



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) – 2019

April 2023

BCOM E1045 – Business Mathematics

No. of questions: Six (06)

Time: 03 hours

Answer only five (05) questions.

Question No. 01

a) Simplify the following algebraic expression;

i. $(6a + 7c) - \{(3a + 3c^2) + 9(a + c)\}$

ii. $-(8c + 19p)(11p) + (4c + p^2 + 65) + 2x$

iii. $\frac{8ab}{4ab} - \frac{4a^2}{4ab} + \frac{12ab^2}{3ab}$

(06 Marks)

b) Area of a rectangle is 21m^2 . If the perimeter of the rectangle is 20 m, find the length and width of the rectangle. (Length is greater than the width)

Area = length X width

Perimeter = 2 (length + width)

(03 Marks)

c) Assume in 2022, Sri Lankan progressive income tax rates will be 10.8% on the first Rs. 65,000, 14.75% on the next Rs. 60,000, and 18.4% on any additional income. By considering the above details if the gross, taxable earnings for the year will be Rs. 265,000, what percentage of your earnings will you be pay in taxes?

(04 Marks)

d) Simplify the following exponential fractional expression;

i. $(3x^2y^{-5})(-6x^{-5}y^3)\left(\frac{1}{12}x^{-1}y^6\right)$

$$\text{ii. } \left[\frac{(d^6)^{-9}}{(d^6)^{10}} \right] \div \left[\frac{(d^9)}{(d^{12})} \right]^{-8}$$

(03 Marks)

e) Simplify the following using factorization knowledge.

$$\text{i. } 3a^2 - 39a + 120$$

$$\text{ii. } \frac{x^2 - 4}{x^2 - 7x + 10} \div \frac{x^2 - x - 6}{x^2 - 3x - 10}$$

(04 Marks)

(Total 20 Marks)

Question No. 02

a). Solve following equations.

$$\text{i). } \frac{2x+6}{3} = \frac{x-4}{6} + \frac{1}{2}$$

$$\text{ii). } (x+3)^2 + (2x-1)^2 = 5x(x+1)$$

(04 Marks)

f) Jamis owns Rs. 250,000 shares in a corporation, which represents 2% of all issued shares for the company. If he sold $\frac{2}{5}$ of his shares to another investor for Rs. 88,800. What is the total value for all of the shares issued by the company?

(04 Marks)

g) Two cellphone companies are offering different rate plans. Exatel is offering Rs. 1200 per month, which includes a maximum of 800 minutes plus Rs. 3 for every minute above the maximum. Glog is offering Rs. 2000 for a maximum 1500 minutes, but it charges Rs 0.50 for every minute above the maximum. Up to how many minutes would Exatel be the better choice?

(04 Marks)

h) Solve the following simultaneous equations.

$$\text{i. } 3a + 2b - 2c = -5$$

$$8a + 3b + 3c = 17$$

$$2c - 3b + c = -1$$

ii. $12g - 2h + 5k = 71$

$5g + 3h + 2k = 48$

$6g - 4h + 6k = 52$

(08 Marks)

(Total 20 Marks)

Question No. 03

a). Briefly explain the mathematics of finance and importance of it to financial sector.

(04 Marks)

b). Suppose you wish to retire forty years from today. You determine that you need Rs. 40,000 per month up to 15th birthday after retirement, but you wish to collect that total money on same date of retirement. Consider the annual interest as 12% and calculate how much you need to deposit today if compounded monthly to recover that money on the date of retirement.

(04 Marks)

c). An administrative clerk working with a company commenced on an annual salary of Rs. 218,000 and has received a 10% increase each year.

i). How much did he earn in his fifteenth year of employment?

ii). If a company offer promotion after his fifteen years' service with increasing salary increasing rate up to 11.25%, how much has he earned from the company altogether in 20 years?

(04 Marks)

- d). By considering the following table and calculate maturity value of each investment using given information.

Investment code	Principal	Interest Rate (Annual)	Term
A005	Rs: 8000	8% compounded quarterly	4 years
A006	Maturity value of "A005" Investment	16% compounded monthly	5 years and 5 months
A007	Maturity value of "A006" Investment	25.2% compounded semi-annually	8 years and 6 months

(08 Marks)
(Total 20 Marks)

Question No. 04

- a) Find the number of permutations of the word "PROPORTION".
(02 Marks)
- b) In how many ways 08 passengers can sit in a bus having vacant 20 seats?
(04 Marks)
- c) Explain the set operations below by giving one example each.
- Union of sets
 - Intersection of sets
 - Complement of sets
- (06 Marks)
- d) Expand and simplify using Pascal's Triangle or Binomial Theorem.
- $(2x - 3y)^3$
 - $(3x - y/2)^4$

(08 Marks)
(Total 20 Marks)

Question No. 05

- a) Explain any three (03) basic differential rules with one example each. (09 Marks)
- b) If the demand function $P = 80 - q^{0.5}$ derive the corresponding MR function. (03 Marks)
- c) A monopoly firm faces the demand schedule $P = 460 - 2q$ and the cost schedule $TC = 20 + 0.5 q^2$. How much will be the maximum profit of this monopoly firm? (08 Marks)
- (Total 20 Marks)**

Question No. 06

- a) What is meant by transposes of matrices. Verify your answer using two examples. (04 Marks)
- b) What are the properties of transposes of matrices. (03 Marks)
- c) If

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 0 & -1 \\ 6 & 7 \end{pmatrix}, \text{ verify}$$

$$\text{that } (AB)^t = B^t A^t$$

(03 Marks)

- d) A manufacturing company produces three types of television sets as A, B, C. The sales of the three television sets in one city are 400, 300 and 200 respectively. The other city are 300, 200 and 100 respectively.

I. Present the above details in a matrix form.

(03 Marks)

II. If the cost of each set A, B, C is Rs. 1000, Rs. 2000, Rs. 3000 respectively and selling price is Rs. 1500, Rs. 3000, Rs. 4000 respectively. Find the total profit using matrix knowledge.

(07 Marks)

(Total 20 Marks)