Uva Wellassa University, Sri Lanka
End Semester Examination – August 2010

MRT 111-1 Crystallography

Time: One (01) hour

Total five (05) Questions
Answer **four (4)** questions only
Illustrate your answers with labeled sketch diagrams where necessary

01) i. Explain how radius ratio affects coordination geometry in chemical compounds.

(10 marks)

ii. Describe different closest packing structures in minerals assuming atomic hard sphere model.

(15 marks)

02) i. Draw a face centred cubic (FCC) crystal structure using atomic hard sphere model. Show the relationship between the atomic radius R and unit cell edge length *a* for FCC crystal structure.

(10 marks)

ii. Atomic Packing Factor (APF) is the ratio between the volume of atoms in a unit cell and the total unit cell volume. Calculate APF for FCC crystal structure.

(15 marks)

03) i. Define following terms and describe briefly.

a. Unit Cell and Lattice
b. Crystal Forms
c. Symmetry Elements and Operations

(25 marks)

04) i. List out all crystal systems and indicate the essential symmetry of each system.

(10 marks)

ii. With an illustrated example describe the 3-fold roto-inversion symmetry in a crystal.

(15 marks)

05) Describe how you would calculate the Miller Index of a planar surface. Derive the Miller Index of a planar surface in a crystal that intersects +a axis at a unit length, +b axis at two units and is parallel to c axis.
Show that any plane parallel to the above will have the same Miller Index. The second plane should also intersect +a and +b axes.

(25 marks)