SAMPLE QUESTION PAPER
CLASS- XII
PHYSICS THEORY (TERM- II)
SESSION 2021 – 22

MM: 35 TIME : 2 Hours

General Instructions :

1) There are 12 questions in all. All questions are compulsory.
2) This question paper has three sections. Section A, Section B and Section C.
3) 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.
4) There is no overall choices. 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.
5) You may use log tables if necessary but use of calculator is not allowed.

SECTION - A

Q1. Write two characteristic features of nuclear force which distinguish it from coulomb's force.

Q2. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? Give reason.

Lenses	Power (D)	Aperture (cm)
L_1	3	8
L_2	6	1
L_3	10	1

OR

Calculate the speed of light in a medium whose critical angle is 45°.

Does critical angle for a given pair of media depend on wavelength of incident light? Give reason.

Q3. Explain the term 'depletion layer' of a p-n junction diode and how the width of depletion layer changes, when the junction is

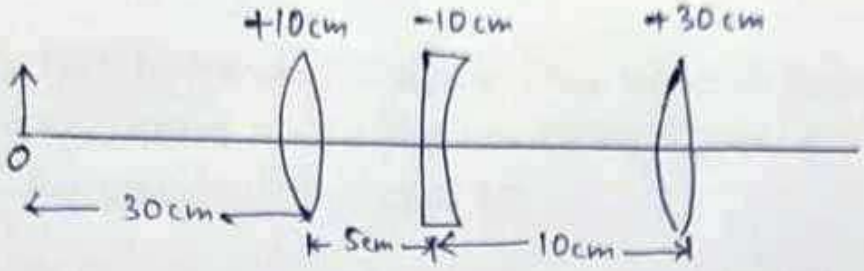
1) Forward biased and 2) Reversed biased

SECTION – B

Q4. Answer the following questions :

a) Name the EM waves which are produced during radioactive decay of nucleus . Write their frequency range.
b) Welders wear special glass goggles while working . Explain why?
c) Why are infrared waves often called as heat waves? Give their one application.

Q5. Three lenses of focal lengths +10cm, -10cm and +30cm are arranged co-axially as in the figure given below. Find the position of the final image formed by the combination.



Q6. An equilateral glass prism has a refractive index 1.6 in air. Calculate the angle of minimum deviation of the prism, when kept in a medium of refractive index $\frac{4\sqrt{2}}{5}$

Q7. Explain the following , giving reasons:

i)When monochromatic light is incident on a surface separating two media, the reflected and refracted light both have the same frequency as the incident frequency.

ii)When light travels from a rarer to a denser medium, the speed decreases. Does this decrease in speed imply a reduction in the energy carried by the wave? And

iii) Draw the intensity distribution for the fringes produced in

(i)Interference and (ii) diffractions

OR

(i) In a single – slit diffraction experiment, the width of the slit is made double the original width. How does this affect the size and intensity of the central diffraction band?

(ii) How does the angular separation between fringes in single- slit diffraction experiment change when the distance of separation between the slit and screen is doubled?

(iii) Find the intensity at a point on a screen in Young's double slit experiment where the interfering waves of equal intensity have a path difference of $\lambda/4$.

Q8. a) An α-particle and a proton are accelerated from rest by the same potential. Find the ratio of their de-broglie wavelengths.

b) The work function of a certain metal is 4.2 eV. Will this metal give photoelectric emission for incident radiation of wavelength 330nm?

Q9. Using Rutherford model of the atom, derive the expression for the total energy of the electron in hydrogen atom. What is the significant of total negative energy possessed by the electron?

Q10. Draw a graph showing the variation of potential energy between a pair of nucleons as a function of their separation. Indicate the regions in which the nuclear force is (i) attractive and(ii)repulsive

Write the important conclusions which you can draw regarding the nature of the nuclear forces from the above graph.

Q11. Draw a circuit diagram of a full wave rectifier and explain the working. Draw the input and output waveforms indicating clearly the functions of the two diodes used.

OR

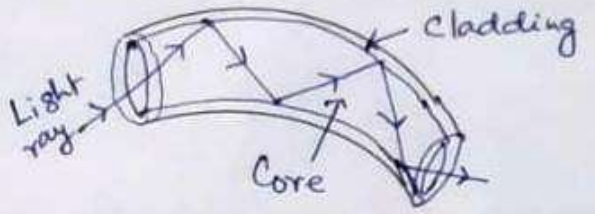
I)Describe the working of Light Emitting Diodes (LEDs)

(ii) Which semiconductors are preferred to make LEDs and why?

(iv) Give two advantages of using LEDs over conventional incandescent low power lamps.

Q12. CASE STUDY- OPTICAL FIBRE

An optical fibre is a thin tube of transparent material that allows light to pass through, without being refracted into the air or another external medium. It makes use of total internal reflection.



The fibres are fabricated in such a way that , light reflected at one side of the inner surface strikes the other at an angle larger than critical angle. Even, if fibre is bent, light can easily travel along the length.

(i) Which of the following is based on the phenomenon of total internal reflection of light?

a) Sparkling of diamond

b) Optical fibre communication

c) Instrument used by doctors for endoscopy

d) All of the above

(ii) A ray of light will undergo total internal reflection inside the optical fibre, if it

a) goes from rarer medium to denser medium

b) incident at an angle less than the critical angle

c) strikes the interface normally

d) incident at an angle greater than the critical angle

(iii) If in core, incident angle is equal to critical angle than the refraction angle will be

a)0° b)45° c) 90° d) 180°

(iv) In an optical fibre,correct relation of refractive indices of core (n_1) and cladding (n_2) is

a)$n_2 = n_2$ b)$n_2 > n_2$ c)$n_1 < n_2$ d) $n_2 + n_2 = 2$

(v) If the value of critical angle is 30° for total internal reflection from given optical fibre, then speed of light in that fibre

a)$3x10^8$ m/s b) $1.5x10^8$ m/s c) $6x10^8$ m/s d) $4.5x\ 10^8$ m/s

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