

CBSE SAMPLE QUESTION PAPER-2

CLASS XII

PHYSICS THEORY

TERM II

SESSION 2021 – 22

MM : 35

TIME : 2 Hours

General Instructions :

- (i) There are 12 questions in all. All questions are compulsory.
- (ii) This question paper has three sections: Section A, Section B and Section C.
- (iii) Section A contains three questions of two marks each, Section B contains eight questions of three marks each, Section C contains one case study-based question of five marks.
- (iv) There is no overall choice. However, an internal choice has been provided in one question of two marks and two questions of three marks. You have to attempt only one of the choices in such questions.
- (v) You may use log tables if necessary but use of calculator is not allowed.

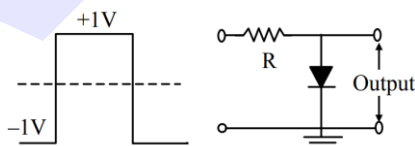
SECTION-A

1. If the intensity of the incident radiation on a photosensitive surface is doubled, how does the kinetic energy of the emitted electrons get affected? How does the maximum kinetic energy of electrons emitted vary with the work function of the metal ?

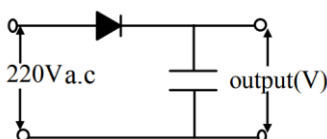
OR

What is impact parameter ?

2. A square wave (-1V to 1 V) is applied to p-n junction diode as shown below. Draw the output waveform.



3. A diode is connected to 220 V (rms) a.c. in series with a capacitor, as shown below. What is the voltage V across the capacitor ?

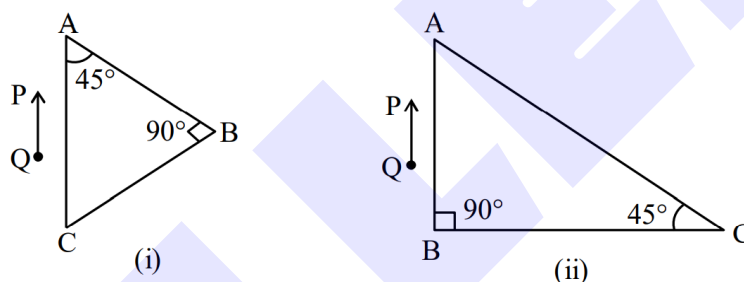


SECTION-B

4. Write any three limitations of Bohr's theory.
5. (a) Show the biasing of a photo-diode with the help of a circuit diagram. Draw graphs to show variations in reverse bias currents for different illumination intensities.
(b) Distinguish between the light emitting diode and the photodiode.
6. Draw the graph showing variation of potential energy of a pair of nucleons as a function of their separation. Also mark the regions in the graph where the force is attractive and where the force is strongly repulsive. Write any two characteristics of nuclear force.
7. In a single slit diffraction pattern, how is the width of central bright maximum changed, when
 - (i) the slit width is decreased,
 - (ii) the distance between the slit and the screen is increased and
 - (iii) light of smaller wavelength is used. Justify your answer.
8. Write two conditions required for TIR to take place. Explain mirage effect produced in very hot desert with the help of diagram.

OR

- (a) What is dispersion of light? Explain why white light is dispersed when passing through a prism.
- (b) A right angled crown glass prism with critical angle 41° is placed before an object, PQ, in two positions as shown in the figure (i) and (ii). Trace the paths of the rays from P and Q passing through the prisms in the two cases.



9. Define the term threshold frequency and stopping potential for photoelectric effect. Show graphically, how the stopping potential for a given metal, varies with frequency of incident radiation. Mark threshold frequency on the graph.
10. (a) A ray of light goes from glass (refractive index = $5/3$) to water ($4/3$). Find the critical Angle.
(b) A thin prism (refractive index = $3/2$) in air is immersed in a liquid of refractive index $5/4$. Find the ratio of angle of deviations in the two cases .
(c) The length of an astronomical telescope is 16 cm and its magnifying power is 3. Find the focal lengths of the lenses .
11. (a) How can we show that em waves carry momentum ?
(b) Optical and radio telescopes are built on the ground but X-ray astronomy is possible only from satellites orbiting the earth. Why ?
(c) Suppose that earth's atmosphere is absent, will the average temperature on earth's surface be higher or lower than what it is at present ? Why ?

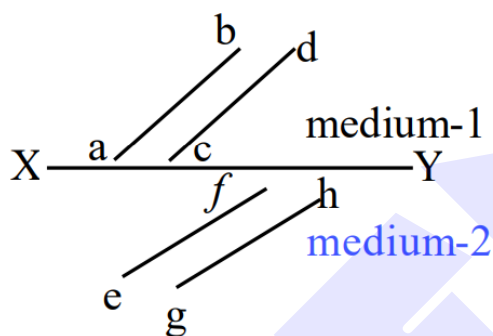
OR

- (a) Define interference. What are coherent sources of light ?
- (b) Write the conditions required for sustained interference.
- (c) Write the conditions for obtaining maximum and minimum intensity in YDSE.

SECTION-C

CASE STUDY

12. Wave front is a locus of points which vibrates in same phase. A ray of light is perpendicular to the wave front. According to Huygens principle, each point of the wave front is the source of a secondary disturbance and the wavelets connecting from these points spread out in all directions with the speed of wave. The figure shows a surface XY separating two transparent media, medium- 1 and medium-2. The lines ab and cd represent wave fronts of a light wave travelling in medium- 1 and incident on XY. The lines ef and gh represent wave fronts of the light wave in medium -2 after refraction.



- (i) Light travels as a –
- (1) parallel beam in each medium
 - (2) convergent beam in each medium
 - (3) divergent beam in each medium
 - (4) divergent beam in one medium and convergent beam in the other medium
- (ii) The phases of the light wave at c, d, e and f are ϕ_c , ϕ_d , ϕ_e , and ϕ_f respectively. It is given that $\phi_c \neq \phi_f$
- (1) ϕ_c can not be equal to ϕ_d
 - (2) ϕ_d can be equal to ϕ_e
 - (3) $(\phi_d - \phi_f)$ is equal to $(\phi_c - \phi_e)$
 - (4) $(\phi_d - \phi_c)$ is not equal to $(\phi_f - \phi_e)$
- (iii) Wave front is the locus of all points, where the particles of the medium vibrate with the Same –
- (1) phase
 - (2) amplitude
 - (3) frequency
 - (4) period
- (iv) A point source that emits waves uniformly in all directions, produces wave fronts that are –
- (1) spherical
 - (2) elliptical
 - (3) cylindrical
 - (4) planar
- (v) What are the types of wave fronts ?
- (1) Spherical
 - (2) Cylindrical
 - (3) Plane
 - (4) All of these