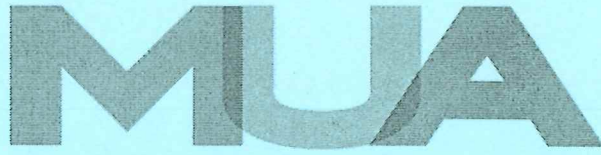


The  
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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF EDUCATION ARTS

MTH 102 : MATHEMATICS FOR SCIENCE

DATE: 28<sup>TH</sup> JULY 2022

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. Write all your answers in the Examination answer booklet provided.

## QUESTION ONE

a) Critique the values given on whether they are probability values. (3 marks)

- i. -0.79
- ii. 0.33'
- iii. 1.0
- iv. 1.01
- v. 0

b) Simplify fully;  $\frac{3}{i-2}$  (2 marks)

c) Prove the following identity;  $\tan \theta + \frac{1}{\tan \theta} = \frac{1}{\sin \theta \cos \theta}$  (3 marks)

d) Given that  $f(x) = x^2 + 3x$  and  $g(x) = 2x - 1$ , compute;

$$f(g(x)) \quad (3 \text{ marks})$$

e) Solve the equation:  $\log x - \log(x^2 - 1) = -2 \log(x - 1)$ . (5 marks)

f) Seven committee members decided to handshake each other. If each member shook every other member's hand, analyse the number of handshakes those were. (3 marks)

g) Critique whether  $y^2 + 2x = 8$  is a function or not. (3 marks)

h) Calculate the number of words that can be formed by using all letters of the word 'MATHS'? (3 marks)

## QUESTION TWO

a) If  $\sin \theta = \frac{2}{5\sqrt{2}}$ , leaving your answer in surd form, compute

$$\cos \theta \quad (3 \text{ marks})$$

b) In a soccer game, players A and B are 15m apart. Player C has the ball and wants to pass it either to A or B, whoever is nearer to him. If the angle  $CAB = 45.6^\circ$  and

angle  $ABC = 37.9^\circ$ , find by calculation who between A and C, did C pass the ball? (5 marks)

- c) At a certain instance, the bottom of a cliff, boat A and boat B are collinear. The distance from boat A to boat B is 80m, and the angles of elevation from boat A and boat B to the top of the cliff are  $28^\circ$  and  $24^\circ$  respectively.
- i. Draw a sketch to represent the information (2 marks)
  - ii. Evaluate the distance between boat A and the bottom of the cliff (3 marks)
  - iii. Calculate the height of the cliff. (2 marks)

### QUESTION THREE

- a) Evaluate the domain for which the value of  $y$  is positive  $y = |\sqrt{x}| - 6$  (3 marks)
- b) The table below shows the population of kids in school tabulated according to their heights.
- i. Find the mean height of the kids using an appropriate Assumed Mean, A. (4 marks)
  - ii. Examine the median height for the data given. (4 marks)
  - iii. Formulate the variance and standard deviation (4 marks)

Height (in cm)	40 - 59	60 - 79	80 - 99	100 - 119	120 - 139	140 - 159
No. of kids	2	4	9	11	7	3

### QUESTION FOUR

- a) Function  $f$  is defined by

$$f(x) = -2x^2 + 6x - 3$$

find  $f(-2)$ .

(2 marks)

- b) Divide  $3x^5 - 2x^3 + 5x^2 - x - 2$  by  $x - 2$  (5 marks)
- c) Decompose the following rational function to fractions;  $\frac{7x^3 - 2x^2 + 8x - 7}{(x^2 + 2)(x^2 - 1)}$  (8 marks)

### QUESTION FIVE

- a) Using the Quadratic Formula method solve  $x$  for in;

$$2x^2 + 7x - 4 = 0 \quad (3 \text{ marks})$$

- b) From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there in the committee. In how many ways can it be done? (5 marks)
- c) From a group of 6 men and 4 women, 6 persons are to be selected to form a committee. Analyse the number of ways it can be done if;
- The committee must meet the one third gender rule (3 marks)
  - The committee must meet the one third gender rule, but men must be more than women. (2 marks)
  - The committee must meet the one third gender rule, and women must be more than or equal to men. (2 marks)

### QUESTION SIX

- a) Explain how the graph of  $h(x + 2) - 2$  compares to the graph of  $h(x)$  (3 marks)
- b) A certain wedding committee is formed by 24 members. A transport manager and a decoration manager are to be randomly picked from the committee with no bias. If out of the members, 8 are teachers, 9 are business persons and the rest are Advocates, find the probability that two managers:
- Are both Advocates (3marks)
  - None is a teacher (3 marks)
  - Both are from the same profession (3 marks)

iv. They are from different professions

(3 marks)

