UNIVERSITY OF KELANIYA – SRI LANKA

Centre for Distance and Continuing Education

FACULTY OF COMMERCE & MANAGEMENT STUDIES

Bachelor of Commerce (Special) Degree First Year Examination (External) – 2021

October 2023

BCOM E1045 - Mathematics for Business

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

Answer any five (05) questions.

Question No. 01.

a). Explain how data driven economic practices have increased the importance of Business mathematics.

(04 Marks)

b). Solve following problems

i. $\dfrac{12ab}{8ab} - \dfrac{4a^2}{4ab} + \dfrac{12ab^2}{3ab}$

ii. $\dfrac{6x^{-6}y^6z^9}{2x^5y^2z^7}$

iii. $\dfrac{(d^9)}{(d^6)} \left[\dfrac{(d^4)^{-6}}{(d^2)^{-7}}\right] \left[\dfrac{d^2}{d^3}\right]^{-9}$

(06 Marks)

c). Suppose you are managing a small business that sells two types of products: Product X and Product Y. You want to represent the total revenue and total cost for a month using algebraic expressions. Product X is sold for Rs 200 each, and you sell 'a' units of Product X. Product Y is sold for Rs 300 each, and you sell 'b' units of Product Y. Your fixed costs for the month are Rs 50,000. Write an algebraic expression for the total revenue generated from selling 'a' units of Product X and 'b' units of Product Y. Write an algebraic expression for the total cost, including fixed costs and variable costs for 'a' units of Product X and 'b'

units of Product Y. If your goal is to break even (total revenue equals total cost), write an equation that represents this situation in terms of 'a' and 'b'.

(04 Marks)

d). Factorize following expressions.

i. $\dfrac{a^2-16}{a^2-25} \div \dfrac{a^2-2a-8}{a^2-10a+25}$

ii. $x^2 - 3x - 154$

iii. $2x^2 + 22x + 60$

(06 Marks)

(Total 20 Marks)

Question No. 02

a). Solve following simultaneous equations.

i. $x - 3y + 4k = 4$
$4x + 2y + k = 38$
$2x + 3y - 5k = 16$

ii. $2a + 3b - c = 17$
$4a + 8b - 2c = 46$
$a - 2b + 5c = 37$

(06 Marks)

b). Find the values of following quadratic equations using formula.

i. $2x^2 + 21 = 23x$
ii. $x^2 - 5x + 6 = 0$
iii. $4x^2 + 2x - 12 = 0$

(06 Marks)

c). Three internet service providers, Xfinity, Spectrum, and Linkwave are offering different plans. Xfinity offers a plan for $49.99 per month, which includes a maximum of 500GB of data usage plus $10 for every additional 100GB used. Spectrum offers a plan for $64.99 per month, which includes a maximum of 800GB of data usage, but charges $5.55 for every additional 100GB used. Linkwave offers a plan for $54.99 per month, which includes a maximum of 650GB of data usage, but charges $2 for every additional 50GB used. Analyze above data plans and list down up to which gigabytes level each service provider would be the better choice?

(08 Marks)

(Total 20 Marks)

Question No. 03

a). If the first 3 terms in an arithmetic progression are 9,14,19 then what is the 17th term?

(03 Marks)

b). In an arithmetic progression, the sum of the first 8 terms is 216, and the sum of the next 5 terms is 155. Find the common difference and the first term of the arithmetic progression.

(05 Marks)

c). A Sunil arranges to pay a debt of Rs.660,000 in 40 monthly instalments which are in a arithmetic progression. When 30 instalments are paid he dies leaving one third of the debt unpaid. Find the value of the first instalment.

(05 Marks)

d). Assume that you are investing in a financial instrument with a geometric progression of returns. In the first year, you invest $5,000, and it yields a return of 10%. In the second year, you invest the resulting amount, and it yields a return of 15%. If this pattern continues for 10 years, calculate the total amount of your investment after 10 years, considering the compounded returns.

(07 Marks)

(Total 20 Marks)

3

Question No. 04

a). If n(A - B) = 18, n(A ∪ B) = 70 and n(A ∩ B) = 25, then find n(B).

(04 Marks)

b). In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many like both coffee and tea?

(04 Marks)

c). In a group of 100 persons, 72 people can speak English and 43 can speak French. How many can speak English only? How many can speak French only and how many can speak both English and French?

(04 Marks)

d). What is a binomial?

(02 Marks)

e). Expand and simplify the following expressions by using Binomial Theorem.

i. $(x/2 - 2y)^4$

(03 Marks)

ii. $(a+2b)^5$

(03 Marks)

(Total 20 Marks)

Question No. 05

a). Distinguish the different between permutations and Combinations.

(04 Marks)

b). How many 5-digit telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once?

(05 Marks)

c). How many distinct permutations can be made from the word " UNIVERSITY".

(03 Marks)

d). In a small village, there are 87 families, of which 52 families have at most 2 children. In a rural development programme, 20 families are to be chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made?

(05 Marks)

e). A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done?

(03 Marks)

(Total 20 Marks)

Question No. 06

a). Express the following system of linear equations in matrix form

$3 x_1 + 2 x_2 + 4 x_3 = 21$

$4 x_1 + x_2 + 2_3 = 16$

$2/5 x_1 + 2 x_2 - x_3 = 35$

(04 Marks)

b). Explain the following matrices with examples.

   i.   Suqare Matrix

   ii.   Null Matrix

   iii.   Unit Metrix

(03 Marks)

c). Find the transpose and the determinant of the following matrices.

$$A = \begin{bmatrix} 1 & 4 \\ -1 & 3 \end{bmatrix}_{(2 \times 2)} \quad B = \begin{bmatrix} 1 & 0 & 9 \\ 6 & 1 & 3 \\ 4 & 0 & 2 \end{bmatrix}_{(3 \times 3)}$$

(06 Marks)

d). If the following matrices have given you , find the followings.

$$A = \begin{bmatrix} 8 & 2 & 6 \\ 4 & 0 & 2 \\ 6 & 0 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 0 & 4 \\ 6 & 1 & 3 \\ 7 & 2 & 2 \end{bmatrix} \quad C = \begin{bmatrix} 0 & 1 & 3 \\ 2 & -1 & 7 \\ 0 & 1 & 0 \end{bmatrix}$$

(3x3) (3x3) (3x3)

i. $A + B$

ii. $A - C$

iii. AC

iv. $4A$

(07 Marks)

(Total 20 Marks)