



PROGRAM : BACHELOR OF TECHNOLOGY
CHEMICAL ENGINEERING

SUBJECT : **ENGINEERING MANAGEMETN 3A (CHEMICAL)**

CODE : **EMGCHA3**

DATE : SUMMER EXAMINATION
25 MAY 2019

DURATION : (SESSION 1) 08:30 - 11:30

WEIGHT : 40 : 60

TOTAL MARKS : 69

EXAMINER(S) : DR R HUBERTS

MODERATOR : PROF L VAN DYK

NUMBER OF PAGES : 3 PAGES

REQUIREMENTS : Use of scientific (non-programmable) calculator is permitted
(only one per candidate)

HINTS AND INSTRUCTIONS TO CANDIDATE(S):

- **ATTEMPT ALL QUESTIONS.** Please answer each question to the best of your ability.
- Write your details (module name and code, ID number, student number etc.) on script(s).
- Number each question clearly; questions may be answered in any order.
- Make sure that you read each question carefully before attempting to answer the question.
- Transfer the answers accurately onto Blackboard (Bb).
- You may use the resource pdf files supplied to you for reference.

Question Zero**[Total: 2 Marks]**

Please record your calculations in the script provided neatly and numbered according to the question numbering. No need to write text-based questions in your script too.

Question One**[Total: 13 Marks]**

Year	Production (thousands)
2009	150
2010	150
2011	140
2012	130
2013	110
2014	150
2015	140
2016	130
2017	100
2018	120

You have been running an orange juice concentration plant, and the sweetened concentrated juice is delivered in barrels to customers. The production for the last ten years is given in the accompanying table. One thousand barrels represents a profit of R1.0mil. The demand for concentrated fruit juice is constant at 160 thousand barrels a year, and the yearly shortfall is met by importing concentrated juice, which is sold for a reduced profit per thousand barrels given on Bb. Use the following random numbers between 0 and 99 to simulate the expected profit in the next five years.

Year	2019	2020	2021	2022	2023
Random Number	97	79	10	22	64

By how many million Rands will the total profit for the next five years decrease in total if the demand for fruit juice barrels decreases to 155 thousand barrels a year due to the newly introduced sugar tax? **[13]**

Question Two**[Total: 15 Marks]**

List steps 1, 2, 4, 6, and 8 in planning for an organization. Give the title of the 5 steps, and then write two to three lines in your own words on each of these steps, using the urine separation and treatment project as an example. No need to write in your answer script for this question. **[15]**

Question Three**[Total: 9 Marks]**

Warehouse →	Limpopo	Free State	Western Cape	Capacity:
University Site ↓				↓
UJ	100	80	400	5
TUT	50	120	600	8
CPUT	500	200	(on Bb)	4
Demand →	4	3	10	

You own a company that produces struvite from urine separation at various universities in the country. The struvite has to be transported to fertilizer warehouses close to farming communities around the country, where it is to be sold to farmers as slow-release phosphorus fertilizers. The annual crate production amounts, the annual crate demands of the warehouses, and the transport costs (in R per crate) are given in the table. The transport cost from CPUT to the Western Cape warehouse is subject to change, and will be given to you on Bb. Use the NWC approach to allocate the crates of struvite to the routes, and calculate the initial transport costs that this allocation represents. **[9]**

Question Four**[Total: 9 Marks]**

For this question, answer in two to three lines of your own words for each sub-question:

4.1. What do you understand the term subcontracting to mean? **[3]**

- 4.2. Why does this tend to be an antagonistic aspect of project management? [3]
 4.3. Why should you consider using the word partnering rather than subcontracting to describe what happens? [3]

Question Five**[Total: 12 Marks]**

For this question, answer in two to three lines of your own words for each sub-question:

- 5.1. Discuss one aspect of the tussle for authority between a line manager and a specialist. [3]
 5.2. If you have power, it means that you have the ability to influence other members of your organization. Describe your power given on Bb. [3]
 5.3. What happens if you as a manager delegate one of your responsibilities to your subordinate? [3]
 5.4. Are you / will you be more of an Afrocentric manager or more of a Eurocentric manager? Discuss one measure you could take to adjust your natural tendency and get the balance right in your relationship with a subordinate. [3]

Question Six**[Total: 9 Marks]**

Year	Cash flow (Rmils)
2020	1.5
2021	1.5
2022	1.4
2023	1.3
2024	1.1
2025	1.5
2026	1.4
2027	1.3
2028	1.0
2029	9.0

You want to invest an amount, given on Bb, in an apple juice concentrating plant early next year. You expect to run the plant for 10 years, and then sell it at the end of 10 years to recoup some of the initial investment. The cash flows for this endeavour, measured at the end of the years listed for the given year, are given in the accompanying table. The cash flow at the end of the last year, 2029, includes the cash you get back from the sale of the plant. The interest rate is 10%.

- 6.1. Calculate the NPV of this endeavour at the beginning of 2020. [7]
 6.2. Does the NPV indicate that your endeavour is economically sound? Explain why. [2]

END**[Total: 69 Marks]**