University of Kelaniya - Sri Lanka

Centre for Open and Distance Learning

Faculty of Commerce and Management Studies

Bachelor of Commerce (Special) Degree Examination (External) – 2008

Year I

BCOM E 1045 – Mathematics for Business

No. of questions: Six (06) **Time: 03 hours**

Answer any five (05) questions.

01. i. Define rational and irrational numbers. Giving three examples for each.

(04 marks)

ii. Find factors.

(a) $x^3 + 2x^2 - x - 2$

(b) $x^4 - 1$

(c) $x^4 + x^3 - 3x^2 - 4x - 4$

(d) $x^3 - y^3$

(08 marks)

iii. If $(x - 2)$ is a factor of $a x^2 - 12 x + 4$, find a.

(02 marks)

iv. Expand and simplify the following binomial expressions.

(a) $(x - \frac{1}{x})^4$

(b) $(a - b)^3 (a + b)^3$

(c) $(x^2 - y)^5$

(06 marks)
(Total 20 marks)

02. i. Evaluate $\frac{10!}{7!}$

(02 marks)

ii. Write $\frac{9 \times 8 \times 7}{4 \times 3 \times 2}$ in factorial notation.

(02 marks)

iii. Factorise $8! - 4(7!)$

(02 marks)

iv. Explain the each of the following terms giving two examples for each.

(a) Permutations

(b) Combinations

(06 marks)

v. Simplify $\dfrac{\log_a 27 + 2\log_a 3}{\log_a 72 - \log_a 24}$

(02 marks)

vi. Describe the following terms using suitable examples.

(a) Complement of sets

(b) Intesection of sets

(06 marks)
(Total 20 marks)

03. i. Write the following series in the sigma notation.

(a) $1 - x + x^2 - x^3 + \ldots\ldots$

(b) $2 - 4 + 8 - 16 + \ldots + 128$

(04 marks)

ii. The 8^{th} term of an Arithmetic Progression is 11 and the 15^{th} term is 21. Find

(a) The common difference
(b) The first term of the series
(c) The n^{th} term

(06 marks)

iii. Write down the 15^{th} term and the n^{th} term of the following Geometric Progressions.

(a) $2 , 1 , \frac{1}{2} \ldots\ldots$

(b) $3 , -6 , 12 , \ldots.$

(04 marks)

iv. Evaluate $\sum_{r=1}^{10}(1.05)^r$

(02 marks)

v. The 5^{th} term of a Geometric Progression is 8, the 3^{rd} term is 4, and the sum of the first ten terms is positive. Find,

(a) the first term

(b) the common ratio

(c) the sum of the first ten terms

(04 marks)
(Total 20 marks)

04. i. Given $A = \begin{bmatrix} 4 & -1 \\ 6 & 9 \end{bmatrix}_{(2X2)}$, $B = \begin{bmatrix} 0 & 3 \\ 3 & -2 \end{bmatrix}_{(2X2)}$ and $C = \begin{bmatrix} 8 & 3 \\ 6 & 1 \end{bmatrix}_{(2X2)}$, find

(a) $A + B$

(b) $C - A$

(c) $3A$

(d) $4B + 2C$

(08 marks)

ii. What are the "properties" of transpose of matrices?

(03 marks)

iii. Find the determinant of the following matrix.

$$A = \begin{bmatrix} 4 & 3 & -1 \\ 5 & 0 & 1 \\ 1 & 3 & 4 \end{bmatrix}_{(3X3)}$$

(03 marks)

iv. Find the inverse of the following matrix.

$$A = \begin{bmatrix} 4 & -2 & 1 \\ 7 & 3 & 3 \\ 2 & 0 & 1 \end{bmatrix}_{(3X3)}$$

(06 marks)
(Total 20 marks)

05. i. What is the slope of the function $y = 4x^2$ when x is 8?

(02 marks)

ii. Derive an expression for the slope of the function $y = 30x - 0.5x^2$ for any value of x.

(03 marks)

iii. Given that Total Revenue Function $TR = 80q - 2q^2$, derive the MR function.

(03 marks)

iv. Differentiate the following statements with respect to x.

(a) $x^2(x-1)^{\frac{1}{2}}$

(b) $\frac{(x-1)}{(x+1)}$

(c) $x \ln x$

(d) $(x+1)^6$

(12 marks)
(Total 20 marks)

06. i. Integrate the following functions with respect to x,

(a) $2x^2 - \frac{1}{x^2} + x$

(b) $\sqrt{x} + \frac{1}{\sqrt[3]{x}}$

(c) $3x^{-\frac{1}{2}} - x^{-3/2}$

(d) $5x^4 - 3x^2 + 7$

(e) $\frac{4}{x^3} - \frac{1}{x^2} + x$

(10 marks)

ii. If a firm faces the Marginal Cost, $MC = 180 + 0.3\ q^{2}$ and the Marginal Revenue, $MR = 540 - 0.6\ q^{1.5}$, what is the maximum profit it can make. (Total fixed cost is 65).

(05 marks)

iii. Evaluate the following definite integrals.

(a) $\int_5^6 (6\,x^{6.5} - 3\,x^{-2} + 85\,x^4)\ \mathrm{d}\,x$

(b) $\int_1^{-3} (20 + 4\,x)\ \mathrm{d}\,x$

(05 marks)
(Total 20 marks)