



(Knowledge for Development)

**KIBABII UNIVERSITY**

(KIBU)

**UNIVERSITY EXAMINATIONS**  
**2022/2023 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS**  
**YEAR ONE SEMESTER TWO EXAMINATIONS**

**FOR THE DIPLOMA IN**  
**(INFORMATION TECHNOLOGY)**

**COURSE CODE : DIT 063**

**COURSE TITLE : BASIC MATHEMATICS**

**DATE: 10/08/2023**

**TIME: 8.00 A.M- 10.00 A.M**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO**

**QUESTION ONE (COMPULSORY) (28 MARKS)**

- a. Define
- i. Trigonometry (2 marks)
  - ii. Quadratic equation (2 marks)
- b. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there? (4 marks)
- c. Find the sum of all the numbers between 0 and 207 which are exactly divisible by 3 (4 marks)
- d. Simplify the following  $\frac{5^4 \cdot 6^{-2}}{5^2}$  (3 marks)
- e. Solve the following equations using logarithms  $\log_3 \frac{1}{27} = x$  (2 marks)
- f. Solve the following quadratic equation using quadratic formula
- i.  $x^2 - 2x + 2 = 0$  (3 marks)
  - ii.  $x^2 + 2x - 8 = 0$  (2 marks)
- g. Simplify  $3\sqrt{2x} - 5\sqrt{8x} + \sqrt{72x}$  (4 marks)
- h. Using the remainder theorem find the remainder when  $(3x^2 - 4x + 2)$  is divided by  $(x - 2)$  (2 marks)

**QUESTION TWO (16 MARKS)**

- a. If two letters are to be selected from A, B, C, D and E considering the order of selection, find the possible outcomes (4 marks)
- b. State the remainder theorem (2 marks)
- c. Using the theorem above find the remainder of  $x^3 - 2x^2 - 5x + 6$  When divided by  $(x + 2)$  and explain your answer (3 marks)
- d. Using long division divide  $(x^3 - 2x^2 - 5x + 6)$  by  $(x + 2)$  (5 marks)
- e. Find the value of  $x$  given  $\log_4 64 = x$  (2 marks)

**QUESTION THREE (16 MARKS)**

- a. Define the term Arithmetic series (2 marks)
- b. Which term of the series 2187, 729, 243, ... is  $\frac{1}{9}$ ? (5 marks)
- c. Determine the i) 9<sup>th</sup> and ii) 16<sup>th</sup> term of the series 2, 7, 12, 17, ... (4 marks)

- d. Solve  $x^2 - 2x + 8 = 0$  by completing squares (5 marks)

**QUESTION FOUR (16 MARKS)**

- a. Use the binomial series to determine the expansion of  $(2 + x)^7$  (6 marks)
- b. A drilling machine is to have 6 speeds ranging from 50rev/min. if the speed form a geometric progression determine their values each correct to nearest whole number. (7 marks)
- c. Find the value of  $x$   
 $200(1.1)^x = 20,000$  (3 marks)

**QUESTION FIVE (16 MARKS)**

- a. Given a right angle triangle with hypotenuse 15cm and the length of 12cm find the solutions of all the six trigonometric functions (8 marks)
- b. Verify that  $\cos(180^\circ - x) = -\cos x$  and  $\sin(180^\circ + x) = -\sin x$  (4 marks)
- c. Given a triangle with the sides ABC where the angle ABC is  $X^\circ$  and the length  $b$  is 2.3 cm and the angle BCA is  $43^\circ$  and the length  $c$  is 3.5 cm. using sin rule find the solutions of  $X^\circ$  (4 marks)