University of Kelaniya - Sri Lanka

Centre for Open and Distance Learning

Bachelor of Business Management (General) Degree
First Examination (External) - 2007

BMGT E 1055 - Mathematics for Business

No. of Questions: Six (06) Time: 03 hours

Answer any five (05) questions.

(1) (a) In a survey of 100 families, the number that read recent issues of a certain monthly magazine were found to be;

The number of families that read only the April issue 18, number of families that read April issue but March 23, number of families that read both April and February 8, number of families that read April issue 26, February 48. Number of families that read both February and March issues 08, none of the families read three months 24. With the help of set theory find

I. How many families read March issue?

II. How many families read two consecutive issues?

III. How many families read the April and March issues but not the February issue?

(08 Marks)

(b) I. Factorize

1. $(a + 2b)^2 - 16x^2$
2. $(3x + 7y)^2 - (2x - 3y)^2$
3. $x^3p^2 - 8y^3p^2 - 4x^3q^2 + 32y^3q^2$

II. Simplify

$$\frac{x^2 + 7x + 12}{x^2 + 2x - 3} \times \frac{6x^2 - 6}{x^2 + 2x - 8}$$

III. Solve for x,

$$\text{Log}_x (8x - 3) - \log_x 4 = 2$$

IV. Given $\log 2 = .3010$, $\log 3 = .4771$, find the value of,

$$\text{Log} \frac{(16)^{1/5} (5)^2}{(108)^3}$$

(12 marks)

1. $x^2 - 5x + 6 = 0$

2. $2x^2 + 3x - 1 = 0$

3. $(x+1)(x+3)(x+4)(x+6) = 72$

II. If $X = 3^{\frac{2}{3}} + 3^{-\frac{2}{3}}$ show that

$$9X^3 - 27X = 82.$$

III. Obtain the simplest value of

$$\frac{(2^{2n} - 3.2^{2n-2})(3^n - 2.3^{n-2})}{3^{n-4}(4^{n+3} - 2^{2n})}$$

IV. Find the value of

$$\frac{(.3)^{\frac{1}{3}} (1/27)^{\frac{1}{4}} (9)^{1/6} (.81)^{\frac{2}{3}}}{(.9)^{\frac{2}{3}} (3)^{-\frac{1}{2}} (1/3)^{-2} (243)^{-\frac{1}{4}}}$$

(14 marks)

(b) I. Out of the letters A, B, C, p, q, r, how many arrangements can be made

1. beginning with a capital letter.
2. beginning and ending with a capital letter.

II. From 6 boys and 4 girls, 5 are to be selected to admission for a particular college. In how many ways can this be done if there must be exactly 2 girls?

(6 Marks)

(3) (a) I. How many terms of the following series may be taken so that their sum is 66?

-9,-6,-3,.....

II. The sum of n terms of two arithmetical progressions are in the ratio of $7n + 1 : 4n + 27$. Find the ratio of their 11^{th} terms.

(8 Marks)

(b) A man saved Rs. 165000 in 10 years. In each year after the first he saved Rs. 1000 more than he did in the preceding year. How much did he save in the first year?

(6Marks)

(c) I. Find the gradient of the line passing through the points A(-5,-6) and B (-2, 7).

II. $X^2 + Y^2 + 8X - 2Y + 13 = 0$ is the equation of a circle. Find the centre and radius.

(6 marks)

(4) (a) A food processing plant has a particular problem with the delivery and processing of perishable goods with a short life. All deliveries must be processed in a single day and, although there are number of processing machines available, they are very expensive to run. A researcher has developed the function $Y = 12x - 2a - ax^2$ to describe the profit (Y in Rs 10,000) given the number of machines used (x) and number of delivers (a) in a day.

1. Shows that the system is uneconomic 4 delivers are made in one day.

2. If 3 delivers are made in one day find the number of processing machines that should be used in order that the profit is maximized. What is the maximum profit?

(10 Marks)

(b) Supposing your firm has recently started to give business advice to your clients. Acting as a consultant of a client's firm you have knowledge about followings,
AR (Average Revenue) = 200-8x
MC (Marginal Cost) = $x^2 - 28x + 211$
Further investigation has shown that the firms cost when not producing output is Rs. 1000 .
You are required to ,

1. If total cost is the integral of marginal cost find the equation of total cost curve.
2. Find the equation of total revenue curve?
3. When the profit is at maximum, what is the maximum profit and number of items?
4. Find the equation of marginal revenue curve?

(10 Marks)

(5) A monopolist sells two products x and y and its the demand functions are given below;

$Px + Qx = 80$
$Py + 2Qy = 50$

The total cost is given as,

$TC = 14\ Q_x^2 + 4Q_y^2 + 8Q_y + 6Q_y + 4Q_x\ Q_y + 30$

1. Find how many units of each of these products to be sold to as to maximize his net profit?
2. Find the value of the profit and prices of each product?

(20 Marks)

(6) (a) What are the different type of Matrices? Explain.

(b) Find the solution for the following equation system by using knowledge of matrices.

$7X_1 - X_2 - X_3 = 0$
$10X_1 - 2X_2 + X_3 = 8$
$6X_1 + 3X_2 - 2X_3 = 7$

(20 marks)