Assignment-2

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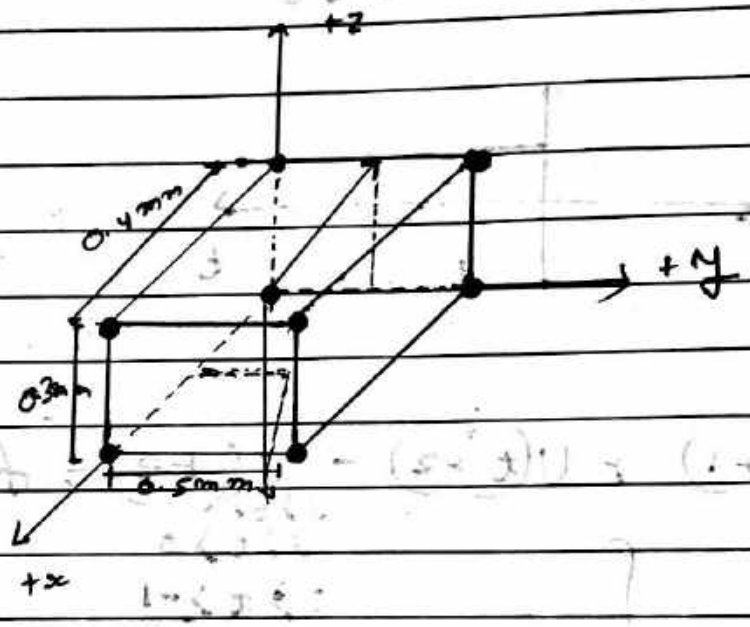
(1)



For Direction 1

	x	y	z
Projections	a	b/2	c
	0	1/2	1
	0	1	2

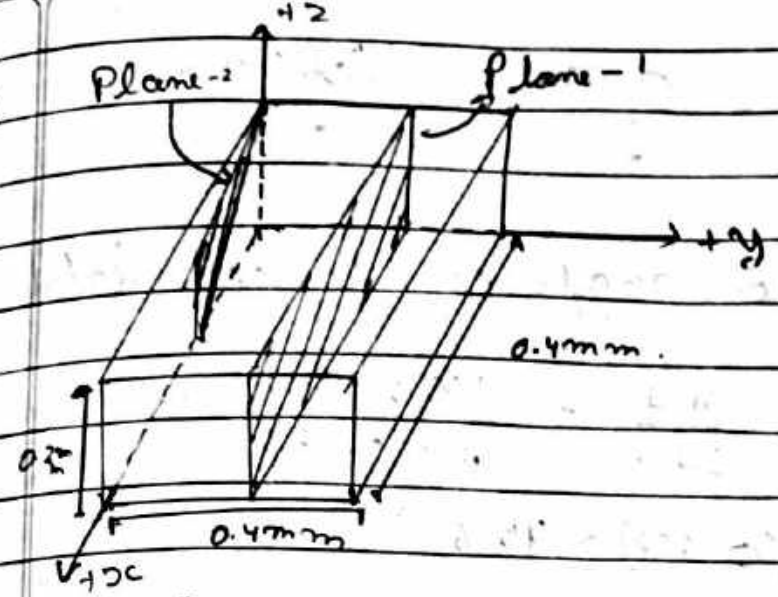
∴ Indices for Direction 1 is [0 1 2]

For Direction 2

x	y	z
a/2	b/2	-c
1/2	1/2	-1
1	1	-2

∴ Indices for Direction 2 is [1 1 -2]

2)



Plane-1	x	y	z
	∞a	$b/2$	∞c
	∞	$1/2$	∞
	0	2	0

∴ Plane 1 is a (0 2 0) Plane.

Plane-2	x	y	z
	$a/2$	$-b/2$	$c/1$
	$1/2$	$-1/2$	1
	2	-2	1

∴ Plane 2 is $(2\ \bar{2}\ 1)$ Plane

3) $a = 2\sqrt{2}R$ where a = cube length
R = atomic Radius

Here R = 0.1387 nm for Platinum in FCC crystal Structure

Now $a = 2\sqrt{2}R = 2 \times 0.1389\sqrt{2}$ nm = 0.392nm

Interplanar spacing for (1 1 3) set of planes

$$d_{112} = \frac{a}{\sqrt{1^2+1^2+3^2}} = \frac{0.392}{\sqrt{11}} = 0.11827\,nm$$

Now diffraction angle can be calculated by :-

$$\sin\theta = \frac{n\lambda}{2d_{113}} = \frac{1\times(6.1542)}{2\times(0.1183)} = 0.652$$

$$\theta = \sin^{-1}(0.652) = 40.69^\circ$$

∴ Expected diffraction angle $= 2\theta$

$$= 2\times(40.69^\circ)$$
$$= 81.38^\circ \quad \text{Ans}$$

4)

Screw Dislocation	Edge Dislocation
• It is a type of line defect which occurs when the planes of atoms in the crystal lattice trace a helical path around the dislocation line	• It is a type of line defect which occurs when there exists an extra half plane of atoms in the middle of the crystal lattice. It also occurs due to loss of half of a plane of atoms in the middle of the lattice.
• Shear, Tensile and Compressive stress fields are absent	• Shear, Tensile, compressive stress fields may be present.

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• In this dislocation Burger's vectors are always parallel to the dislocation line	• In the dislocation Burger's vector is always perpendicular to the dislocation line
• Region of lattice disturbance is in two separate planes and cross each other at right angles	• Region of lattice disturbance extends along an edge inside a crystal.
• The dislocation occurs only due to glide motion	• This dislocation occurs due to climb and guide motion.