

1. Present and describe all elements for point group  $C_{3v}$ .

2. Define the basis vectors of primitive unit cell for crystal GaN. What Bravais lattice is in the basis of this lattice? Define the cartesian coordinates of basis vectors and all atoms inside of primitive unit cell. Define the number of space group.

3. Draw the planes for  $\langle 111 \rangle$ ,  $\langle \frac{1}{2}, \frac{1}{2}, \frac{1}{2} \rangle$ ,  $\langle 0, \frac{1}{2}, \frac{1}{2} \rangle$ ,  $\langle 0, \frac{1}{4}, \frac{1}{4} \rangle$ ,  $\langle 0, 0, \frac{1}{4} \rangle$  Miller indices in  $\Gamma_c$  lattice.