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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(BUSINESS ADMINISTRATION)

Date: 15th April, 2022
Time: 11.30am –1.30pm

KBA 106 - BUSINESS MATHEMATICS

INSTRUCTIONS TO CANDIDATES

ANSWER **QUESTION ONE (COMPULSORY)** AND **ANY OTHER TWO** QUESTIONS

QUESTION ONE (30 MARKS)

a) The sets L, M and N in a universal set consisting of the first 10 lower-case letters of the alphabet are L = {a, b, c} M = {b, c, a, e} N = {a, d, e, f}

Required: Determine members of the following sets:

i) $L \cap M \cap N'$ (3 Marks)

ii) $(L \cup M \cup N)'$ (2 Marks)

b) A product has a selling price as sh. 200 whereas unit variable cost is sh. 140. the annual fixed cost is sh. 720,000. You are required to determine the following (B.E.P.)

i) Breakeven sales units (3 Marks)
ii) Profit to be made if 20000 units are sold (3 Marks)
iii) Sales required for a profit of Sh. 2,000,000 (3 Marks)

c) Functions are important in the business and economic world. List four benefits of functions to the business and economic world? (4 Marks)

d) A revenue function is quadratic in nature. When x= 5, R= 50 whereas when x= 4, R= 48. Determine the revenue function. (4 Marks)

e) Solve the following equations using the matrix method.

$5x+9y = -30$
$6x-2y = 28$ (4 Marks)

f) At a certain factory, the marginal cost is $3(q-4)$ dollars per unit when the level of production is q units. By how much will the total manufacturing cost increase if the level of production is raised from 6 units to 10 units? (4 Marks)

QUESTION TWO (20 MARKS)

a) The demand function of a certain commodity is quadratic and passes through the points (p, q) = (5,1600); (10,900); (20,100). The form of the function is $q = a + b_1 p + b_2 p^2$. Determine the function. **(6 Marks)**

b) The revenue function of a product is R = 28q - q2 and the unit variable cost v = q – 8 while fixed cost is Sh.64. Determine the following:

i) Total cost function **(5 Marks)**
ii) Profit function **(4 Marks)**

c) If the demand function for a commodity is given by the equation $p^2 + 4q = 1600$,

and the supply function is given by the equation $550 - p^2 + 2q = 0$, find the equilibrium quantity and price. (5 Marks)

QUESTION THREE (20 MARKS)

a) A firm sells a product whose data in two periods is as follows:

Period	Sales (Shs)	Variable cost (Shs)	Profit (Shs)
I	100000	60000	20000
II	150000	90000	40000

Assume the price, unit variable cost, and fixed costs are the same in the two periods.

Required:

i) Determine the fixed cost (3 Marks)

ii) Determine the breakeven sales revenue (3 Marks)

iii) What is the profit when sales are sh. 600000 (2 Marks)

b) Solve the following simultaneous equation using Cramer's rule

x+3y-z=1
-2x-6y+z=-3
3x+5y-2z=4 (6 Marks)

c) Integrate the following functions

i) $\int \left(x^5 + 4x^3 + x^2 + 6\right)dx$ (3 Marks)

ii) $\int_2^4 4y^2 + y^{-2} + 1 dy$ (3 Marks)

QUESTION FOUR (20 MARKS)

a) Solve the following simultaneous equations using elimination method

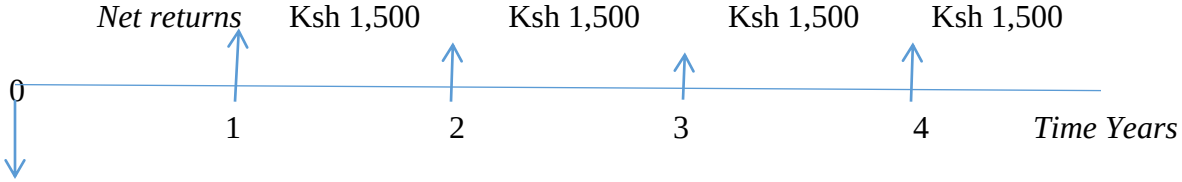
$$2x + y = 12$$
$$y - 3x = 2$$

(4 Marks)

b) Several families went to a movie together. They spent $19.25 for 8 tickets. If adult ticket cost $3.50 and the children's ticket cost $1.75 how many of each kind of tickets were bought?

(6 Marks)

c) Consider an investment decision characterized by the cash flow pattern shown below



(5,000)

i) The initial investment as shown is Ksh 5,000 and the net returns are shown on the graph. Find the project's Net Present Value (NPV). The cost of capital (Interest) is 12%

(6 Marks)

ii) Explain why the Net Present Value (NPV) method is considered superior to the Internal Rate of Return.

(4 Marks)

QUESTION FIVE (20 MARKS)

a) A survey was conducted on the newspaper readership of 3 dailies; the Mirror, the Citizen and the Times, M, C, T respectively and the following data was obtained: The number of people who read M, C & T was found to be 55, 45 and 39 respectively. The number that read M & T = 19, the number that read C & M = 15, the number that read C & T = 14. Those who read all the 3 were found to be 4 people only.

Required

i) Represent the information in a Venn diagram (4 Marks)

ii) Determine the number of people who:

i) Read the Mirror only. (3 Marks)

ii) Read Citizen or Times but not the Mirror (3 Marks)

iii) The total number of people interviewed if 5 people read none of the papers.

(3Marks)

b) Solve the following quadratic equations using the stated method;

i) $4x^2 - 3x - 1 = 0$ (completing squares) (4 Marks)

ii) $3x^2 = x + 10$ (factorization) (3 Marks)