

결정학개론

445.206 003

2006년 10월 2일

1st Quiz

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1.(40점) 가)(5점) What is "anisotropy" and what feature of crystal gives rise to anisotropy?

나)(5점) Distinguish between  $[uvw]$  and  $\langle uvw \rangle$ .

다)(5점) crystal structure = ( ) + ( )

라)(5점) Discuss the difference between stereographic, gnomonic, and orthographic projections

마)(5점) What is the zone axis of the planes  $(\bar{1}11)$  and  $(1\bar{1}\bar{1})$  ?

바)(5점) 병진 격자와 부합하는 회전축은 5개만이 존재함을 설명하여라.

사)(5점) Carry out the rotoreflection operation  $S_6(\tilde{6})$  on a stereographic projection and compare with the rotoinversion axis.

아)(2점) Which of the following statements is true for all plane lattice types?

(a)  $\mathbf{a}^*$  is always parallel to  $\mathbf{a}$ , and  $\mathbf{b}^*$  is always parallel to  $\mathbf{b}$

(b)  $\mathbf{a}^*$  is always perpendicular to  $\mathbf{b}$ , and  $\mathbf{b}^*$  always perpendicular to  $\mathbf{a}$

(c)  $\mathbf{a}^*$  is always perpendicular to  $\mathbf{a}$ , and  $\mathbf{b}^*$  always perpendicular to  $\mathbf{b}$

자)(3점) Which one of the statements about real and reciprocal lattice vectors below is true?

(a) The components  $u$ ,  $v$ , and  $w$  of a vector  $\mathbf{r}_{uvw}$  in real space give the plane index  $(uvw)$ .

(b) The components  $h$ ,  $k$  and  $l$  of the reciprocal vector  $\mathbf{g}_{hkl}$  in reciprocal space give the direction index  $[hkl]$ .

(c) The reciprocal vector  $\mathbf{g}_{hkl}$  in the reciprocal lattice is always perpendicular to the plane  $(hkl)$  in the real lattice.

차)(보너스, 5점) What is the distance between 201 and 102 in a monoclinic lattice  $\{2,3,4,90,60,90\}$ ?

2.(30점) 가)(10점) Consider a particular plane whose intercepts are 1, 2, and 6 on the X, Y, and Z axes, respectively.

a) Index the plane.

b) How many planes are there from the origin to the rational intercept plane?

c) What is the equation of the plane nearest to the origin?

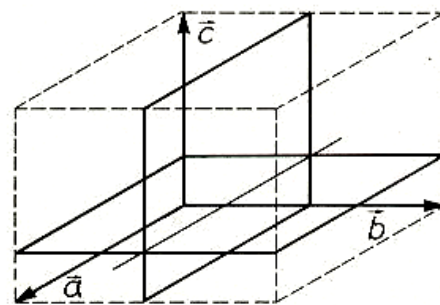
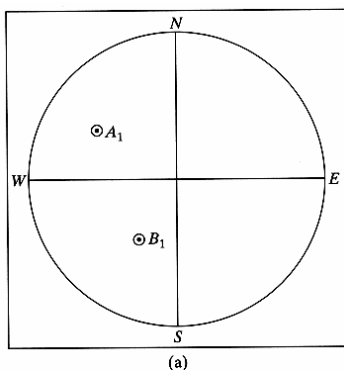
나)(10점) Z축이 6회 회전축인 대칭조작을 Cartesian coordinate와 Hexagonal coordinate에서 행렬로 표시하시오.

$$R(6_z^5) =$$

다)(10점) What condition must be fulfilled to make (a) [110] perpendicular to (110) and (b) [111] perpendicular to (111)?

3.(30점) 가)(10점) Draw the point group  $\bar{3} \frac{2}{m}$  on a stereographic projection. Also, include the symmetry elements on the stereographic projection.

나)(10점) Describe the procedure of rotating  $A_1$  about  $B_1$  by  $40^\circ$  in a clockwise direction.



다)(10점) Give the coordinates for the planes and lines drawn in the unit cell shown above.