UNIVERSITY
OF
JOHANNESBURG

PROGRAM: NATIONAL DIPLOMA
                     EXTRACTION METALLURGY

SUBJECT: **MINERAL PROCESSING II**

CODE: **MPR 2B20**

DATE: SUMMER SUPPLEMENTARY EXAMINATION

DURATION: 3HRS

WEIGHT: 50:50

FULL MARKS: 67

TOTAL MARKS: 100

EXAMINER: PROF W. NHETA

MODERATOR: Dr E. MATINDE

NUMBER OF PAGES:3

INSTRUCTIONS TO STUDENTS:

ANSWER ALL QUESTIONS.
USE 4 DIGITS UNLESS THE QUESTION STATES OTHERWISE.

Question 1

The area on which to build a stockpile is 60m long and 20m wide.
An ore has an angle of repose of 35^0, a True Density of $2.65t/m^3$
and there will be 40% voids in the stockpile.
If an elongated stockpile is built on the above area,

1.1 What tonnage will it contain ?   (8)

1.2 If conical stockpiles were built on the same area, how many
     stockpiles could you build to maximise the tonnage?   (2)

1.3 What would be the total tonnage of these stockpiles?   (5)
                                                                                                    [15]

Question 2

FOR FEED AND PRODUCT SIZE CALCULATIONS USE 4 DECIMAL PLACES

A mill that is 3m in diameter and 4m long draws 2Mw when grinding an ore from
80% passing 12mm to 80% passing 0.075mm at a feed rate of 100t/hr. It draws
300kw when running empty.

2.1 Calculate the Bond Work Index of the ore.   (2)

The plant needs to increase its throughput by 50% and is considering two options to
treat this increased throughput: -
1.   adding an additional mill of the same diameter as the existing mill
2.   replacing the existing mill by a larger diameter mill that is the same length
         as the existing mill.

2.2 What would be the diameter and length of each of these two new mills to the
     nearest 0.5metre and their total power draws.   (10)
                                                                                                    [12]

Question 3

A mill operating in closed circuit with a cyclone is treating a gold quartzite ore at a
new feed treatment rate of 100tons/hour of solids. The recirculating load of solids
is 250% at a Pulp Density of $1.773t/m^3$. The mill discharge volume is $320.6m3/hour$
while the Pulp Density of the cyclone overflow is 1.118t/m3.

How much water, in litres/second is being added to:

3.1 the mill feed inlet, to control milling density (11)

3.2 the cyclone feed pump, to control the cyclone feed density. (12)

3.3 Show the water balance for the overall circuit to confirm your results. (2)

[25]

Question 4

Pulp with a PD of 1.72 is fed to a 3.5metre diameter drum filter at the rate of 180m^3/day.
9tons/day of solids go to the filtrate.
The cake contains 12% moisture and the solids SG is 4 t/m^3 .
The production rate of the filter is 1.940 tons of dry solids/m^2/day.

Calculate:
4.1 The length of the filter in metres (answer to 1 decimal place) (3)

4.2 The %solids in the filtrate (3)

4.3 The % of the water in the feed that reports to the filtrate (3)

4.4 How much water is lost in the filter cake in litres/minute (3)

4.5 The total volume of the filtrate m^3/hr (3)

[15]