ESO 205T

Nature and Properties of Materials

Interaction session: 11-12 Monday
Tutorial: 11-12 Thursday

Assignment 1

Question 1

Consider a regular array of points with distance between the points being 'a' as shown below. Only two type of arrows are possible in this 1D line group. Create crystal/s of lattice parameter 'a' and '2a' by placing an arrow at each point in Fig.1. Analyze this crystal in terms of a lattice + motif. [10]

Question 2

Complete the pattern [10]

AMTU

BCD

HIO

NS

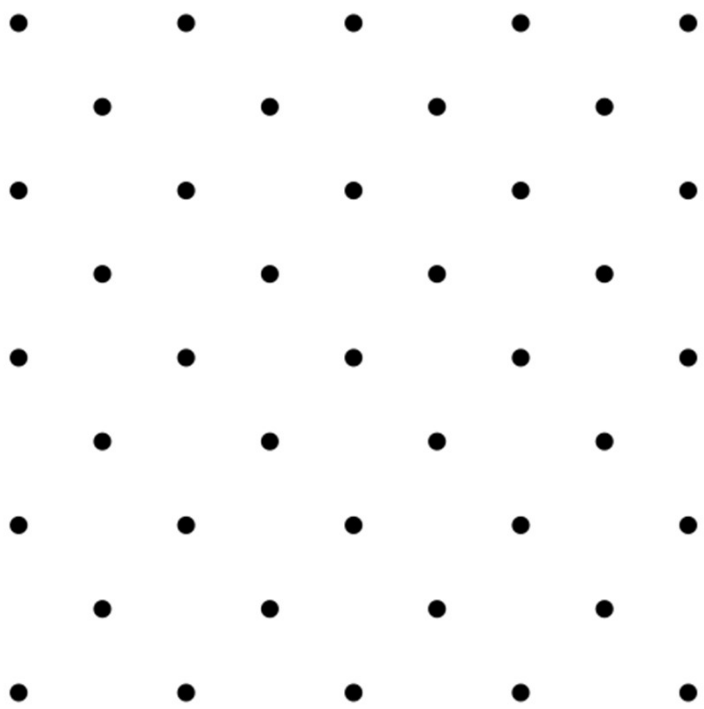
FGJ

Question 3

The crystallographic restriction theorem is based on the observation that the rotational symmetries of a crystal are usually limited to 2-fold, 3-fold, 4-fold, and 6-fold. Provide a geometrical proof for the theorem. [10]

Question 4

Overlay symmetry elements like rotations, mirrors and translation on the lattice provided below. [10]



Question 5

Find the plane group for the following pattern that has been obtained by putting a isosceles triangle on a square lattice. [10]