JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DIPLOMA IN COMMUNITY HEALTH

1ST YEAR 1ST SEMESTER 2022/2023 ACADEMIC YEAR

MAIN CAMPUS/ KISUMU CAMPUS

COURSE CODE: SMA 2111/WMB 2111

COURSE TITLE: MATHEMATICS I

EXAM VENUE: **STREAM: DIPLOMA IN COMMUNITY HEALTH**

DATE: 14/07/2022 **EXAMS SESSIONS: 9.00 – 10.30AM**

TIME: 1 ½ HOURS

Instructions:

1. **Answer question one (compulsory) and any other two questions.**
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) Prove that $sin^2\theta + cos^2\theta = 1$ 3marks

b) The following gives the frequency of the number of orders received each day during the past 50 days at the office of mail order company.

Number of order	frequency
10-12	4
13-15	12
16-18	20
19-20	14

Calculate:

i. Mean (3marks)

ii. Variance (3marks)

c) Simplify

$\frac{1}{3-\sqrt{5}} + \frac{1}{3+\sqrt{2}}$ (3marks)

d) Solve:

$4^{x+1} = 0.25$ (3marks)

e) Simply

$2\log_3 5 - \log_3 10 + 3\log_3 4$ (3marks)

f) Find the power set of {a, b, c} (3marks)

g) Find the sum of all-natural numbers from 1 to 500 which are divisible by 3 (3marks)

h) Use the remainder theorem to determine the remainder in

$-4x^3 + 8x^2 + 12x + 16$ divided by $(x+2)$ (3marks)

a) Solve: $x^2 - 4x - 14 = 0$ by the completing squares (3marks)

QUESTION TWO (20 marks)

a) Based on the grouped data below;

Time to work	**frequency**
1-10	8
11-20	14
21-30	12
31-40	9
41-50	7

Calculate

i. The standard deviation (3marks)
ii. Median (3marks)
iii. Mode (3marks)
iv. Inter-quartile range (3marks)

b) Solve the equation:
$\text{Log}_{10}(3x+2) - 2\log_{10}x = 1 - \log_{10}(5x-3)$ (4marks)

c) Solve:
$32^{x+1} + 9 = 3^{x+3} + 3^{x}$ (4marks)

QUESTION 3

a) Given: A = {1,3,5}, B= {2,4,6} and C= {0,2,4,6,8}

Using the universal set of all the three sets, find

i. i) $A \cap B \cap C$ (3marks)
ii. $A^c \setminus C$ (3marks)
iii. $A^c \cup (B \cap C)$ (3marks)
iv. Given A, B and C as sets, draw a Venn diagram and indicate $A \cap B \cap C$ (4marks)

b). Show that (2x+3) is a factor of $f(x) = 2x^3 + 3x^2 - 2x - 3$ (3marks)

c). Solve $\sin\theta = ½ \quad for \quad 0^\circ < \theta < 360^\circ$ (4marks)

QUESTION FOUR (20 marks)

a) The 2nd, 3rd and 9th term or arithmetic progression are three consecutive terms of a geometric progression. Find

i. Common ratio (4marks)
ii. Sum of the first 15 terms of the progression (4marks)

b) A progression has a second term of 48 and a fourth term of 27. Find the first term of the progression in each of the following cases;

i. Progression is arithmetic (3marks)
ii. The progression is geometric with positive common ratio (3marks)

c) Solve equation: $x^2 + 8y + 5 = 0$ using quadratic formula (3marks)

d) Convert: $\frac{\pi}{6}$ c into degrees (3marks)

QUESTION FIVE (20 marks)

a) A travel agent surveyed 100 people to find out how many of them had visited the cities of Kisumu and Mombasa. 31 people had visited Kisumu, 26 had visited Mombasa, 12 people had visited both cities.

   i. Draw a Venn diagram for the data (3marks)

   ii. Find number of people who visited Mombasa but not Kisumu (3marks)

b) Derive the quadratic form using $ax^2+bx+c=0$ (4marks)

c) The population of Bondo town increases at the rate of 10% annually. Its present population is 200,000. What will be the population at the end of 5 years (4marks)

d) Define cardinality of a set (2marks)

e) Find the cardinality of set X if $X= \{y: 6y^2+7y=3\}$ (4marks)