

ANSWERS TO NUMERICAL QUESTIONS (2002-2003)

1(b) To calculate the spacing of planes of the type (hkl), use the formula:

$$d = a_0 / (h^2 + k^2 + l^2)^{1/2}$$

then

$$d_{110} = 0.3620\text{nm}$$

$$d_{130} = 0.1619\text{nm}$$

$$d_{004} = 0.1280\text{nm}$$

$$d_{224} = 0.1045\text{nm}$$

- (c) [1-20] lies in (004)
[2-24] lies in (110)

3(c) Calculation of time for layer regrowth:

i) velocity = $v_0[\exp(-E_A/kT)]$

$$= 3.68 \times 10^8 [\exp(-2.76/8.61 \times 10^{-5} \times 853)]$$

$$= 1.758 \times 10^{-8} \text{cm/s}$$

ii) time required to regrow $2 \times 10^{-5} \text{cm}$:

$$= 2 \times 10^{-5} / 1.758 \times 10^{-8} \text{s}$$

$$= 1138 \text{s}$$