



UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

SCHOOL OF ENGINEERING

MAIN EXAMINATIONS: JUNE 2023

COURSE AND CODE: MINERALS PROCESSING

ENCH4MP

DURATION: 2 HOURS

TOTAL MARKS: 100

INTERNAL EXAMINERS:

Dr J Pocock

INTERNAL MODERATOR:

Dr M. Mkhize

EXTERNAL MODERATOR:

Dr L Maharaj

INSTRUCTIONS:

1. **ALL** questions should be attempted.
2. Any programmable or non-programmable calculator may be used provided it has been cleared of any information that would subvert the purpose of the examination.
3. Calculations must be shown in sufficient detail to illustrate your understanding of the procedure.
4. This examination paper, together with all associated diagrams **MUST** **BE**
HANDED IN TOGETHER WITH YOUR SCRIPT.

Student Number:

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SECTION A

Self Study

1. Using at least three examples of minerals processing flowsheets from the case studies, describe how the liberation size and physical and surface chemical properties of the constituents of an ore determine the processing methods used to economically produce a concentrate of the valuable constituent(s) of the ore.

(25 marks)
2. South Africa has a highly developed mining industry mainly based around the Wits Basin and the Bushveld Igneous Complex. From the case study materials, give an example of a mineral produced in either of these mining areas and a brief block diagram which describes the processing of the chosen ore to a concentrate.

(15 marks)
3. Sedimentary deposits tend to require surface rather than deep shaft mining as is generally required by igneous deposits. Briefly explain why this is the case using examples from the case studies.

(10 marks)

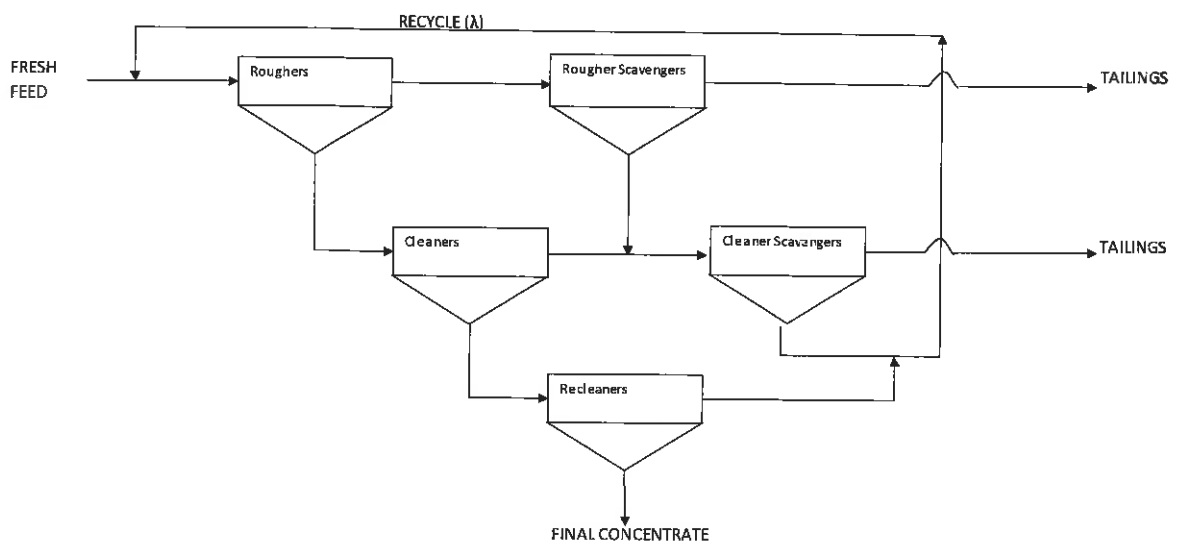
TOTAL /50/

2. a. In froth flotation, what is the function of collectors and suppressants used in the process?

(5 marks)

- b. For the flotation circuit shown below, determine an expression for the overall recovery to the concentrate of the values for a given set of flotation kinetics in terms of the recoveries at each stage in the process.

(15 marks)



3. When using electrostatic separation, what are the important forces acting upon the particles on contact with the drum of the separator (note that you do not have to give any formulae to calculate these, just the forces themselves). Using a diagram, show how an electrostatic separator affects a separation of conducting and non-conducting minerals.

(10 marks)

TOTAL /50/