



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

MAIN EXAMINATION

P.O. Box 62157
00200 Nairobi - KENYA
Telephone: 891601-6
Fax: 254-20-891084
E-mail: academics@cuea.edu

AUGUST - DECEMBER 2018 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

REGULAR / ODEL PROGRAMME

CID 072: FOUNDATIONS OF BUSINESS MATHEMATICS

Date: DECEMBER 2018

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions

- Q1. a) Distinguish between any of the following terms using suitable examples
i) Classical Probability and Frequency Probability
ii) Union of a set and intersection of a set
iii) Universal set and empty set **(6marks)**
- b) Given the functions $f(x) = x^2 - 3$ and $g(x) = 4x + 7$, use the rules of algebra of functions to work out;-
i) $(f + g)(x)$
ii) $(f \cdot g)(x)$
iii) $(f \div g)(x)$ **(6marks)**
- c) Solve for x in each of the following
 $3x^2 + 13x - 10$ **(3marks)**
- d) Solve the following Simultaneous equation using Gaussian elimination method **(9marks)**
$$2x + y + 3z = -2$$
$$x - y - z = -3$$
$$3x - 2y + 3z = -12$$
- e) For each of the following sets of revenue (TR) and total cost equations (TC), Express π as a function of output x and then determine the maximum output level by finding the vertex of the Parabola.
i) $TR = -6x^2 + 1200x$, $TC = 180x + 3350$ **(3marks)**

$$ii) TR = -4x^2 + 900x, TC = 600x + 12,500 \quad \text{(3marks)}$$

- Q2. a) The demand function of a firm is given, as $P = 50 - 0.5q$. Given that, P is the Price and q is the number of commodities;
- Write down the equation of the total Revenue Function **(2marks)**
 - Graph the total revenue for $0 \leq P \leq 100$ **(5marks)**
 - Estimate the value of q for which the total revenue is maximum and give the value of the total revenue **(3marks)**
- b) A computer retailer conducted a survey of 250 clients and obtained the information shown.

Gender	AGE		
	Less than 25	25-40	41 and over
Male	70	25	50
UFemale	45	40	20

If a customer is selected at random, find the following probabilities;

- The customer is a female aged 25-40. **(2marks)**
 - The Customer is male **(1mark)**
 - If the selected customer is less than 25, what is the probability that they are female? **(4marks)**
 - Are the events aged 25-40 and female, Independent? **(3marks)**
- Q3. a) Use Matrices find the equilibrium values for x, y and z given the following first order conditions. **(10marks)**
- $$\begin{aligned} 10x - 2y - z &= 0 \\ -2x + 16y - z &= 0 \\ 60 - x - y &= 0 \end{aligned}$$
- b) A manufacturer makes two products x_1 and x_2 . The first requires 5hours for processing, 3hours for assembling and 4 hours for packaging. The second requires 2 hours for processing, 12 hours for assembling and 8 hours for packaging. The plant has 40 hours available for processing, 60 hours available for assembling and 48 hours available for packaging. The profit margin for x_1 is sh. 700 and that of x_2 is sh. Sh. 2100.
- Express the data in equations necessary to determine the output pairs that will maximize profits **(3marks)**
 - Use the graph paper provided or otherwise to identify the pair that gives maximum profit, and hence give the value of maximum profit **(7marks)**

- Q4. a) A nutritionist wishes her clients to have a daily minimum of 30 units of Vitamin A, 20 units of Vitamin D, and 24 units of Vitamin E. One dietary supplement y_1 costs sh. 800 per kg and provides 2 units of Vitamin A, 5 units of Vitamin D and 2 units of Vitamin E. A second supplement y_2 Costs sh. 1600 per kg and provides 6 units of Vitamin A, 1 Unit of Vitamin D and 3 Units of Vitamin E. Workout the least cost of combinations of Supplements meeting daily requirements. **(10marks)**
- b) In a recent survey, people were asked if they took a vacation in the summer, winter, or spring in the past year. The results were, 73 took a vacation in the summer, 51 took a vacation in the winter, 27 took a vacation in the spring and 2 had taken no vacation. In addition, 10 had taken vacations at all three times, 33 had taken both a summer and a winter vacation, 18 had taken only a winter vacation, and 5 had taken both a summer and spring but not a winter vacation.
- Draw a Venn diagram for the information
 - How many people were surveyed?
 - How many people had taken vacations at exactly two times of the year?
 - How many people had taken vacations during at most one time of the year?
 - What percentage, had taken vacations, during both summer and winter but not spring? **(10marks)**

END