



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**FIRST YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF BSC. BIOMED, BSC. AGED,
BSC.GENERAL**

MATH 111: GENERAL MATHEMATICS

STREAM: R

TIME: 2 HRS

DAY: MONDAY [11.30 – 1.30 P.M]

DATE: 26/01/2026

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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INSTRUCTIONS: Answer Question 1 and Any Other 2 Questions

QUESTION ONE (30 MARKS)

(a) Solve for p given

(i) $5^{3p+3} = \frac{1}{625}$ (2 Marks)

(ii) $|5p - 3| = 12$ (3 Marks)

(b) Solve $x - 6 \leq 3x - 4 < x + 10$ and represent the solution on a number line (3 Marks)

(c) Simplify completely $\frac{15x^2+2x-8}{50x^2-32}$ (3 Marks)

(d) Given that $f(x) = \frac{3x-2}{x+4}$ and $g(x) = \frac{2+4x}{3-x}$ (3 Marks)

Show that f and g are inverses of each other

(e) Solve for y given that $\log(3z + 40) + \log(z - 10) = 3$ (3 Marks)

(f) In how many ways can five letters of the word **SENATOR** be arranged? (3 Marks)

(g) Find the slope of the curve $g(t) = (2t - 5)(t + 3)$ at $t = -1$ (3 Marks)

(h) Obtain the area of the region bounded by the curve $y = x^2 - x - 1$ and the

line $y = x + 2$ (3 Marks)

(i) Mr. Ogotu recorded the test scores for his class of 24 students. The average (mean) score on the test was 72%. A student named Lawi was absent for the test and took a make-up test the following week. Lawi scored 97% on his make-up test.

(i) Calculate the new mean test score for the class after including Lawi's make-up test score.

(2 Marks)

(ii) If the new class mean after including Lawi's score is exactly 71%, what score did Lawi get on his make-up test?

(2 Marks)

QUESTION TWO (20 MARKS)

- (a) Define statistics (2 Marks)
- (b) Given that $x^2 - y^2 = 21$ and $x + y = 7$, determine
- (i) $x - y$ (3 Marks)
- (ii) xy (3 Marks)
- (c) The third term of a G.P. is 12 and sixth term is 96. Find the common ratio, the first term and the sum of the first 9 terms. (4 Marks)
- (d) Solve for x given that $2^{2x+3} - 2^{2x+1} = 24$ (4 Marks)
- (e) The principal of Cherika High School is preparing a report. She states that twice the number of students in the school is less than 1200 and two-thirds of the number of students is at least 350. By letting P represent the number of students in Cherika High School, express the possible range for the number of students as a compound inequality. (4 Marks)

QUESTION THREE (20 MARKS)

- (a) Compute without using a calculator;
- (i) 6_2P (2 Marks)
- (ii) ${}^{11}_7C$ (2 Marks)
- (b) Find w given that $w + \frac{1}{w} = 2$ (4 Marks)
- (c) Determine the values of the constants α and β given that $\frac{5-3i}{4+2i} = \alpha + \beta i$ (4 Marks)
- (d) A committee consisting of 9 men and 6 women is to be selected from a group of 12 men and 10 women. In how many ways can this be done? (4 Marks)
- (e) The ninth term of an A.P. is 26 and the sum of the first 16 terms is 392. What is the sum of the first 12 terms? (4 Marks)

QUESTION FOUR (20 MARKS)

- (a) Evaluate $\int_1^3 \frac{x^2 - 3x + 2}{x - 2} dx$ (4 Marks)
- (b) Determine the solutions of $\log_t 9 - \log_9 t = \frac{3}{2}$ (4 Marks)
- (c) The mean heights of students visiting a public library on a particular day during the December holiday are recorded in a table as shown below;

Height(x),cm	130-144	145-159	160-174	175-189
Frequency	5	12	9	4

Find the;

- (i) Modal class (1 Mark)
- (ii) Median height (2 Marks)
- (iii) Standard deviation of the given data; (3 Marks)
- (d) Given that $f(x) = 3x - 5$ and $g(x) = \frac{4-2x}{x+5}$; Find
 - (i) $4f^{-1}(2) - 2g(-3)$ (3 Marks)
 - (ii) $f(g(-2))$ (3 Marks)

QUESTION FIVE (20 MARKS)

- (a) Use First Principles to differentiate $f(x) = x^2 + 3x - 2$ with respect to x (4 Marks)
- (b) A farmer has 800 meters of fencing material and wants to fence off a rectangular plot of land along a straight river. The side along the river does not need fencing. The farmer intends to use the plot for grazing cattle. Determine;
 - (i) The maximum possible area (2 Marks)
 - (ii) The corresponding dimensions (2 Marks)
- (c) Simplify completely; (4 Marks)

$$\frac{4(t+7)^2 - 20(t+7) + 25}{4(t+7)^2 - 25}$$
- (d) Let $P = 6 - 3i$ and $Q = 2 + 4i$ Determine;
 - (i) $\frac{2}{3}P - \frac{1}{2}Q$ (2 Marks)
 - (ii) $\frac{\frac{4}{3}P}{\frac{3}{2}Q}$ (2 Marks)
- (e) In a candidate class, each student sent a success card to the other exactly once. If a total of 420 success cards were exchanged, how many candidates are in the class? (4 Marks)