GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS
MAY - AUGUST 2023 SEMESTER

BACHELOR OF COMMERCE

COURSE CODE: BCBA 103

COURSE TITLE: BUSINESS MATHEMATICS

DATE: 2 AUGUST 2023   **TIME: 3:00 PM – 6:00 PM**

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY.**
2. SECTION B: ANSWER ANY OTHER **THREE** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: All exam rooms are under CCTV surveillance during the examination period.

SECTION A: COMPULSORY

Question One

a) Define the following terms:

  i.   Disjoint sets   **[1 Mark]**

  ii.   Complement of a set   **[1 Mark]**

  iii.   Universal set   **[1 Mark]**

  iv.   Union of sets   **[1 Mark]**

  v.   Intersection of sets   **[1 Mark]**

b) In a class of 100 students, 20 take Guitar lessons and 40 take singing classes, and 8 take both. Find the number of students who:

  i) don't take either Guitar or singing lessons.   **[4 Marks]**

  ii) only take one lesson   **[3 Marks]**

       Differentiate the following functions with respect to x

  i. $(x + 1)(2x^3 - 21)$ **[4 Marks]**

  ii. $3x^5 - 5x^3 + 110$ **[3 Marks]**

c) Obtain the following integrals

  i. $2x^4 dx$ **[3 Marks]**

  ii. $(2x^{-3} + x^2)\,dx$ **[3 Marks]**

d) Mr Kamau decides to deposit KSH 20,000 at the end of each year in a bank which pays 10% p.a. compound interest. If the instalments are allowed to accumulate, what will be the total accumulation at the end of 9 years?   **[5 Marks]**

e) The sum of two numbers is 12. Find the maximum value of their product.   **[5 Marks]**

f) A wire of length 16cm is to form a rectangle. Find the dimensions of a rectangle so that it has maximum area.   **[5 Marks]**

SECTION B: ANSWER ANY THREE QUESTIONS

Question Two

a) Given that U={1,2,3,4,5,6,7,8}, A={1,2,6,7}, B={2,3,4,7} and C={4,5,6,7}.Find

   i.   A∩B   **[2Marks]**

   ii.   A∪B∪C^C **[2 Marks]**

b) A survey of 100 exercise conscious persons resulted in the following information:

      50 jog, 30 swim and 35 cycle

      14 jog and swim

      7 swim and cycle

      9 jog and cycle

      3 people take part in all three activities

Using a Venn Diagram to answer the following questions.

   i.   How many jog but do not swim or cycle?   **[3 Marks]**

   ii.   How many take part in only one of the activities?   **[3 Marks]**

   iii.   How many do not take part in any activities?   **[4 Marks]**

c) A survey of 100 in Cleveland shows that 60 people have visited Las Vegas, 15 have visited Miami and 6 have visited both.
Using a Venn Diagram to answer the following questions.
How many people only visited one place?   **[3 Marks]**

How many people have visited neither place?   **[3 Marks]**

Question three

a) In a certain period of time KSH 1,200 becomes KSH 1,560 at 10% p.a. simple interest. Find the principal that will become KSH 2232 at 8% p.a. in the same time.   **[4Marks]**

b) A sum of money invested at Compound Interest payable yearly amounts to KSH 10, 816 at the end of the second year and to KSH 11,248.64 at the end of the third year. Find the rate of interest and the sum.   **[4 Marks]**

c) What is the present value of KSH 1,000 due in 2 years at 5% compound interest, according as the interest is paid:

   i. (yearly? **[4 Marks]**

   ii. half-yearly? **[4Marks]**

d) The difference between simple and compound interest on a sum put out for 5 years at 3% was KSH 46.80. Find the sum. **[4 Marks]**

Question Four

 a) A farming equipment is purchased on instalment basis, such that KSH 10,000 is to be paid on the signing of the contract and five yearly instalments of KSH 5,000 each payable at the end of 1st, 2nd, 3rd, 4th and 5th years. If interest is charged at 10% per annum what would be the cash down price? **[5 Marks]**

 b) James purchased a house valued at KSH 300,000. He paid KSH 200,000 at the time of purchase and agreed to pay the balance with interest of 12% per annum compounded half yearly in 20 equal half yearly instalments. If the first instalment is paid after six months from the date of purchase, find the amount of each instalment. **[4 Marks]**

 c) Mr Oluoch retires at the age 60 years. He will get the pension of KSH 42,000 a year paid in half-yearly instalment of rest of his life. Reckoning his expectation of life to be 15 years and that interest is at 10% p.a. payable half yearly. What single sum is equivalent to his pension? **[4 Marks]**

 d) Calitechs can sell x items per month at a price $p = 300 – 2x$ Shillings. Produced items cost the manufacturer y Shillings, $y = 2x + 1000$. How much profit will yield maximum profits? **[7 Marks]**

Question five

 a) What is Break Even Point (BEP) in cost revenue analysis? **[2 Marks]**

 b) For a certain establishment, the total revenue function R and the total cost function C are given by $R = 83x – 4x^2 – 21$ and $c = x^3 – 12x^2 + 48x + 11$ where x = output. Obtain the output for which profit is maximum **[10 Marks]**

 c) If the total cost function is $c = 3q^3 – 4q^2 + 2q$, find at what level of output, average cost be minimum and what level will it be? **[8 Marks]**