



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTUARIAL**  
**SCIENCES**

**UNIVERSITY EXAMINATION FOR THE BACHELOR OF SCIENCE .....**

**FIRST YEAR 1<sup>ST</sup> SEMESTER 2023/2024 ACADEMIC YEAR**

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<b>COURSE CODE:</b>	<b>WMB 9101</b>
<b>COURSE TITLE:</b>	<b>MATHEMATICS I</b>
<b>EXAM VENUE:</b>	
<b>STREAM:</b>	<b>BSC COMMUNITY HEALTH (KISUMU CAMPUS)</b>
<b>DATE:</b>	<b>EXAM SESSION</b>
<b>TIME:</b>	<b>2 HOURS</b>

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**Instructions:**

- 1. Answer all questions in Section A and any other 2 questions in Section B**
- 2. Candidates are advised not to write on the question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

**QUESTION ONE (30 MARKS)**

- a) Let  $U = \{a, b, c, d, e, f, g, h, i\}$  be the universal set,  $A = \{a, c, f\}$ ,  $B = \{b, c, f, h\}$ ,  $C = \{a, d, h\}$ . Find
- i)  $A \cap B$  (2 marks)
  - ii)  $(A \cup B)^c$  (2 marks)
  - iii)  $C \setminus A$  (1 mark)
  - iv)  $A^c \cap (B \cap C^c)$  (3 marks)
  - v) Power set of C (2 marks)
- b) Given  $A = \{1, 2, 3\}$  and  $B = \{x, y\}$ , show that  $A \times B \neq B \times A$ . (3 marks)
- c) Given that  $\sin \theta = \frac{1}{4}$ . Find (4 marks)
- i)  $\cos \theta$
  - ii)  $\tan \theta$
  - iii)  $\sec^2 \theta$
- d) Solve  $\cos^2 \theta - 4 \sin \theta = 1$  (5 marks)
- e) Define (3 marks)
- i) Relation
  - ii) Sequence
  - iii) Null set
- f) Solve by completing square method  $ax^2 + bx + c = 0$  (5 marks)

**QUESTION TWO (20 MARKS)**

- a) In a class there are twenty three boys and fourteen girls. The teacher wants to select 2 boys and 3 girls to represent the class for a function. (3 marks)
- b) Solve  $5^{x-2} = 3^{3x+2}$  (4 marks)
- c) In a group of 191 students, 10 are taking English, Computer science and Music, 36 are taking English and Computer, 20 are taking English and music, 18 are taking computer science and music, 65 are taking English, 76 are taking computer science and 63 are taking music. Find how many students are taking: (10 marks)
- i) English and music but not computer science.
  - ii) Computer science and music but not English
  - iii) Computer science and neither English nor music
  - iv) None of the three.
- d) Find the sum of the following arithmetic progression  $1+3+5+\dots+101$ . (3 marks)

**QUESTION THREE (20 MARKS)**

- a) 24 people go on holidays. If 15 go swimming , 12 go fishing and 6 do neither. How many people go fishing and swimming? Draw a Venn diagram and fill the number of people in all the regions. (5 marks)
- b) In how many ways a committee consisting of 3 men and 2 women can be chosen from 7 men and 5 women? (3 marks)
- c) Let  $f$  and  $g$  be the functions from the set of integers to the set of integers defined by  $f(x) = x^2 + 2x + 1$ ,  $g(x) = 3x + 2$ ,  $s(x) = \frac{1}{x+5}$  and  $t(x) = \frac{4}{x-1}$   
(4 marks)
- i)  $g(3)$
- ii)  $f \circ g$
- iii)  $s \circ t$
- d) Find the inverse of  $f(x) = 3x^2 + 4$  (3 marks)
- e) Use binomial theorem to expand  $(3x - 1)^5$  (5)

**QUESTION FOUR (20 MARKS)**

- (a) An arithmetic progression with first 8 terms has 101 terms. If the sum of the first three terms is one-third of the sum of the last three terms, find;
- (i). the common difference,  $d$  (4 marks)
- (ii). The sum of the last 48 terms of the series (4 marks)
- (b). Find the sum of all the terms in A.P
- 10, 15, 20, ....., 1000 (4 marks)
- (c). Solve the equation  $M = Q - 5\log\left(\frac{d}{10}\right)$ , calculate  $d$  if  $M=15$  and  $Q=5$ . (4 marks)
- (d). Evaluate;

$$s = \sum_{n=1}^{10} \left(2n + \frac{1}{2}\right) \quad (4 \text{ marks})$$

**QUESTION FIVE (20 MARKS)**

- a) Find the accumulated amount if sh.20,000 is deposited for  $3\frac{1}{3}$  years at 10% p.a compound interest. ( 5 marks)
- b) If kshs. 180,000 is invested at compound interest of 10% p.a, determine.
- (i) The value after 10 years. ( 5 marks)
  - (ii) The time ,correct to the nearest year, it takes to reach Kshs. 600,000 ( 5 marks)
- c) A man deposited some money in a savings bank for  $2\frac{3}{4}$  years and found the money he had earned sh.8, 600 simple interest. If the rate was  $8\frac{1}{2}\%$  p.a , how much money did he have in his account at the end of the period? ( 5 marks)