

Kundan Vidya Mandir
Pre Board. 2022
Physics. 12

Time. 2hr.

Marks 35

Section A (two marks questions)

Q1. The refractive index of the material of a concave lens is N . It is immersed in a medium of refractive index N_1 . A parallel beam of light is incident on the lens trace the path of the emergent ray in each of the following case (1) N_1 greater than N (2) N_1 is less than N (3) $N_1 = N$.

Q2. If we go on increasing the wavelength of light incident on a metal surface, what changes in the number of electrons and the energy take place?

OR

• An electron, an alpha particle and a proton have the same kinetic energy which of these particles has the largest De Broglie wavelength?

Q3. Why are photodiodes used preferably in reverse bias condition?

Section B (Three mark questions)

Q4. Which constituent radiations of the electromagnetic spectrum is used

- (1) in radar
- (2) to photograph internal parts of human body and
- (3) for taking photographs of the sky during night and foggy conditions. Give one reason for your answer in each case

OR

Name the constituent radiations of electromagnetic spectrum which

- (1) is used in satellite communication
- (2) is used for study crystal structure
- (3) is similar to the radiation emitted during decay of radioactive nuclei
- (4) has its wavelength range 390 nm to 770 nm
- (5) is absorbed from sunlight by ozone layer
- (6) produces intense heating effect.

Q5. In Young's double slit experiment the two slits 0.15 mm apart are illuminated by light of wavelength 450 nm. The screen is 1 m away from the slits. Find the distance of the second bright fringe and the second dark fringe from the central maximum. How will the fringe pattern change if the screen is moved away from the slits.

Q6. State Huygens' principle and prove the laws of reflection on the basis of wave theory.

Q7. Give reason for the following

- (1) photoelectric current in a photocell increases with the increase in intensity of the incident radiation
- (2) the stopping potential varies linearly with the frequency of the incident radiation for a given photosensitive surface with the slope remaining the same for different surfaces

(3) maximum kinetic energy of the photoelectron is independent of the intensity of the incident radiation.

Q8. State the basic postulates of Bohr's theory of atomic spectra .Obtain an expression for radius of the orbit and the energy of the orbital electron in hydrogen atom.

Q9A neutron is absorbed by a lithium nucleus which subsequent emission of alpha particle write the corresponding nuclear reaction and calculate the energy released in this reaction

$m(^6\text{Li } 3) = 6.015126 \text{ u}$

$m(^4\text{He } 2) = 4.00026044 \text{ u}$

$m(^1\text{n } 0) = 1.0086654 \text{ u}$

$m(^3\text{H } 1) = 3.016049 \text{ u}$

Q10 Draw a circuit diagram of full wave rectifier .

Explain its working .

draw the input and output waveform indicating clearly the functions of two diodes is used.

Q11.Explain with the help of a diagram how depletion region and potential barrier are formed in a junction diode? If a small voltage is applied to a PN junction diode how will the barrier potential be effected when it is forward biased and reverse biased.

Section C (case study. 5 marks)

Q12 Total internal reflection is a phenomena of reflection of light into denser medium at the interface of denser medium with the rarer medium .For this phenomena to occur necessary condition is that light must travel from denser to rarer medium and the angle of incidence in denser medium must be greater than critical angle for the pair of media in contact .Critical angle depend upon the nature of the medium and the wavelength of the light we can show that

$n_1 \sin C = n_2$

(1). Calculate Critical angle for glass air interface where refractive index of glass is 1.5

(2)Calculate the refractive index of water ,the critical angle for water air interface is 48.6° .

(3)Critical angle for air water interface for violet colour is 49° what is the value for red colour would be?

(4)Which of the following is not due to total internal reflection working of optical fibre,difference between apparent and real depth of the pond ,Mirage on the hot summer days and brilliance of diamond.

(5) The critical angle for glass air interface is C and for glass water interface is X how are C and X related .

OR

A compound microscope is an optical instrument used for observing highly magnified images of tiny objects .Magnifying power of a compound microscope is defined as the ratio of the angle subtended at the eye by the final image to the angle subtended at the eye by the object when both the final image and the object are situated at the least distance of distinct vision from the eye. consider a compound microscope that consist of an objective lens of focal length 2 cm and eyepiece of focal length 6.25 cm separated

by a distance of 15 cm.

- (1) Draw the ray diagram for compound microscope using the data above. (2)
- (2) How we can increase the magnifying power of a compound microscope? (1)
- (3) Does the magnifying power of microscope depend on colour of light used justify your answer. (1)
- (4) Can a microscope function as a telescope by inverting it, can a telescope function as a microscope? (1)

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