JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS AND ECONOMICS

DEGREE OF BACHELOR IN BUSINESS ADMINISTRATION

FIRST YEAR 2ND SEMESTER 2022/2023 ACADEMIC YEAR

KISUMU CAMPUS

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COURSE CODE: BAB1104/ABA107

COURSE NAME: MANAGEMENT MATHEMATICS I

DATE: 22/12/2022   SESSION: 9.00-11.00AM

TIME: 2 HOURS

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1. Answer question ONE(COMPULSORY) and ANY other two questions.
2. Candidates are advised not to write on the question paper.
3. Candidates must hand in their answer booklets to the invigilator while in the examination room.

QUESTION 0NE (compulsory)

a) Explain how management mathematics aids in Business Management

(10mks)

b) Use a Venn diagram to illustrate the following concepts:

     i)   Intersection of sets   (1mk)

     ii)   Union of sets   (2mks)

     iii)   Disjointed sets   (2mks)

c)   Let $A = \{a, b, c, d, e, f\}$ $B = \{b, c, g\}$ and $C = \{a, c, e\}$.

    Compute

    i. $A \cup B \cup C$ (2mks)

    ii. $A \cap B \cap C$

             (2mks)

    iii. $A - B$ (1mk)

d)   If $S = \{a, b, c\}$ $T = \{1, 2\}$ $U = \{p, q\}$

    Find $S \times T \times U$ (2 mks)

e)   In a survey of 60 people it is found that 25 like to drink milk, 26 coffee and 26 tea, 11 like milk and coffee, 8 like coffee and tea and 8 like none of the three.

    Using Venn diagram

    i.   Find the number of people who like all the three drinks   (4 mks)

    ii.   Find the number of people who like exactly one of the three drinks   (4 mks)

QUESTION TWO

a) Solve
$$x^2 + xy + xz = 45$$
$$y^2 + yz + yx = 75$$
$$z^2 + zx + zy = 105 \quad \text{(5 mks)}$$

b) $4x - 3y = 1, 12xy + 13x^2 = 25$ (5 mks)

c) A person desires to create an endowment fund to provide for a prize of Ksh.300 every year. If the fund can be invested at 10% p.a compound interest, find the amount of the endowment.
    (5mks)

d) Draw the graph of $4x + 3y \leq 6$. Mark two solutions of this graph.
    (5mks)

QUESTION THREE

i) Cite business areas where the concept of linear functions meet application.
    (4mks)

ii) A firm sells a product whole data in two periods follows:

Period	sales	variable cost	profit
1.	100000	60000	20000
2.	150000	90000	40000

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

Required;

i) Determine the fixed costs.
    (3mks)
ii) Determine the break-even sales revenue.
    (2mks)
iii) What is the profit when sales are Ksh600,000 ?   (3mks)
iv) What is the sales revenue required for a profit of Ksh110,000 ?
    (4mks)
v) Determine the profit if the variable cost incurred is Ksh300,000.
    (4mks)

QUESTION FOUR

a) Sketch the general graph of an exponential function. (4mks)

b) Given that $f(x) = 1800x^{-2e}$. Find $f(5)$ (4mks)

c) A group of iologists studied the nutritional effects on rats that were fed a diet containing 10% protein. The protein was made up of yeast and corn flour. By changing the percentage p (expressed as a decimal) of yeast in the protein mix, the group estimated that the average weight gains g(in grams) of a rat over a period of time was given by:
$$g = 200p^2 + 200p + 20$$
determine the percentage of yeast that gave an average weight gain of 70 grams. (8mks)

d) The cost C for affirm producing q units of a product is given by the cost equation:
$$C = (Zqlog.q) + 20$$
Evaluate the cost when q=6. (5mks)

QUESTION FIVE

a) Explain the concept of time value of money. (4mks)
b) Quarterly deposits of $5000 are to be made in an account which earns interest at the rate of 12% per year compounded quarterly.
   i) To what sum will the investment grow by the time of the twentieth deposit? (3mks)
   ii) How much interest will be earned during this period? (3mks)
c)

A firm is considering the purchase of a machine. Two machines A and B are available, each costing Ksh.50000. In comparing the profitability of those machines, a discounting rate of 10% is to be used. Earning after taxation is expected to be as follows:

Year	Machine A cash inflow	Machine B cash inflows
1	15000	5000
2	20000	15000
3	25000	20000
4	15000	30000
5	10000	20000

You are also given the following data:

Year	Present value factor @10% discount
1	0.909
2	0.826
3	0.751
4	0.683
5	0.621

Required:

Evaluate the project using

    i)   The payback period   (5mks)

    ii) The net present value   (5mks)