Directorate of Education, GNCT of Delhi
Suggestive Solutions
Practice paper term – 2
Class – XII
Physics (Code: 042)

	खंड – अ SECTION – A
प्र. स. Q. No.	
Q1	a) Correct two differences between n-type and p-type semiconductor. b) Depletion region or depletion layer is a region in a P-N junction diode **where no mobile charge carriers are present**. Depletion layer acts like a barrier that opposes the flow of electrons from n-side and holes from p-side.
Q2	Correct derivation with steps OR a) Bohr's quantisation condition: an electron can revolve only in certain discrete, non-radiating orbits for which total angular momentum of the revolving electron is an integral multiple of h/ 2 π where h is the Planck's constant. i.e L= mvr = nh/2 π b)The Rydberg's formula for the hydrogen atom is

	As we know that for Paschen series, $\frac{1}{\lambda} = R\left(\frac{1}{3^2} - \frac{1}{n^2}\right)$ Where R= Rydberg's constant λ = wavelength For shortest wavelength put n=∞ and R=1.097×10^7 m^{-1} So now equation becomes $\frac{1}{\lambda} = 1.097 \times 10^7\left(\frac{1}{3^2} - \frac{1}{\infty^2}\right)$ $\Rightarrow \frac{1}{\lambda} = 1.097 \times 10^7\left(\frac{1}{3^2}\right)$ $\Rightarrow \lambda = 8.21 \times 10^{-7}$ m
Q3	a) Solar cell b) P point shows open circuit voltage ,Q point shows short circuit circuit c) The energy band gap for Si is about 1.1eV, while for GaAs, it is about 1.53eV. The GaAs and Si absorb relatively more energy from the incident solar radiation being of relatively **higher absorption coefficient**.
	खंड – ब **SECTION – B**
Q4	Mass of the bullet, m = 0.040 kg Speed of the bullet, v = 1.0 km/s = 1000 m/s Planck's constant, h = 6.6×10^{-34} Js De Broglie wavelength of the bullet is given by the relation: $\lambda = h/mv$ = 6.6 x 10^{-34} / 0.040 x 1000 = **1.65×10^{-35} m** Mass of the ball, m = 0.060 kg Speed of the ball, v = 1.0 m/s

	De Broglie wavelength of the ball is given by the relation: λ = h/mv = 6.6 x 10^{-34} / 0.060 x 1 = **1.1 x 10^{-32} m** ball is having more wavelength than bullet.
Q5	a) Total internal reflection b) Following are the two conditions for the total internal reflection to take place: 1) The angle of incidence in the denser medium must be greater than the critical angle for that pair of media. 2) The ray of light must travel from a denser medium into a rarer medium c) n = 1 / sin C = 1/sin30º = 2 Speed of light in medium v = c/n = (3 x10^8) / 2 = 1.5 x 10^8 m/s
Q6	a) Diode D1 is forward biased and diodeD2 is reverse biased. b) D2 is in reverse bias so no current through it. Now I = ε / R = 6 / 2+1 = 2A c) Correct two differences
Q7	a) The descending order of frequencies: red light, x-rays, microwaves, radio waves are given as: X-rays > Red light >Microwaves >Radio Waves b) The waves used in radar are microwaves. c) The main role of the ozone layer in the atmosphere is that it absorbs all harmful UV rays and protect us from their harmful effects.
Q 8	a) (i) point source : spherical wave front (ii) Distant light source: plane wave front b) Correct definition of coherent sources c) There is no change in speed of light and wave length when a wave gets reflected from a given surface . OR

	a)Coherent sources have a constant phase difference. This ensures that the position of Maxima and minima do not change with time i.e., a sustained interference pattern is obtained. b)This happens because, the intensity of central maximum is due to wavelets from all parts of the slit. First secondary maxima is formed due wavelets from one third parts of the slit and second secondary maxima is due to wavelets from one fifth part of the slit and so on. This is the reason why intensity of secondary maxima becomes less as compared to central maxima. c) $\beta = \frac{D\lambda}{d}$ $\beta' = \frac{(D/2)\lambda}{10d} = \frac{1}{20}\frac{D\lambda}{d} = \frac{1}{20}\beta$
Q9	a) Correct two differences between nuclear fission and nuclear fusion. b) The ratio of their nuclear densities is 1:1, as nuclear density is constant for all nuclei.
Q 10	$mvr = \frac{nh}{2\pi}$ Where, h=Planck's constant $= 6.62 \times 10^{-34} Js$ n=Quatum number $\therefore n = \frac{mvr2\pi}{h}$ $= \frac{2\pi \times 6 \times 10^{24} \times 3 \times 10^{4} \times 1.5 \times 10^{11}}{6.62 \times 10^{-34}}$ $= 25.61 \times 10^{73} = 2.6 \times 10^{74}$ Hence, the quanta number that characterizes the Earth's revolution is 2.6×10^{74}
Q11	a) Reflection and refraction arise through interaction of incident light with the atomic constituents of matter. Atoms may be viewed as oscillators, which take up the frequency of the external agency (light) causing forced oscillations. The frequency of light emitted by a charged oscillator equals its frequency of oscillation. Thus, the frequency of scattered light equals the frequency of incident light. (b) No. Energy carried by a wave depends on the amplitude of the wave, not on the speed of wave propagation. (c) For a given frequency, intensity of light in the photon picture is determined by the number of photons crossing an unit area per unit time OR

Fringe separation, $\beta = \dfrac{D\lambda}{d}$

Given, $D = 1m, \lambda = 500nm = 5 \times 10^{-7}m$ and $d = 1mm = 1 \times 10^{-3}m$

$\therefore$ Fringe separation, $\beta = \dfrac{1 \times 5 \times 10^{-7}}{1 \times 10^{-3}}m$

$= 5 \times 10^{-4}m = 0.5mm$

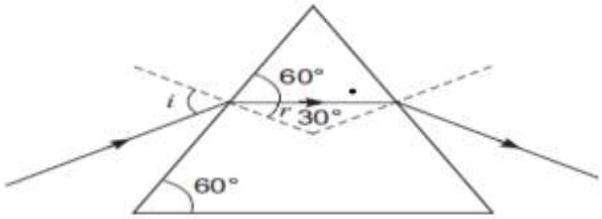
खंड – स
SECTION – C

Q12

a) iii

b) i

c) iv



From the figure, we see

$r = 30°$

$$n_{21} = \frac{\sin i}{\sin r} \Rightarrow \sqrt{3} = \frac{\sin i}{\sin 30°}$$

$$\sin i = \sqrt{3} \sin 30° = \sqrt{3} \times \frac{1}{2}$$

$$i = 60°$$

d) iii

Given that;

Refractive index = μ = 1.4

Angle of prism = A = 5°

Angle of deviation = δ = (μ - 1) A = (1.4-1) × 5 = 2°

	(e) iv Here, $\mu = \sqrt{3}, \delta_m = A$ From prism formula $\mu = \dfrac{\sin(A+\delta_m)/2}{\sin A/2}$ $\sqrt{3} = \dfrac{\sin A}{\sin A/2} = \dfrac{2\sin A/2\cos A/2}{\sin A/2} = 2\cos A/2$ $\cos A/2 = \dfrac{\sqrt{3}}{2} = \cos 30^\circ$ $A/2 = 30^\circ$ or $A = 60^\circ$