UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA EXTRACTION METALLURGY
SUBJECT	:	**MINERAL PROCESSING II**
CODE	:	**MPR 2B20**
DATE	:	SUMMER EXAMINATION 25/11/2017
DURATION	:	(SESSION 1) 08:30– 10:30
WEIGHT	:	50:50
FULL MARKS	:	70
TOTAL MARKS	:	100

EXAMINER	:	DR W NHETA
MODERATOR	:	MR M. HENDERSON
NUMBER OF PAGES	:	3

INSTRUCTIONS TO STUDENTS:

ANSWER ALL QUESTIONS.
PUT YOUR FINAL ANSWERS ON THE ANSWER SHEETS PROVIDED.
INCLUDE YOUR WORKING IN THE SCRIPT. IF NO WORKING IS SHOWN IN THE SCRIPT, NO MARKS WILL BE AWARDED
ENSURE THE ANSWER SHEETS HAVE YOUR NAME AND STUDENT NUMBER ON THEM.
ENSURE YOU HAND IN THE ANSWER SHEETS WITH YOUR SCRIPT.
USE 4 DIGITS UNLESS THE QUESTION STATES OTHERWISE.

Question 1

A conical stockpile contains 20 000tons of ore that has a True Density of 2.65t/m^3.
It contains 30% voids and has an angle of repose of 35°.

1.1 What is its height and the area of its base? (6)

It is being emptied by a conveyor that is 1000mm wide. It is supposed to travel at 2.5m/sec but in fact is only running at 1.5m/sec. After running at this speed for 2 hours, it is decided to stop and overhaul it so that it will run at the design speed This takes 3 hours. When it starts again, it is running at the design speed of 2.5m/sec.

1.2 What is the total time in hours and minutes to remove the stockpile? (7)

1.3 How much time, in hours and minutes, was saved by stopping to overhaul the conveyor compared to continuing to run at 1.5m/sec until the stockpile was cleared? (2)

(15)

Question 2

A crusher is in closed circuit with a 20mm screen. The new feed rate is 205t/hr and it contains 82.93% +20mm material.

The screen efficiency based on the undersize is 85.42% and the feed to the screen is 350t/hr.

2.1 Complete the following table.

	Mass t/hr	**+20mm t/hr**	**-20mm t/r**	**%+20mm**
New Feed				
Crusher feed				
Crusher product				
Screen feed				
Screen U/S				
Screen O/S				

(17)

2.2 What is the %Screen Efficiency based on the Screen Oversize (3)

[20]

Question 3

A milling circuit is closed with a cyclone.
Using the following data:
Solids density of the ore is 2.791t/m^3
Cyclone overflow contains 120t/hr solids
Cyclone overflow pulp density is 1.090t/m^3
The new feed to the circuit contains 26.3m^3/hr of water.
The mill discharge is at 65% solids
The mill discharge contains 420t/hr of solids
The cyclone feed has a liquid/solids ratio of 2.3333

Calculate the following:

3.1 the pulp density of the mill feed t/m^3 (4)

3.2 the pulp density of the mill discharge t/m^3 (4)

3.3 the mass of water in the cyclone overflow t/hr (5)

3.4 the volume of water added to the mill feed in litres/minute (2)

3.5 the volume of water added to the cyclone feed in m^3/hr (1)

3.6 the % recirculating load of solids (2)

3.7 Show that the water in the circuit is in balance (2)

[20]

Question 4

A thickener is fed with 380m^3/hr of pulp having a L/S ratio of 6.0:1.
The underflow has a volume of 76m^3/hr of pulp and a L/S ratio of 1:1.
The thickener can treat 1.498t/m^2/24hr
If the solids density is 3.0kg/litre,

Determine:

4.1 the diameter of the thickener to the nearest metre (3)

4.2 the mass of solids in t/hr in the thickener feed (3)

4.3 the mass of solids in t/hr going to the thickener underflow (3)

4.4 the volume of the overflow in m^3/hr (3)

4.5. the % of the water in the thickener feed going to the overflow (3)

(15)