



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
FACULTY OF ENGINEERING**

DEPARTMENT OF MINING AND PROCESS ENGINEERING

QUALIFICATION : BACHELOR OF ENGINEERING IN METALLURGY, CHEMICAL ENGINEERING & MINING ENGINEERING	
QUALIFICATION CODE: BSc.	LEVEL: 7
COURSE CODE: MIP710S; MPC711S	COURSE NAME: MINERAL PROCESSING 314 & MINERAL SEPARATION PROCESSES
SESSION: APRIL 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 60

SECOND OPPORTUNITY QUESTION PAPER	
EXAMINER(S)	Dr. Clement K. Owusu Mr. Thomas Moongo
MODERATOR:	Prof. Godfrey Dzinomwa

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer all questions.2. Read all the questions carefully before answering.3. Marks for each questions are indicated at the end of each question.4. Please ensure that your writing is legible, neat and presentable.

PERMISSIBLE MATERIALS

1. Examination paper.

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

Question 1

- a) A plant is commissioned to mill 600 tonnes of material per hour to produce an end product for a construction firm. At a feed size of 960 μm , a three-stage crushing circuit, comprising of a primary, secondary and tertiary crushers arranged in series, was employed in order to achieve the targeted end product size. If the reduction ratio for the primary, secondary, and tertiary crushers are 6, 4 and 2 respectively.
- Determine the product size of material exiting the tertiary crusher. (5 marks)
 - Based on (i) estimate the total energy required to crush the 600 tonnes of material to the product size if the work index of the material is 15.42 kwh/t. (5 marks)
 - If the work index of the material changes to 13.7 kWh/t, estimate the tonnage of material that could be crushed for the same energy. (5 marks)

Question 2

- a) Discuss the influence of mill speed on grinding efficiency (6 marks)
- b) A plant treats 800.0 tonnes of material during a shift, assaying 1.2 g/t Au, to produce a concentrate of 85 g/t Au, and a tailing of 0.23 g/t Au.
- Estimate the tonnage (tph) of concentrate and Tailings (5 marks)
 - Recovery of Au into the concentrate. (4 marks)

Question 3

- a) Tailings materials prior to deposition may be dewatered or modified. Briefly explain 3 ways by which tailings material could be densified (6 marks)
- b) Consider a binary mixture of galena (density; 7.5 g/cm³) and quartz (density; 2.65 g/cm³) particles being classified in water (density; 1 g/cm³). If the quartz particles are 20 mm in diameter, calculate the diameter of galena particles (in mm) for the two minerals to settle at the same terminal velocity. (5 marks)
- c) Explain briefly the mode of operation of the hydrocyclone (4 marks)

Question 4

- a) What is the relevance contact angle in froth flotation? (2 marks)
- b) Discuss briefly the role of the following reagents and give one example each
- i. Collector; (2 marks)
 - ii. Frother; (2 marks)
 - iii. Activator; and (2 marks)
 - iv. Depressant (2 marks)
- c) Discuss the influence of feed rate and moisture content on screening efficiency (5 marks)

End

