CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD DEGREE OF
BACHELOR OF COMMERCE, COOPERATIVE MANAGEMENT AND
ENTREPRENEURSHIP & ENTERPRISE MANAGEMENT

BCOM 162: BUSINESS MATHEMATICS II

STREAMS: BCOM/BCOP/BEEM Y1S2   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 9/04/2020   **11.30 A.M - 1.30 P.M.**

INSTRUCTIONS
Answer questions **ONE** and any other **TWO** questions.

QUESTION ONE   (30 MARKS)

(a) Explain the meaning of the following probability terms

   (i)   Independent events   [2 Marks]

   (ii)   Equally likely events   [2 Marks]

(b) A firm has analyzed their operating conditions, prices and costs and has developed the following functions: Total Revenue: TR=300 – 2^2 and Average Cost = 2+1000/ where x is the number of units sold. The firm wishes to maximize profit. Assume that all output produced is sold.

   (i)   Determine the total cost function   [2 Marks]

   (ii)   What quantity should be sold to maximize profit?   [4 Marks]

   (iii)   What will be the amount of maximum profit?   [2 Marks]

(c) A chemical manufacturer must decide whether or not to expand its product line. The possible strategies available to achieve this objective are
   (i)   Construct a large plant
   (ii)   Construct a small plant
   (iii) Do nothing

The market for the chemical could either be favourable, neutral or unfavourable with probabilities of 0.5, 0.2 and 0.3 respectively. The payoffs in Ksh. Associated with the strategies are given in the table below:

	Strategies		
	Large Plant	Small Plant	Do Nothing
Unfavourable	25,000	-10,000	-125,000
Neutral	400,000	440,000	400,000
Favourable	650,000	740,000	750,000

Use the table to determine the best alternative using the following criteria
   (i)   Maximum   [3 Marks]

   (ii)   Hurwicz (Take =0.75)   [3 Marks]

   (iii) Laplace   [3 Marks]

   (iv)   Expected Monetary value   [3 Marks]

(d) Use matrix algebra to solve the following system of simultaneous equations
   $+ 2y + 3z - 3 = 0$
   $2 + 5y + 4z - 4 = 0$
   $3 + 5y + 6z - 8 = 0$ [6 Marks]

QUESTION TWO   (20 MARKS)

(a) Outline two areas in management where calculus geometry is useful   [2 Marks]

(b) For what values of   is $y = {}^3 - 3^2 - 9 + 5$ minimum?   [4 Marks]

(c) Evaluate

(d) The demand function faced by a firm is p=200-3. the marginal cost function of a commodity is given as MC=80-2 where is the quantity produced in units. The total cost is Ksh.775 when 10 units of the commodity are produced.

Find:
    (i)   The total revenue function for the commodity   [2 Marks]

    (ii)   The total cost function for the commodity.   [3 Marks]

    (iii)   The output at which the profits of the firm are maximum.   [3Marks]

    (iv)   If the government imposes a tax on the company of Ksh.4 per unit of quantity
              produced, determine the new price that maximizes the profit.   [2 Marks]

QUESTION THREE   (20 MARKS)

(a) Explain the difference between open and closed Leontief model   [2 Marks]

(b) Akinyi, Kimathi and Melisa purchased rice from two supermarkets P and Q. Akinyi
    purchased 1000kg from P and 700kg from P and 800kg from Q. If one kg of rice in P
    costs Ksh.40 while in Q it costs Ksh.50, use matrix operations find the amount of money
    spent by each person individually.   [6 Marks]

(c) An economy has two industries T1 and T2. The industries have the following technology
    matrix

     Determine the gross production for each industry.

                                                 [6 Marks]

(d) An electronic manufacturer has two lines A and B assembling identical electronic units.
    During the last eight-hour shift, line A produced 200 units while the line B produced 300
    units. It is estimated that 5% of the units assembled on line A and 10% of those
    assembled on line B are defective. All defective units must be reworded at a significant
    increase in cost. One unit is selected at random from the 500 units produced.
    (i)   If it is found to be defective, find the probability that it was assembled on line A.
                                                       [3 Marks]

    (ii)   Find the probability that the unit is defective given that it was assembled on line
            B.   [3 Marks]

QUESTION FOUR (20 MARKS)

(a) Explain the meaning of decision theory and describe the decision making environments
                                                                                    [4 Marks]

(b) Explain the following criteria in decision theory

   (i)   Hurwicz   [2 Marks]

   (ii)   Laplace   [2 Marks]

(c) A milk processing factory is experiencing low output and as a result, the firm's management is considering three courses of action: To arrange for subcontracting (S_1), will cost the firm Ksh.15,000; overtime production will cost Ksh.33,000 while construction of new facilities will require investment of Ksh.58,000. The correct choice depends largely upon the future demand, which may be low, medium, or high. By consensus, management ranks the respective demand probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals effect upon the profits (in Ksh as shown in the table below:

Demand	Course of action		
	S_1	S_2	S_3
Low (L)	10,000	-20,000	150,000
Medium (M)	50,000	60,000	20,000
High (H)	50,000	100,000	200,000

Show this decision situation in the form of a decision tree and indicate the most preferred decision and its corresponding expected net monetary value.   [12 Marks]

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