(b) (i) Mass of solid = $1 \times (9 \times 2)$
$= 18$ g
Mass of liquid = $18 - 14$
$= 4$ g

(ii) Volume of displaced water $= \frac{18}{1.30}$
$= 13.8\ cm^3$
Length of immersed tube $= \frac{13.8}{2}$
$= 6.9$ cm

(iii) The density of the liquid is minimum when the entire 12 cm long tube is submerged.
Mass of displaced liquid = 18 g
$18 = \rho \times 12 \times 2$
$\rho = 0.75\ g\ cm^{-3}$

10 (a) The process of inserting a small, controlled number of impurities into the lattice of a pure semiconductor crystal.

(b)

Material	Conductivity
Conductor	Height
Insulation	None
Semiconductor	Low at low temperature, high at high temperature.

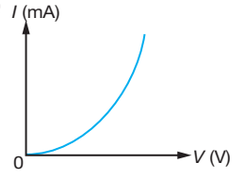
(c)

	Majority charge carriers	Minority charge carriers
Semiconductor type-*p*	Hollow	Free electrons
Semiconductor type-*n*	Free electrons	Hollow

(d)

Appropriate features	Reason
A substance with 4 valence electrons	Pentavalent or trivalent elements can be easily doped into them to form *p* type or *n* type semiconductors
Highest melting point	So that the material does not melt at high temperatures
Solid state	Materials can be easily formed into various types of components
Resistivity at room temperature	Current can flow through it easily
Material *C* is the most suitable	Because it has 4 valence electrons, its highest melting point, in the solid state and low resistivity at room temperature

(ii)

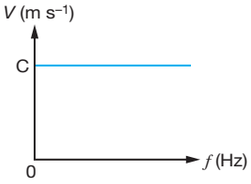


Section C

11 (a) (i) Equation: Both waves are transverse waves.
Light waves travel at a speed of 3.0×10^8 m s^{-1} in a vacuum.
Light waves travel at a slower speed from deep water to shallow water.
The speed of water decreases but the frequency does not change.
Light waves change direction when exiting the surface of the water while water waves are refracted closer to the normal when entering the shallow water area.
The wavelength of water waves decreases.
Light waves are transverse waves that are perpendicular to each other.

(ii) The wavelength is inversely proportional to the frequency of the wave.

(iv)



(c) (i) $\lambda = \frac{330}{480}$
$= 0.06875$ m

(ii) $a = 2.0$ m, $\lambda = 0.6875$ m, $D = 4$ m
$\lambda = \frac{ax}{D}$
$x = \frac{D\lambda}{a}$
$= \frac{4 \times 0.6875}{2.0}$
$= 1.375$ m