of a meter bridge and write the mathematical relation used to determine the value of an unknown resistance. Why cannot such an arrangement be used for measuring very low resistance?