



PROGRAM : NATIONAL DIPLOMA
EXTRACTION METALLURGY
SUBJECT : **MINERAL PROCESSING II**

CODE : **MPR 2B20**

DATE : SUMMER EXAMINATION
03/12/2016

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

The top of a silo is 55metres above the ground. The bottom of the cone is 2metres above the ground. The bottom cone is 13metres deep and the cone angle is 60° .

The bulk density of the ore is 1.96 and it has an angle of repose of 35° .

The live load in the silo is 90%.

The material in the silo is being moved by a conveyor that is 800mm wide and travelling at 2m/second to form an elongated stockpile that will be 9metres high.

Calculate:

- 1.1 The live load of the silo in tons. (4)
- 1.2 How long will it take to empty the silo in hours and minutes? (4)
- 1.3 What will be the total length of the elongated stockpile? (4)
- 1.4 What will be the width of the elongated stockpile? (4)
- 1.5 What will be the area of the base of the elongated stockpile? (4)

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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. (4)

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. (16)

[20]

Question 3

The new feed to a crushing circuit is 165t/hr and it contains 10% -20mm material. The circuit is closed by 20mm screen. The feed to the screen is 300t/hr and it contains 61.3% -20mm material.

Calculate:

- 3.1 The % oversize efficiency (3)
- 3.2 The % undersize efficiency (3)
- 3.3 The % re-circulating load (3)
- 3.4 The % - 20mm in the screen oversize (3)
- 3.5 The % -20mm going into the crusher. (3)

[15]

Question 4

A drum filter is 3metres in diameter and 6metres long.

It can produce 2.016t of dry solids/m²/24hr

Using the following data,

- the filtrate contains 0.25t of dry solids/hr
- the cake contains 15% moisture
- the solids density is 2.714t/m³
- the volume of the pulp in the feed is 165m³/day

Calculate:

- 4.1. the mass of the cake in tons of dry solids/24hr (3)
- 4.2. the Pulp Density of the feed (3)
- 4.3. the %solids of the feed (3)
- 4.4. the volume of the filtrate in litres/second (2)
- 4.5. the Liquid:Solids Ratio of the filtrate (2)
- 4.6. the % of the water in the feed that goes to the filtrate (2)

[15]

Total Marks 70