



SCHOOL OF ENGINEERING

MAIN EXAMINATIONS: NOVEMBER 2025

COURSE AND CODE: CHEMICAL ENGINEERING TOPICS 2 ENCH4CB

DURATION: 2 HOURS

TOTAL MARKS: 100

INTERNAL EXAMINER/S: Dr J Pocock

INTERNAL MODERATOR: Mrs A Singh

EXTERNAL MODERATOR: Mrs M Schalkwyk

INSTRUCTIONS:

1. **ALL** questions should be attempted. Answer in **INK**.
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. **Two answer books are provided. Label them Book A and Book B. Answer Section A in Book A and Section B in Book B.**
5. This examination question paper, together with all associated diagrams, **MUST BE HANDED IN TOGETHER WITH YOUR SCRIPT.**

Student Number:

QUESTION 1

Using a block diagram, describe the faecal sludge management service chain, giving examples of the economic/employment opportunities that are available at each stage of the chain.

TOTAL /20/

QUESTION 2

Describe the advantages and disadvantages of transfer stations in faecal sludge transport.

TOTAL /13/

QUESTION 3

Provide an overview of the hazards associated with handling faecal sludge with examples.

TOTAL /17/

QUESTION 4

An informal settlement in an urban area of eThekweni municipality has been provided with basic sanitation in the form of pit latrines. The sludge from the pits is removed at regular periods and taken to a central processing facility. Give an example of the type of treatment technology which may be suitable for processing the sludge with the advantages and disadvantages of using that particular technology as well as the final products and potential income generation that can be gained from the treatment.

TOTAL /20/

QUESTION 5

For each of the following multiple choice questions, please choose the two correct answers

- I. Which of the options below are not part of an integrated planning approach? (2 marks)**
- A. Prioritizing containment and emptying in the sanitation service chain.
 - B. Taking a holistic view, including technology, planning, and management.
 - C. Considering the enabling environment.
 - D. Assigning one actor/stakeholder that will make all the decisions.
- II. Which of the following examples are part of ensuring the collection of useful, good quality data for initial situation analysis? (2 marks)**
- A. Gathering data from various sources, and cross-checking.
 - B. Installing metres or sensors to measure water flow, water pressure, etc.
 - C. Getting information only from official community representatives
 - D. Hold interviews with women only.
- III. Which of the following statements is not correct? (2 marks)**
- A. Consultation and collaboration are stakeholder participation levels.
 - B. The main objective of a stakeholder analysis is to decide who will be in charge of the faecal sludge treatment plant.
 - C. The first step of a stakeholder analysis is to identify all the different stakeholders.
 - D. A stakeholder analysis should be done only at the beginning and end of a faecal sludge management project cycle/intervention.
- IV. Which of the following are part of the sanitation services ladder? (2 marks)**
- A. Basic Sanitation
 - B. Faecal sludge management
 - C. Flush toilet
 - D. Safely managed sanitation
- V. Which of the following are examples of a disabling institutional environment? (2 marks)**
- A. Cost-effective wastewater/sludge discharge fees
 - B. Over staffing with under-skilled people
 - C. Different sanitation options (e.g. flush toilets or pit latrines) for different contexts
 - D. Enforcement of regulation that covers a part of the sanitation service chain

TOTAL /10/

QUESTION 6

In February 2025, residents of Chatsworth, Northdene, Moseley held a protest at the eThekweni Municipality's Water and Sanitation office in the Durban CBD demanding urgent action to address ongoing water shortages. The protesters voiced their anger over what they perceived as mismanagement, unfair water distribution, and the failure of city officials to resolve the crisis. "I am 71 years old and my husband is 82. We are pensioners, yet every day, we have to carry 20-litre containers of water. It has been five or six years since we had a normal water supply, but we still receive high water bills every month. That is not right,". Sarojini Dorasamy, a resident from Moseley, said they have been without reliable water for 42 days from January this year. Beyond being inconvenienced, residents emphasized the severe health implications. "The president said, 'Water is life, sanitation is dignity,' but where is our dignity? Women suffer from UTIs (urinary tract infections), young girls are struggling during their periods, and even schools are closing early because of the water crisis. How are children supposed to learn?" asked Dorasamy.

Community representatives called for a meeting with the municipal officials at the Water and Sanitation office. Meanwhile the DA welcomed President Cyril Ramaphosa's decision to authorize the Special Investigating Unit (SIU) to probe alleged corruption in eThekweni's Water and Sanitation Department. DA eThekweni caucus leader Thabani Mthethwa said: "People are justifiably frustrated, more so at the lack of urgency by the ANC/IFP city leadership and officials to resolve the water situation". He further called for immediate interventions. "More resources, both human and financial, are needed to urgently attend to this crisis and remove political interference".

- a. Based on the background information above, use the interest-influence matrix to **identify** and **classify** the stakeholders according to their level of interest and influence. Justify your classification. [14 marks]
- b. Explain gender analysis [3 marks]
- c. Explain the concept of intersectionality. [3 marks]

TOTAL /20/