



PAN AFRICA CHRISTIAN UNIVERSITY
SCHOOL OF HUMANITIES AND SOCIAL SCIENCES
END OF SEMESTER EXAMINATION FOR
DIPLOMA IN ENTREPRENEURSHIP MANAGEMENT
JANUARY-APRIL 2019 SEMESTER

CAMPUS: ROYSAMBU

DEPARTMENT: BUSINESS STUDIES

COURSE CODE: DENT0112

COURSE TITLE: QUANTITATIVE TECHNIQUES

EXAM DATE: MONDAY 8TH APRIL 2019

TIME: 9.00AM-12.00PM

INSTRUCTIONS

- Read the instructions and questions carefully before you write the answers.
- Write your **STUDENT NUMBER** in the Answer Booklet given
- This paper consists of **five questions**.
- Answer Question **ONE** and any other **FOUR** questions
- *Write clearly and legibly.*
- *ALL PAC University's examination rules and regulations apply*

QUESTION ONE: COMPULSORY

- a) Determine the second order derivative of each of the following functions with respect to x.

i. $Y = 4x^3 - 3x^2 - 5x + 8$ (2 Marks)

ii. $Y = 7x^4 - 5x^3 + 6x^2 - 4x$ (2 Marks)

- b) Integrate each of the following functions with respect to x

i. $Y = 5x^3 - 5x^2 - 9x + 6$ (2 Marks)

ii. $Y = 2x^2 - 7x^3 + 7x - 3$ (2 Marks)

- c) Determine the maximum and minimum points of the following functions

i. $Y = 4x^3 - 9x^2 - 30x + 10$ (4 marks)

ii. $Y = 4x^3 - 27x^2 + 24x + 12$ (4 Marks)

- d) Solve the following equations using matrix method

i. $4x + 8y + z = -6$

$$2x - 3y + 2z = 0 \quad (6 \text{ Marks})$$

$$x + 7y - 3z = 8$$

ii. $5x + 9y = -30$

$$6x - 2y = 28 \quad (3 \text{ Marks})$$

- e) A shop stocks two types of Jembes, Type 1 and Type II. Twelve type 1 and five type II Jembes cost shs 1,260 while nine type I and fifteen type II Jembes cost shs 1,620. A farmer bought ten Type 1 and ten Type II Jembes. Determine the amount he paid for them using matrices (5 Marks)

QUESTION TWO

- a) The total revenue and total cost functions for a given firm are as follows

$$TR = 10Q^2 + 200Q$$

$$TC = Q^2 - 10Q + 1,000$$

Required

- i. The output that will maximize the profit (5 Marks)
ii. The maximum profit (2 Marks)

- b) Revenue and average cost function for a given firm are given as

$$AR = 4 - \frac{1}{4}Q$$

$$AC = 4/Q + 2 - 0.3Q + 0.05Q^2$$

Required:

- i. Find the level of Q (output) that would maximize the profit (6 Marks)
ii. Compute the maximum profit. (2 Marks)

QUESTION THREE

- a) Two manufactures X and Y are competing in a certain market. The state transition matrix for the markets summaries the probabilities that customers will move from one manufacture to the other in a given month.

	X	Y
X	0.9	0.1
Y	0.4	0.6

Required

Interpret the state transition matrix in terms of

- Retention and losses (3 Marks)
 - Retention and gains (3 Marks)
- b) Two soft drink products Gleem and Sparkle are competing in the market and their current market share is 60% and 40% each respectively.

Each week the customers of each product switch the product they are consuming. Of those who bought Gleem the previous week 70% will consume the product again this week and the rest will switch to Sparkle. Of those who consumed Sparkle the previous week 80% will consume it this week and the rest will switch to Gleem.

Required:

- Determine the state transition matrix (1 Mark)
- Determine the percentage that will be consuming the two products this week (2 Marks)
- Determine the percentage that will be consuming the two products next week (2 Marks)
- If this process persists long enough, determine the equilibrium market share of the two products. (4 Marks)

QUESTION FOUR

- Highlight three uses of calculus in the business world (3 Marks)
- Explain any three assumptions of liner programing model (6 Marks)
- Solve the following inequalities
 - $-3x + 2 \leq 7$ (3 Marks)
 - $5x^2 + 3x \geq 3x^2 + 2$ (3 Marks)

QUESTION FIVE

- Integrate each of the following functions with respect to x
 - $\int 1/3\sqrt{x} \, dx$ (3 Marks)
 - $\int (6x^6 + 4x^{2/3} + 8) \, dx$ (3 Marks)

- b) Differentiate each of the following functions with respect to x
- $Y = \frac{3x^3 + 3x^2 + 3}{2x}$ (3 Marks)
 - $Y = (4x^2 - 3x)^{1/2}$ (3 Marks)
 -
 - $Y = (7x + 3)(4x^2 + 5)$ (3 Marks)

QUESTION SIX

- a) Explain the following terms as used in networking analysis
- Activity (2 Marks)
 - Event (2 Marks)
 - Dummy activities (2 Marks)
- b) The project of constructing a footbridge over a dual carriage way has been broken down into activities and their duration in the precedence table below. Use it to answer the questions that follow

<u>Activity</u>	<u>Preceding Activity</u>	<u>Duration (weeks)</u>
A	-	10
B	A	12
C	A	8
D	B	8
E	B	14
F	C	6
G	C	15
H	E, F	10
I	D, H	6
J	G	12
K	I, J	10

Required

- Construct a network for the project represented by the precedence table (7 Mark)
- Determine the critical path of the project (2 Marks)