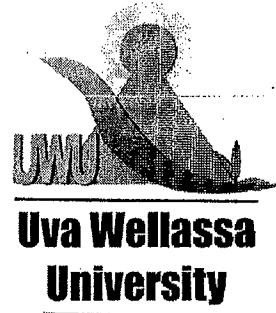




Uva Wellassa University, Sri Lanka  
End Semester Examination – February/ March 2012  
MRT 462-3 Industrial Mineral Processing Technology



Duration: Three (03) hours

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Total five (05) questions  
Answer all questions  
Draw sketch diagrams where necessary

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- 01) (i) Derive the below mentioned formula to calculate percentage of solid by weight ( $x$ ).

$$x = \frac{100s(D-w)}{D(s-w)}$$

where:

$x$  - % solids by weight,  $D$  - pulp density ( $\text{kg}/\text{m}^3$ ),  $s$  - density of solids ( $\text{kg}/\text{m}^3$ ),  $w$  - density of water.

(20 marks)

- (ii) A slurry stream containing quartz is diverted into a 2-litre density can. The time taken to fill the can is measured as 13 sec. The pulp density is measured by means of a calibrated balance, and is found to be  $1350 \text{ kg}/\text{m}^3$ . Calculate the % solids by weight, and the mass flow rate of quartz within the slurry. The density of quartz is  $2675 \text{ kg}/\text{m}^3$ .

(40 marks)

- (iii) A pump is fed by two slurry streams. One stream has a flow rate of  $4.7 \text{ m}^3/\text{h}$  and contains 45 % solids by weight. The other stream has a flow rate of  $3.2 \text{ m}^3/\text{h}$  and contains 52% solids. Calculate the tonnage of dry solids per hour (Density of solid  $3200 \text{ m}^3/\text{Kg}$ ).

(40 marks)

02) (i) List out advantages of *Metallurgical Accounting* and explain them. (20 marks)

(ii) The feed to a flotation plant assays 0.8% copper. The concentrate produced assays 25% Cu, and the tailings 0.15% Cu. Suppose that during the 1<sup>st</sup> shift a plant treats 210.0 t of material. Assaying 2.5% metal, to produce a concentrate of 40% metal and a tailing of 0.20% metal. During the next shift 305 t of material are treated, assaying 2.1% metal, and concentrate of 35.0% metal is produced, leaving a tailing of 0.15% metal.

Calculate and Tabulate metallurgical balance of shift 1, shift 2 and combined shift. (40 marks)

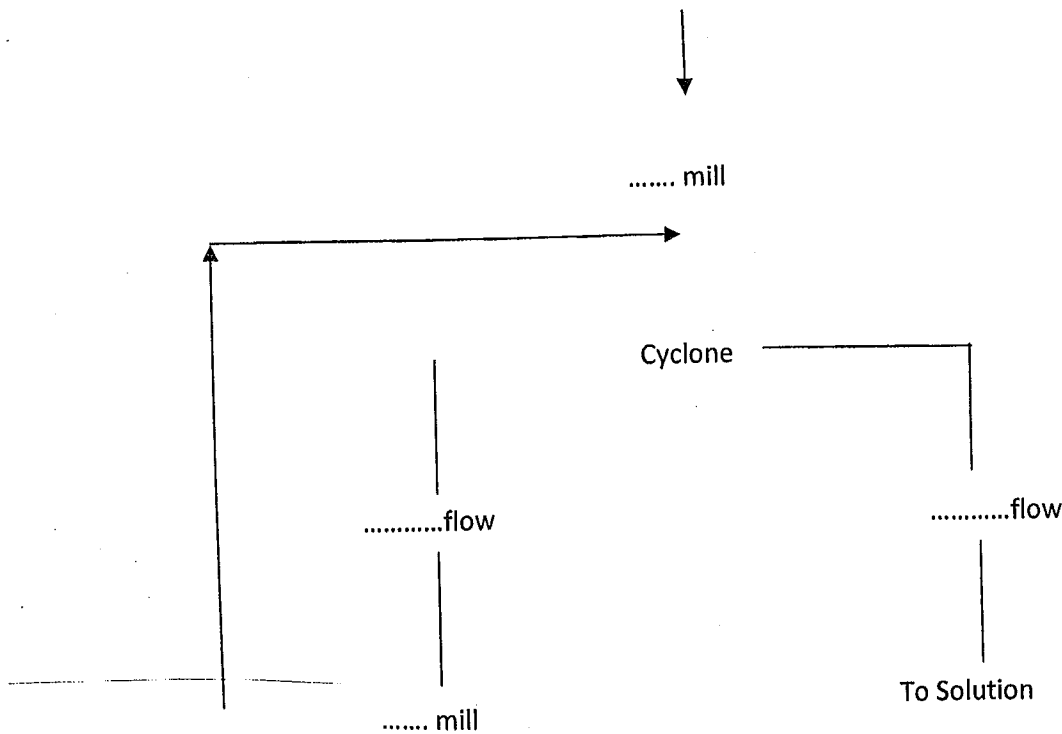
(iii) Fill in the blanks in the circuit shown in Figure 1; the rod mill is fed at the rate of 25 t/h of dry solids (density 2850 kg/m<sup>3</sup>). The cyclone feed contains 40% solids by weight, and size analyses on the rod mill, ball mill discharge, and cyclone.

Feed gave:

Rod mill discharge 24.2% + 200 microns

Ball mill discharge 3.7% + 200 microns

Cyclone feed 14.5% + 200 microns



(40 marks)

Figure 1: Operational flow sheet

- 03) (i) What are the sampling methods used in mineral processing industry?  
Discuss advantages. (25 marks)
- (ii) Briefly explain Gy's sampling calculation method. (25 marks)
- (iii) Explain how to obtain samples from conveyor belt. (25 marks)
- (iv) With the aid of diagrams explain how to produce TSP and SSP. (25 marks)
- 04) (i) Describe;
- (a) Gravity separation methods, (25 marks)
- (b) Froth flotation method, (25 marks)
- used in mineral processing industry.
- (ii) Design a flow sheet for metal crusher and briefly explain each step. (50 marks)
- 05) Write short notes on any four of following topics
- (a) Comminution and related instruments.
- (b) Principles of gravitational concentration.
- (c) Efficiency of Cyclone and Sieves.
- (d) Sri Lankan mineral Processing Industry.
- (e) Dewatering Methods. (Each 25 marks)