



PAN AFRICA CHRISTIAN UNIVERSITY

**BACHELOR OF COMMERCE/ BACHELOR OF BUSINESS
LEADERSHIP/ BACHELOR OF INFORMATION TECHNOLOGY**

END TERM EXAMINATION-ROYSAMBU DAY

DEPARTMENT: BUSINESS

COURSE CODE: BCM 102/ BUS 2123/ BIT 102

COURSE TITLE: BUSINESS MATHEMATICS

Time: 3 HOURS

Instructions

- Read all questions carefully before attempting.*
- Answer FIVE questions out of the SIX Provided*
- Question ONE is Compulsory*

Write your student number on the answer sheet provided

QUESTION ONE: COMPULSORY (40 Marks)

- a. When 55 is added to a certain number and the sum is divided by 3, the result is 4 times the original number. Calculate the original number. **(3 marks)**
- b. Of the 112 students from college of Education, 19 read both Accountancy and Sociology, 70 read Accountancy or Sociology but not French, 27 read Sociology but not Accountancy or French, 53 read Sociology or French but not Accountancy, 19 read French but not Accountancy or Sociology and 8 read Accountancy and French but not Sociology. Each student reads at least one of these courses.

Calculate the number of students that read:

- (i) All three courses **(3 marks)**
- (ii) Only one course **(3 marks)**
- (iii) Only two courses **(3 marks)**

c. Solve for x in the following:

i. $2(3x + 2) - 20 > 8(x - 3)$ **(2 marks)**

ii. $2(3x - 7) + 4(3x + 2) = 6(5x + 9) + 3$ **(3 marks)**

iii. $\left(\frac{1}{9}\right)^{2x} = 3^{7x-1}$ **(3 marks)**

iv. $\log_2(3x+5) = 4$ **(2 marks)**

d. Solve the following simultaneous equations **(6 marks)**

$$\frac{x+y}{3} - \frac{x-y}{4} = \frac{2}{3} \dots\dots\dots (1)$$

$$\frac{2x-3}{3} - \frac{2y+3}{4} = \frac{19}{12} \dots\dots\dots (2)$$

e. Solve the following quadratic equation using completing the square method. **(6 marks)**

$$3x^2 = 2x - 7$$

f. How many terms has the Arithmetic Progression 8, 11, 14, 17, ..., 380 **(6 marks)**

QUESTION TWO (15 Marks)

- a. Adam is 20 years younger than Brian. In two years, Brian will be twice as old as Adam. Calculate how old they both are now. **(7 marks)**
- b. On a 130-kilometre trip a car travelled at an average speed of 55 kph and then reduced its speed to 40 kph for the remainder of the trip. The trip took 2.5 hours.

Required

Calculate how long the car travelled 40 kph. **(8 marks)**

QUESTION THREE (15 Marks)

- a. Solve for the value of x in the below equations.
- i. $\log_6 x^2 - 2x + 3x - 6x = \log_6 6$ **(3 marks)**
- ii. $6^{3x} = 2^{2x-3}$ **(3 marks)**
- iii. $\frac{3x+5}{6x+5} = x-1$ **(3 marks)**
- b. The first term of an arithmetic sequence is $-\frac{1}{2}$ and $T_{22} = 10$. Find T_n **(8 marks)**

QUESTION FOUR (15 Marks)

- a. Solve the inequality $3x - 2 < 10 + x < 2 + 5x$ **(3 marks)**
- b. Solve the following simultaneous inequalities and represent each solution on a number line.
- i. $4x - 33 < -1, -2 < 3x + 1$ **(2 marks)**
- ii. $2x - 5 < 22 \leq 5x - 6$ **(2 marks)**
- c. Solve for x
- $\text{Log}_4 16 \times \text{Log}_3 81 = x$ **(5 marks)**

QUESTION FIVE (15 Marks)

- a. Solve the following simultaneous equations:
- i. $3x - 2y = 8$

$$x + 5y = -3 \quad (2 \text{ marks})$$

ii. $2x + 3y = 27$
 $3x - 2y = 13 \quad (2 \text{ marks})$

iii. $3x - 5y = 23$
 $x - 4y = 3 \quad (2 \text{ marks})$

- b. Mr. Johnson is an employee of an engineering firm. His initial annual salary is KES 20,000. His salary increased by KES 1,500 annually.

Required

- i. Construct the trend of his annual salary for the next six years. **(3 marks)**
ii. Calculate his annual salary in ten years' time. **(3 marks)**
iii. Calculate in how many years' time his salary will be KES 50,000. **(3 marks)**

QUESTION SIX (15 Marks)

- a. Insert 6 arithmetic terms between -3 and 18. **(3 marks)**
b. An arithmetic sequence has the first term as 3 and the common difference of 2. Calculate the number of terms needed to make the sum equal to 99. **(3 marks)**
c. Insert four geometric terms between 2 and 486 **(4 marks)**
d. Given the Geometric Progression: 144, 72, 36, 18 Find the sum of the first eight terms. **(5 marks)**