



ALUPE UNIVERSITY
OFFICE OF THE DEPUTY VICE CHANCELLOR
ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2022 /2023 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER REGULAR EXAMINATION

**FOR THE DEGREE OF BACHELOR OF BUSINESS
MANAGEMENT AND BACHELOR OF EDUCATION**

BUSINESS STUDIES

COURSE CODE: BBM 113:

COURSE TITLE: BUSINESS MATHEMATICS 1

DATE: 06/12/2022

TIME: 9.00AM-12.00PM

INSTRUCTION TO CANDIDATES

- SEE INSIDETHIS PAPER CONSISTS OF 4 PRINTED PAGES
- PLEASE TURN OVER

INSTRUCTIONS TO CANDIDATES

- i. Answer Question **ONE** and any other **TWO** questions.
- ii. Do not write on the question paper.

QUESTION ONE

- a. Discuss the areas of application of business mathematics to manager (5 marks)
- b. What is an identity matrix? (2 marks)
- c. If $A = \{m, n, o, p\}$, $B = \{m, o, p, q\}$, $C = \{m, p, r\}$, and the universal set is defined as $U = \{k, l, m, n, o, p, q, r, s, t\}$, then what is:
 - i. $A \cup B$
 - ii. $A \cap C$
 - iii. $B \cap C$
 - iv. $(A \cap C)'$
 - v. $(A \cup B)'$(7 marks)
- d. Given the following demand function: $Q = (40 - 2P)/3$; where Q is the level of output and P , is the price per unit. The cost function is defined as $TC = 0.5Q^2 + 10Q - 225$.
 - i. Derive the revenue function and the profit function (5 marks)
 - ii. Calculate the corresponding break-even point (4 marks)
- e. Solve the following by substitution method
$$2x + y = 8$$
$$3x - 2y = -2$$
(7 marks)

QUESTION TWO

- a. You are given consumption function; $C = 120 + 0.75Y^d$ where Y^d is disposable income. You are also given the following information: $Y^d = Y - T$ and that $T = tY$. Where Y is total income; T , total tax; and t is tax rate:
 - i. Express consumption C , as a function of total income, Y . (6 marks)
 - ii. Find the level of C if $t = 0.3$ and $Y = 5000$ (4 marks)
- b. Solve the following set of functions using matrix algebra inverse method
$$X_1 + 3X_2 + 3X_3 = 37$$
$$X_1 + 4X_2 + 3X_3 = 47$$
$$X_1 + 3X_2 + 4X_3 = 50$$
(10 marks)

QUESTION THREE

There are 64 students in a certain college 35 of them take mathematics 30 economics and 25 geography. The following additional information is provided; 15 students take

mathematics and economics, 13 take maths and geography, 12 take geography and economics while 5 take mathematics and geography only.

Required

- i. Write the above information in a set notation (2 marks)
- ii. Present the above information in the form of a venn diagram (3 marks)
- iii. How many students take all the 3 subjects (3marks)
- iv. How many students take none of the 3 subjects (3marks)
- v. How many students take 2 subjects only (3marks)
- vi. How many students take 1 subjects only (3marks)
- vii. How many students do not take geography (3marks)

QUESTION FOUR

- a) Explain the assumptions of linear programming (5 marks)
- b) XYZ chemical company is producing two products A and B. The processing times are 3 hours and 4 hours per unit for A on operations one and two respectively and 4 hours and 5 hours per unit for B on operations on one and two respectively. The available time is 18 hours and 21 hours for operation one and two respectively. The product A can be sold at sh. 3 profit per unit and B at sh. 8 profit per unit. Formulate the problem and solve for maximum profit using the graphical method (15 marks)

QUESTION FIVE

Assume that two products A and B currently share the market with shares of 55% and 45% each respectively. Each week some brand switching takes place. Of those who bought A the previous week, 60% buy it again while 40% switch to B. Of those who bought B the previous week, 80% by it again to B. Use transition probability matrix to find the proportion of the market the products will eventually hold. (20 marks)
