



SCHOOL OF PROFESSIONAL STUDIES

BACHELOR OF LEADERSHIP AND MANAGEMENT

UNIT CODE: MGT 121, UNIT NAME: QUANTITATIVE TECHNIQUES

September – December 2018/2019 End Semester Exam - Time: 2 Hours

Instructions: Answer Question ONE (Compulsory) and any other TWO questions.

QUESTION ONE

(a) A travel agent surveyed 100 people to find out how many of them had visited the cities of Mombasa and Kisumu. Data obtained from the records of the travel agent revealed the following;

- 31 people had visited Mombasa.
- 26 people had been to Brisbane.
- and 12 people had visited both cities.

Required:

With an aid of a Venn diagram, find the number of people who had visited:

- | | |
|-----------------------------------|-----------|
| (i) Mombasa or Kisumu. | (3 marks) |
| (ii) Kisumu but not Mombasa. | (3 marks) |
| (iii) Only one of the two cities. | (3 marks) |
| (iv) Neither city. | (3 marks) |
- (b) Briefly explain the following terms as used in set theory.
- | | |
|---------------|-----------|
| (i) Empty set | (2 marks) |
|---------------|-----------|

- (ii) Disjoint set (2 marks)
- (iii) Universal set (2 marks)
- (iv) Complement of a set (2 marks)

(c) Alex bought 3 tins of paint and 4 brushes at a total cost of Shs. 23. Brian bought 2 tins of paint and 3 brushes at a total cost of Shs. 16.

Required:

- (i) Express the above cost of buying one tin of paint and a brush in form of simultaneous equations. (4 marks)
- (ii) Calculate the cost of buying one unit of tin of paint and a brush (6 marks)

(Total: 30 marks)

QUESTION TWO

(a) Solve the following inequalities and plot the solutions on a number line.

- (i) $3x + 1 > 0$ (3 marks)
- (ii) $-5x \leq 10$ (3 marks)
- (iii) $8 < -2x + 4 \leq 3$ (3 marks)

(b) Solve the following inequalities

- (i) $3x - 12 > 15$ (1 mark)
- (ii) $3 > 10x - 7 > 23$ (1 mark)
- (iii) $-1 \leq -4x + 15 \leq 7$ (1 mark)
- (iv) $-1/4x + 8 < 6$ (1 mark)
- (v) $1/2x - 5 \leq 6x$ (1 mark)
- (vi) $3x - 4/5 \geq -x$ (1 mark)

(Total 15 marks)

QUESTION THREE

a) The following equation was obtained from Grace who used it to calculate the break-even point for her business in the month of October.

$$-0.4x^2 + 40x - 360 = 0$$

Required:

- (i) Solve the equation using the quadratic formula. (3 marks)
- (ii) Suppose she uses the following quadratic equation in the month of December.

$$3x^2 = 4 - 11x$$

Solve the following quadratic equation using factorization methods. (3 marks)

b) Distinguish between the following concepts as used in quantitative techniques.

- (i) Linear variable and non-linear variable (3 marks)
 - (ii) Controllable variable and uncontrollable variable (3 marks)
 - (iii) Inverse function and quadratic function (3 marks)
- (15 marks)

QUESTION FOUR

a) Find the integrals of,

- (i) $1/4x^3$ (2 marks)
- (ii) $3x^6 + 4x + 11$ (2 marks)
- (iii) $2x^4 + 9x^3 + 5x - 17$ (2 marks)

(a) Find the derivatives of the following functions

- (i) $Y = 1/4x^{-6}$ (1 marks)
- (ii) $Y = 9x^6 + 13$ (2 marks)
- (iii) $Y = x^4 + 8x^4 + 59x^5$ (2 marks)
- (iv) $Y = (16x + 2)(5x^4 + 7)$ (2 marks)
- (v) $Y = \frac{5x^6 + 12}{x^3}$ (2 marks)

(Total: 15 marks)

QUESTION FIVE

(a) Distinguish between fixed and variable costs. (2 marks)

(b) A firm is faced with the following demand and total cost functions:

$$Q = 150 + 2P$$

$$TC = 80 + 20Q$$

Where: Q = quantity in kilograms

TC = Total costs

P = Price

Required: Calculate;

- (i) Marginal revenue function (2 marks)
- (ii) Profit maximizing level of output (3 marks)
- (c) The demand function of a certain firm is given as follows:
- $$Q + 10 P = 20$$

Where:

Q = Level of output

P = Is the unit price

Required: Determine;

- (i) The average revenue function (4 marks)
- (ii) The total revenue function (4 marks)

(Total: 15 marks)