University of Kelaniya - Sri Lanka

Centre for Distance and Continuing Education

Faculty of Commerce & Management Studies

Bachelor of Business Management (General) Degree First Examination (External) – 2022

BMGT E1055 – Mathematics for Business

April - 2024

No of questions – Eight (08) **Time: 03 Hours**

Answer any five (05) questions.

Non-programmable Calculators are allowed only.

Question No. 01

(a) Explain the importance of Business Mathematics in management.

(05 marks)

(b) Which elements of the set, $\left\{-6.25, -4\frac{2}{4}, -3, -\sqrt{5}, -1, \frac{2}{3}, 1, 2, 10\right\}$ belong to each category listed below?

i) Natural Numbers
ii) Whole numbers
iii) Integer Number
iv) Rational Numbers
v) Irrational numbers

(05 marks)

(c) If $x = 3$ to be one of the roots of the quadratic equation $x^2 - 2Kx - 6 = 0$, then find the value of K.

(05 marks)

(d) The difference of squares of two consecutive even integers is 68. What are these numbers?

(05 marks)

(Total 20 marks)

Question No. 2

(a) Solve the following equation.

$x^2 - 8x + 5 = 0$

(05 marks)

(b) Solve the following inequality expression.

$4 - 2x > 8$

(05 marks)

(c) Factorize the following expression.

$3x^2 - 7x + 4$

(05 marks)

(d) Solve the following pair of simultaneous equations.

$3x + 2y = 7$

$5x - 3y = 37$

(05 marks)

(Total 20 marks)

Question No. 3

(a) Simplify the expression, $(p^2 - 2pq + q^2)^{\frac{1}{2}} \times \frac{1}{pq}$

(05 marks)

(b) Solve the equation for x, $(\sqrt[3]{2})^{2x+7} = (\sqrt[4]{2})^{7x+\frac{2}{3}}$

(05 marks)

(c) Find the value of x if $\log_{10}(x - 10) = 1$

(05 marks)

(d) Solve the following logarithmic equation.

$\log_2(6 - x) = 3 - \log_2 x$

(05 marks)

(Total 20 marks)

Question No. 04

(a) Let set A= $\{1, 2, 3, 4, 5, 6, 7, 8\}$ and set B = $\{3, 5, 7, 9, 11, 13\}$.

Find,

i) $A \cup B$

ii) $A \cap B$

iii) $(A \cap B)^c$

(05 marks)

(b) Let A, B, and C be three sets. Draw a Venn diagram and shade the area representing each of the following.

i) $(A \cap B) \cup (A \cap C)$

ii) $(A \cup B) \cap C^c$

(05 marks)

(c) What is the difference between combination and permutation? Explain by giving two examples.

(05 marks)

(d) In a group of 7 boys and 4 girls, five children are to be selected. In how many different ways can they be selected such that at least one boy and one girl should be there?

(05 marks)

(Total 20 marks)

Question No. 05

(a) A company making 1000 computers each month plans to increase its production. The number of computers produced is to be increased by 100 each month in such a way that the 1000 units in month 1 is increased by 100 to make the total units in month 2 to become 1100, and 1100 units in month 2 is increased by 100 to make the total units in month 3 to become 1200, and so on. until 3400 computers are produced in month N.

i) Find the value of N.

(05 marks)

ii) The company then plans to continue to make 2000 computers each month. Find the total number of computers that will be made in the first 40 months starting from and including month 1.

(05 marks)

(b) A company predicts a yearly profit of Rs. 5,800,000 in the year 2024. The company also predicts that the yearly profit will rise each year by 15% of the pervious year.

i) What is the predicted profit for the year 2028?

(05 marks)

ii) Find the total predicted profit for the period from 2024 to 2028.

(05 marks)

(Total 20 marks)

Question No. 06

(a) If the difference between Simple Interest and Compound Interest on a certain amount of money in 2 years at the 20% rate of interest per annum is Rs. 800, then find the principal amount.

(05 marks)

(b) How much will be the rate of simple interest charged per annum if a loan of Rs.4000 incurs an interest of Rs.1440 after three years.

(05 marks)

(c) Calculate the interest rate for an account that started with Rs.500,000 and now has Rs.1,000,000 and has been compounded annually for the past five years.

(05 marks)

(d) How long, to the nearest year, will it take for an investment of Rs.8000 to reach Rs.12400 if it is invested at 7% per annum compounded quarterly? (Answer to the closet years)

(05 marks)

(Total 20 marks)

Question No. 07

(a) A product's demand function is P = 1000 - 2q. It has a fixed cost of Rs.800 and a variable cost of $100q + 3q^2$, where q is the number of units produced, and P is the unit price. You are required to,

i) Find the Total Revenue function

ii) Find the Total Cost function.

iii) Find the profit function.

iv) Find the number of units at which profit is maximized.

v) Find the Maximum profit.

(02 marks for each)

(b) The cost function of a product is given by,

$$C(x) = x^3 - \frac{615x^2}{2} + 15750x + 18000$$

Where x is the number of units produced.

Determine the number of units that must be produced to minimize the total cost.

(05 marks)

(c) The marginal revenue function of a commodity is given as $MR = 12 - 3X^2 + 4x$. Find the total renue and the corresponding demand function.

(05 marks)

(Total 20 marks)

Question No. 08

(a) Find the sum of the following matrices A and B.

$$A = \begin{bmatrix} 1 & -5 & 4 \\ 2 & 5 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 8 & -3 & -4 \\ 4 & -2 & 9 \end{bmatrix}$$

(05 marks)

(b) Find the product of the following matrices A and B

$$A = \begin{bmatrix} 4 & -2 \\ 7 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 5 \\ 2 & -3 \end{bmatrix}$$

(05 marks)

(c) Solve the following system of linear equations, using matrix inversion method.

$2x + 4y = 2$

$-3x + y = 11$.

(10 marks)

(Total 20 marks)