



# University of Kelaniya – Sri Lanka

## External Examinations Branch

Faculty of Commerce and Management

Bachelor of Business Management (General) Degree First Examination – (External) 2009  
October 2010

BMGT E 1055 – Mathematics for Business

No of questions – 07

Time: 03 Hours

Answer any five (5) questions only

- (01) (a) Simplify the following expression  
 $(4a^{-2}b)^2 (3a^3b^{-4})^{-2}$  (03 marks)
- (b) Find the factors of the following expressions.  
(i)  $a^2 - 2ax + x^2 - 4b^2$   
(ii)  $9a^2 - c^2 - 4cx + 4x^2$  (04 marks)
- (c) (i) Add the group of expression together given below  
 $-5ab + 6bc - 7ac$ ;  $8ac + 3ac - 2ad$ ;  $-2ab + 4ac + 5ad$   
(ii) Deduct  $-7xy + 9z - 8x^2 + 8$  from  $3xy - 10x^2 + 5y + 13$  (04 marks)
- (d) Solve the following equation for b  
 $ab - 3a = 4b + 2$  (04 marks)
- (e) If  $\log_2 16 = x$ , find the value of x (03 marks)
- (f) Divide  $27a^3b^2c$  by  $36a^4b^3c^3$  (02 marks)
- (Total 20 marks)
- (02) (a) A company, which has five regular customers, stocks products r,s,t,u,v,w,x and y. Customer A buys products r,s,t and v only and this is represented in the set notation as  $A = \{r,s,t,v\}$ . Also when B,C,D and E represent the 4 customers it can be given that  $B = \{r,t,v,w,x\}$ ,  $C = \{r,t,x\}$ ,  $D = \{r,v,w\}$  and  $E = \{r,v,w,x\}$ . Specify the elements of each of the following sets, giving their meaning in words.  
(i) A universal set  $\Sigma$   
(ii)  $C \cup D$

- (iii)  $E \cap B$
- (iv)  $C'$
- (v)  $(A \cup B) \cap B'$
- (vi)  $A \cap B \cap C \cap D \cap E$
- (vii)  $(A \cup B \cup C \cup D \cup E)'$

(10 marks)

(b) In a survey of 75 consumers, 12 indicated that they would be buying a new car, 18 said they would buy a new refrigerator and 24 said they would buy a new television. Out of these, 6 would be buying a car and a refrigerator, 4 would be buying a car and a television and 10 would be buying a television and a refrigerator. One person indicated that he would buy all three items.

- 1) Show these information in a ven diagram
- 2) How many are buying
  - (i) Non of these items.
  - (ii) Only a television
  - (iii) Only a car
  - (iv) Only a refrigerator

(10 marks)

(Total 20 marks)

(03) (a) Determine the equation of the line that passes through the points (3,4) and (2,-2)

(04 marks)

(b) Find the equation of the line passing through the point (-2, 4) and is parallel to the line  $y - 2x = 3$

(04 marks)

c) Determine the equation of the circle whose radius is r and the centre is (-3, -4)

(04 marks)

d) The sum of the digits of a two digit positive number is 12. If the digits of the number are reversed, the number would be increased by 36. Find the number.

(04 marks)

e) Identify following numbers giving examples.

(i) Whole numbers

(ii) Real numbers

(04 marks)

(Total 20 marks)

(04) (a) Find the following limits

(i) 
$$\lim_{x \rightarrow \infty} \frac{3x^2 + 2x + 5}{5x^2 - 3x + 2}$$

(04 marks)

(ii) 
$$\lim_{x \rightarrow \infty} \frac{x - 3}{x^3 - 27}$$

(04 marks)

(b) Differentiate following functions with respect to  $x$ ;

(i)  $f(x) = -2x^2 + 6x^2 - 10x + 12$

(ii)  $y = 8x - 4 + 2/x$

(06 marks)

(c) Integrate following.

(i)  $\int \sqrt{a+bx} dx$

(ii)  $\int \sqrt{3x^2 - 4x} dx$

(06 marks)

(Total 20 marks)

(05) (a) Find the inverse of matrix A,

$$A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}_{2,2}$$

(04 marks)

(b) A manufacturer produces three Products X, Y and Z which he sells in two markets P & Q. Annual sales volumes are indicated as follows.

Market	Product		
	X	Y	Z
P	3000	4000	5000
Q	2000	6000	8000

Using your knowledge of matrices:

(i) Find the total revenue in each market, if sales prices of X, Y and Z are given as Rs. 1.50, Rs. 2.00 and Rs. 1.25 respectively.

(ii) Also find the gross profit given that the unit cost for X, Y & Z are to be Rs. 1.00, Rs. 1.25 and Rs. 0.75 respectively.

(08 marks)

(c) A company uses two types of inputs X & Y for producing two types of products P & Q. The input requirements for a unit of each type of product and total available inputs of all two types are summarized in the following table.

Input	Product		Total input available
	P	Q	
X	2	3	30
Y	1	2	16

(i) Represent the above table as a matrix.

(ii) Determine the number of units of each type which can be produced using matrices.

(08 marks)

(Total 20 marks)

(06) (a) Suppose that you have been given following information about a firm.

$$AR = 200 - 8q$$

$$MC = x - 25q.$$

Where AR = Average Revenue

MC = Marginal Cost

Further investigation has shown that the firm's cost when not producing output is Rs. 100.00.

You are required to;

- (i) Find the equation of the total cost, if total cost is the integral of marginal cost.
- (ii) Find the equation of total revenue, if total revenue is average revenue multiplied by output.
- (iii) Find the equation of marginal revenue.
- (iv) Calculate the maximum profit.

(14 marks)

(b) A committee of 7 has to be formed out of 9 men and 5 ladies. Find the number of ways in which the committee could be formed to.

- (i) include 4 men and 3 ladies.
- (ii) include at least one lady.

(06 marks)

(Total 20 marks)

(07) (a) Rs. 10,000/= was invested compounded at 12.5% compound rate of interest, and which amounted to Rs. 52015.80. How many years did it take?

(04 marks)

(b) A person borrowed Rs. 600,000/= from a bank at a compound rate of interest, 13%, semi-annually. If no installment repayments are made how much would be the total amount after 4 years?

(04 marks)

(c) Find the compounded interest rate necessary for Rs. 25000 to earn Rs. 80000 in 14 years.

(04 marks)

(d) Find the  $n^{\text{th}}$  term and the summation up to it of the series

$$a, a+d, a + 2d + a + 3d \dots\dots\dots$$

(04 marks)

(e) Find the  $11^{\text{th}}$  term and the sum of the first 20 terms of the geometric progression 4,8,16,32,64.....

(04 marks)

(Total 20 marks)