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) – 2022

April 2024

BCOM E1045 – Mathematics for Business

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

Answer any five (05) questions.

Question No. 01

a). Define what is the Business Mathematics by highlighting the practical use of it.

(04 Marks)

b). Solve following problems.

i. $\frac{9xy}{6xy} - \frac{5x^2}{10xy} + \frac{7xy^2}{14xy}$

ii. $\frac{10x^{-3}y^4Z^5}{5x^{-2}y^3z^2}$

iii. $3(2x+5)-2(3x-4)=10$

(06 Marks)

c). Imagine you run a small manufacturing company that produces two types of products: Product A and Product B. Each unit of Product A requires 3 hours of labor and 2 units of raw material, while each unit of Product B requires 2 hours of labor and 4 units of raw material. You have a maximum of 240 hours of labor and 160 units of raw material available per week. Find what is the level of equally produced Product A and Product B.

(04 Marks)

b) Factorize following expressions.

i. $\frac{a^2-9}{a^2-16} \div \frac{a^2-a-6}{a^2-7a+12}$

ii. $\frac{2a^3-8a}{4a^2+16a} \div \frac{a^2+2a-15}{2a^2+8a+6}$

(06 Marks)
(Total 20 Marks)

Question No. 02

a). Solve the following simultaneous equations.

i). $2x - y + 3z = 7$

$4x + 3y + 2z = 19$

$x + 2y - z = 4$

ii). $3x - y + 2z = 12$

$2y + 5z = 8$

$x - 3y + z = 4$

(06 Marks)

b). A retail company is considering opening a new shop in one of three potential locations: Colombo, Gampaha and Kandy. The company has estimated the initial setup costs, monthly rent, and expected monthly revenue for each location as follows:

- Colombo: Initial setup cost of Rs: 5,000,000, monthly rent of Rs: 300,000, expected monthly revenue of Rs: 500,000.
- Gampaha: Initial setup cost of Rs: 7,000,000, monthly rent of Rs: 250,000, expected monthly revenue of Rs 300,000.
- Kandy: Initial setup cost of Rs: 4,000,000, monthly rent of Rs: 400,000, expected monthly revenue of Rs: 580,000.

As a analyst the company wants your help to determine which location would be the most cost-effective and profitable choice for opening the new shop. Give your suggestions with the reasons.

(06 Marks)

c). Three car rental companies, as A-Drive, B-Motion, and C-Wheels, offer different rental plans. A-Drive charges Rs 12,000 per day, including 150 kilometers of mileage, and Rs 8 for every additional kilometer driven. B-Motion charges Rs 15,000 per day, including 200 kilometers of mileage, and Rs 10 for every additional kilometer driven. C-Wheels charges Rs 13,500 per day, including 180 kilometers of mileage, and Rs 6 for every additional kilometer driven.

Analyze the car rental plans and determine up to which kilometer level each rental company would be the better choice?

(08 Marks)

(Total 20 Marks)

Question No. 03

Solve the following problems by using the knowledge of series.

a). If the first 3 terms in an arithmetic progression are 3,7,11 then what is the 37th term?

(03 Marks)

b). In an arithmetic progression, the sum of the first 10 terms is 350, and the sum of the next 6 terms is 192. Find the common difference and the first term of the arithmetic progression.

(05 Marks)

c). David leases a car with a total cost of Rs 2,800,000. He decides to pay in 36 monthly installments, forming an arithmetic progression. After paying 24 installments, he switches to a new payment plan. If at this point, he has paid 60% of the total cost, find the value of the first installment in the new payment plan..

(05 Marks)

d). An investment fund promises to double your money every 5 years as a geometric series method. If you invest 100,000 in this fund, how much money will you have after 20 years assuming the fund continues to perform as promised?.

(07 Marks)

(Total 20 Marks)

Question No. 04

a). The head of the "Lolu Marketing Business" wants to set up a call center for the small trading companies under him. For that he has chosen only the numbers 1,2,3,4,5. He hopes to utilize the numbers that could be formed by taking all the numbers so that the same value would not be applied to those numbers again. Accordingly find the number of telephone numbers that can be formed to include five different numbers.

(04 Marks)

b). Ten students have been selected for a training workshop on entrepreneurship. Among them, there are two students with low ability in English. How many ways can ten children be seated in a row, so that these two students are always separated.

(05 Marks)

c). What is the arrangement by which two may be selected for guard duty at the main gate when five watchmen have reported for duty in a certain corporation?

(04 Marks)

d). Find the district permutations of the following words.

i). COMMERCE

ii). STATISTICS

(04 Marks)

e). Representatives of eight countries are participating in an international conference on environment protection. How many ways can these eight people can be seated at a round table.

(03 Marks)

(Total 20 Marks)

Question No. 05

a). A Market research group conducted a survey of 1000 consumers and repored that 720 consumers liked product A and 450 consumers liked protect B. What is the least number that must liked both products?

(05 Marks)

b). If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{1, 4, 7, 10\}$ $B = \{2, 5, 8\}$

Find,

i). $A^{/}$

ii). $B^{/}$

iii). $A \cap B'$

iv). $A' \cap B$

v). $A' \cap B'$

(05 Marks)

c). Simplify the followings.

i). $\frac{9!}{3!}$

ii). $\frac{8!}{4!\,2!}$

(04 Marks)

d). Simplify the following binomial expressions by using binomial theovem.

i). $\left(x - \frac{1}{2}y\right)^4$

ii). $(2a - b)^6$

(06 Marks)

(Total 20 Marks)

Question No. 06

a). A café sells fresh milk, Fruit juice and chocolate milkshake as follows. (in 000' units).

Drink	**First Week**	**Second Week**	**Third Week**
Fresh milk	6	4	4
Fruits juice	3	3	0
Chocolate Milk shake	7	3	0

i). Illustrate the above information in matrix form. Find the transpose of it.

(02 Marks)

ii). Calculate the determinant of the transpose matrix.

(04 Marks)

b). If, $A = \begin{pmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \end{pmatrix}_{(2X2)}$ $B = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \end{pmatrix}_{(2X3)}$ $C = \begin{pmatrix} 2 & 3 & 4 \\ 4 & 5 & 56 \end{pmatrix}_{(2X3)}$

Compute the following.

i). (A - B) + C (03 Marks)
ii). 2A + 2B (03 Marks)
iii). A+ 2B + 3C (03 Marks)

c). Explain the following matrices by giving suitable examples.

i). Identity Matrix
ii). Square Matrix (05 Marks)

(Total 20 Marks)