



University of Kelaniya – Sri Lanka

*External Examinations Branch*

**Faculty of Commerce & Management Studies**

**Bachelor of Business Management (General) Degree First Examination**

**(External) – 2010**

**January 2012**

**BMGT E 1055 – Mathematics for Business**

No of questions – 07

Time: 03 Hours

Answer five (5) questions only

- (01) (a) Simplify the following expression.  
 $(a^{1/3} - 1)(a^{2/3} + a^{1/3} + 1)$  (3 marks)
- (b) Find the factors for the following expressions.  
(i)  $6x^2 - 7x + 2$   
(ii)  $x^7 - 16x^3$   
(iii)  $4x^2 + 27x + 18$   
(iv)  $xy - 2x - 3y + 6$  (4 marks)
- (c) Solve the following equations for x.  
(i)  $2x^2 - 7x + 3 = 0$   
(ii)  $x(x - 3) = x^2 - 4$   
(iii)  $(x + 1)^2 - 9 = 0$  (3 marks)
- (d) Find the value.  
$$\frac{\log_a 27 + 2 \log_a 3}{\log_a 72 - \log_a 24}$$
 (3 marks)
- (e) Given  $P(x) = x^3 + 12x - 9$ ,  
Divide  $P(x)$ , by  $x - 2$ . (3 marks)
- (f) The denominator of a certain fraction is 1 more than the numerator, and the sum of the numerator and denominator is 5. Find the fraction.

(4 marks)

(Total 20 marks)

(02) (a) In a survey of 100 students of a certain school, the numbers studying various languages were found to be; English 28, German 30; French 42; English and French 10; English and Germany 8, German and French 5. All the three languages 3.

(i) How many students were not studying and language?

(3 marks)

(ii) How many students had French as their only language?

(3 marks)

(b) A firm produced 1000 sets of Television during its first month. The total sum of the firm's production at the end of first 10 month's operation is 14,500 sets.

(i) Estimate by how many units, production increased each month, if the increase each month is uniform.

(3 marks)

(ii) Based on the estimate of the monthly increment in production, forecast the level of output for the 15<sup>th</sup> month.

(3 marks)

(c) Spread of a bacteria doubles every 2 hours. If there are 500 bacteria at the beginning, how many bacteria, will there be after 24 hours?

(8 marks)

(Total 20 marks)

(03) (a) Find the length of the line joining the points (1, 2) and (3, 4)

(4 marks)

(b) A triangle is formed by joining the points A (-4, -8), B(-6, 2) and c(6, -10). E is the midpoint of BC and F is the midpoint of AC. Prove that  $EF = \frac{1}{2} AB$ .

(4 marks)

(c) Find the gradient of the straight line which goes through the point (1, 2) and (4, 3)

(4 marks)

(d) Find the equation of the straight line passing through the point (-2, 3) and having a gradient of  $-\frac{4}{3}$ .

(4 marks)

(e)  $x^2 + y^2 + 8x - 2y + 13 = 0$  is the equation of a circle. Find the centre and radius of the circle.

(4 marks)

(Total 20 marks)

- (04) (a) If  $f(x) = Y = 2x^2 - 3$
- (i) Find  $\frac{\Delta y}{\Delta x}$  (2 marks)
- (ii) Find  $\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x}$  (3 marks)
- (b) Differentiate following functions with respect to x;
- (i)  $y = (3x^2 + 1)(x^3 + 2x)$  (2 marks)
- (ii)  $y = \frac{2x - 3}{x + 3}$  (3 marks)
- (c) Integrate the following.
- (i)  $\int x(x + 1)^{1/2} dx$  (2 marks)
- (ii)  $\int 2x(x^2 + 1) dx$  (3 marks)
- (d) Evaluate the following integrals.
- (i)  $\int_1^5 (4 - x) dx$  (2 marks)
- (ii)  $\int_2^3 \frac{x}{(x-1)} dx$  (3 marks)
- (Total 20 marks)

- (05) (a) A person deposits Rs. 8500 in a bank at the beginning of each year. Find the total value that he would be received after 5 years period if the bank pays 12% interest per annum. (5 marks)
- (b) A person is considering of saving money in an account that offers interest at 15% per annum compounded monthly.
- (i) What is the effective annual rate of interest offered? (3 marks)
- (ii) If he invests Rs. 8000 in the account, what will it amount after 3 years.? (5 marks)
- (iii) The person wants to live on the interest in his account, How much will be needed to invest so that he will be able to withdraw Rs. 20000 per month from the account as interest? (7 marks)
- (Total 20 marks)

(06) (a) The demand function for ink pens is,

$$P = 100 - 4q$$

The cost in rupees, of producing  $q$  ink pens is,

$$C = 50 + 20q - 20q^2 + 4/3q^3$$

(i) Find the total revenue function. (3 marks)

(ii) Find the profit function. (3 marks)

(iii) How many ink pens should be made to maximize profit. (4 marks)

(b) A monopoly market has fixed cost of Rs. 20 and marginal cost function  $3q^2 + 4$  for a certain product. The demand equation for product is  $p + q = 20$

(i) Determine the profit function in terms of  $q$ . (3 marks)

(ii) Determine the production level that maximizes the profit. (3 marks)

(iii) Sketch a graph of the derivative of the profit function for  $q \geq 0$ . (4 marks)

(Total 20 marks)

(07) The supply function for a commodity takes the form,

$$Q = aP^2 + bP + C$$

where  $a, b, c$  are constants and  $P$  denotes price.

When  $P = 1$ , the quantity supplied is 10; when  $p = 2$ , the quantity supplied is 24; when  $p = 3$ , the quantity supplied is 46.

(i) Find the system of linear equations for  $a, b$ , and  $c$  (6 marks)

(ii) Use a matrix method to solve these equations. (10 marks)

(iii) Determine the quantity supplied, when the price is Rs. 4. (4 marks)

(Total 20 marks)