Uva Wellassa University, Sri Lanka
Faculty of Science and Technology
Mineral Resources and Technology Degree Programme
1st Semester Examination – March/April 2013

MRT 361-2 and SCT 448-2

Mineral Processing Methods

Number of questions: Five (05)
Answer **four (04)** questions only
Time allocation: Two (02) hours
Total marks: 400

1. a. i. Briefly explain "value addition process of minerals". Give examples. (10 marks)

ii. What is meant by recovery, enrichment ratio, and ratio of concentration? Derive formulas for each of them. (30 marks)

b. In the first shift, 220.0 t of material fed into a flotation plant assays 0.9% copper. The concentrate produced 35% Cu assays, and 0.17% tailings. Calculate the recovery of copper to the concentrate, the ratio of concentration, and the enrichment ratio. (15 marks)

c. i. Briefly discuss hydrometer analysis. Explain how you would obtain experimental data in the laboratory. (25 marks)

ii. What are the advantages and disadvantages of wet and dry sieving? (20 marks)

2. a. What is meant by dewatering? (05 marks)

b. Discuss dewatering methods. (15 marks)

c. Using stokes equation, calculate the diameter of quartz particle (S.G 2.7) which would settle in ceramic slurry (S.G =2.0) after 24 hours. [viscosity of slurry =1.012 x 10^{-3} Pa s, acceleration due to gravity =9.8 m/s^2] (30 marks)

d. Propose a flow sheet to separate garnet from a garnet-rich rock. (50 marks)

50

3. a. i. Briefly explain the function of hydro-cyclone with aid of a diagram. (15 marks)

ii. Describe how you would obtain hydro- cyclone efficiency in laboratory. (30 marks)

iii. A dry solid cyclone is fed at the rate of 20 t/h. The cyclone feed contains 30% solids, the underflow 50% solids, and the overflow 15% solids by weight. Calculate the tonnage of solids per hour in the underflow. (25 marks)

b. Drive a formula for screening efficiency. (30 marks)

4. a. i. What is comminuition? (10marks)

ii. Explain primary crushes with aid of labled diagram. (20 marks)

iii. Draw a flow sheet for a crusher plant to produce 20 mm-40 mm size aggregate. (25 marks)

b. i. Mark the zones of motion of charge in a tumbling mill. (15 marks)

ii. Derive a formula for critical speed of the tumbling mill using a diagram. (30 marks)

5. Describe the operation principle and application of the following mineral processing unit operations.
Use sketches where necessary.

a. Grinding mill used in mineral processing industry
b. Magnetic separator
c. High-tension separator
d. Gravity separation methods
e. Stokes' law related to particle settling

(20 x 5 marks)