Strathmore
UNIVERSITY

STRATHMORE INSTITUTE

DIPLOMA IN BUSINESS CREATION AND ENTREPRENEURSHIP – AL JAMEA

END OF SEMESTER EXAMINATION

UNIT CODE: DE 1106 BUSINESS MATHEMATICS

DATE: 24th October 2022 **Time:** 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.
3. Do not write on the question paper.

Question One (Compulsory)

a) Explain the following terms in relation to matrices:
   (i) Null Matrix **(2 Marks)**
   (ii) Transpose Matrix **(2 Marks)**

b) Mohamed and Farah visited a supermarket to purchase some times. Mohamed bought 9 Jackets and12 sweaters for sh. 21,000. Farah bought 14 Jackets and 6 sweaters for sh 900 more than Mohamed.

Required: Using matrix algebra determine the cost of a jacket and a sweater. **(6 Marks)**

c) A company manufactured 800 items at a total cost of sh. 985,600. The company has a policy of 20% profit margin on every item.

Required: Determine the unit selling price for each item. **(4 Marks)**

d) Mustafa Started his employment with a salary of sh. 120,000 per annum which was increased by sh 10,000 every year up to the4 top of the scale of sh. 1,500,000 per annum.

Required

(i) In how many years' time does he reach the top scale? **(3 Marks)**

(ii) What is the total amount he would earn during this period? **(3 Marks)**

e) Out of a group of 60 people, 20 invested in the stock market, 35 had certificates of deposit (CD's), and 34 had savings bonds. Furthermore 23 had both CD's and bonds, 13 had both stocks and Cd's and 13 had both bonds and stocks. Finally 10 of the people had no investments.

(i) Represent this information in form of a Venn diagram **(3 Marks)**

(ii) Determine how many people had all the three types of investments . **(3 Marks)**

(iii) Determine the probability of a person selected randomly that the person invested in at most two investments **(4 Marks)**

Total 30 Marks

Question Two

a) Of 100 people, 60 invested in company A and 72 invested in company B. If 40 of the people invested in both companies, how many of the 100 invested in Company A and did not invest in company B? **(5 Marks)**

b) A sales man earns a commission of 3% on sale of chairs and a commission of 4% on sale of tables. The selling price of a chair and a table are sh 6,000 and sh 15,000 respectively. During the month of June 2022 the number of chairs the sales man sold were 10 units more than the number of tables sold. He received a total commission of sh 21,300. Determine the number of chairs and tables the salesman sold in the month of June 2022. **(5 Marks)**

c) The profit function of a company is given as Profit = $-0.008X^2 + 400X - 150{,}000$; where X equals to the number of units sold and P is the annual profit in dollars.

Required:

(i) What type of function is this **(1 Marks)**

(ii) What is the maximum profit **(4 Marks)**

Total 15 Marks

Question Three

a) A company has a fixed cost of €8250 and a marginal cost of €400 for each item produced. If the company receives €800 for each item sold, how many items must it sell to make a profit of € 5,750? **(4 marks)**

b) A company with four retail stores has 35 TVs t, 60 stereos s, 55 videocassette recorders v and 45 camcorders c, in store 1; 80t, 65s, 50v, and 38c in store 2; 29t, 36s, 24v, and 32c in store 3; and 62t, 49s, 54v, and 33c in store 4.

(i) Express the present inventory in matrix form. **(3 marks)**

(ii) The parent company sends out deliveries, $D = \begin{pmatrix} 8 & 6 & 9 & 5 \\ 4 & 7 & 5 & 2 \\ 6 & 3 & 0 & 8 \\ 5 & 9 & 7 & 4 \end{pmatrix}$ to its stores. What is the new level of inventory? **(2 marks)**

c) A wholesaler sold 105 packets of sugar and 224 packets of salt at a total sale of sh 61,320 on a certain day. On the same day the wholesaler supplied 245 packets of sugar and 96 packets of salt to a supermarket making a total sales of sh. 40,680.

Required: Using matrix algebra determine the selling price per packet of sugar and salt. **(6 Marks)**

Total 15 Marks

Question Four

a) A dry cleaning business in the city finds that its variable cost (V) is a function of the number of houses cleaned each month (H) and is given by;

$V = 240H - 20H^2$

Its monthly fixed cost is sh 30,000.

Customers are charged a price of shs. 640 per house cleaned

Required:

(i) Total profit function **(2 Marks)**

(ii) Profit during the month when 50 houses were cleaned **(2 Marks)**

(iii)The break-even level for the business **(2 Marks)**

b) What amount will an account have after 1.5 years if $\$ 8000$ is invested at an annual rate of 9%:

(i) Compounded weekly **(3 marks)**

(ii) Compounded continuously (daily) **(2 marks)**

c) A retiree receives $ 5120 a year interest from $ 40, 000 placed in two bonds, Bond A paying 14%p.a interest rate and bond B paying 12%p.a interest rate. How much is invested in each bond? **(4 marks)**

Total 15 Marks

Question Five

A company manufactures two products X and Y. The cost of making 15 units of Product X and 10 Units of product Y is sh.600. The cost of making 5 units of product X and 8 units of product Y is sh. 340. The company makes a profit of 20% and 25% on each of products X and product Y respectively.

Required

a) Express the above cost of making product X & Y in form of simultaneous equations **(3 Marks)**

b) Calculate the cost of making one unit of product X and a unit of product Y.**(2 Marks)**

c) Calculate the selling price of each product **(2 marks)**

d) Solve the following equation using the factorization method and the formula method

$4X^2 - X - 3 = 0$ **(4 Marks)**

e) Solve the following simultaneous equations using the substitution method

$4X + 3Y = 7$

$3X - 2Y = 9$ **(4 Marks)**

Total 15 Marks