AFRICA NAZARENE

UNIVERSITY

DISTANCE LEARNING

CENTRE:	**RONGAI**
DEPARTMENT:	**COMPUTER SCIENCE**
UNIT TITLE:	**BASIC MATHEMATICS**
UNIT CODE:	**MTH 100**
LECTURER:	**E. ROCHE**
TRIMESTER:	**2ND TRIMESTER 2015/2016**
DATE:	**13TH APRIL, 2016**
TIME:	**9.00AM – 11.00AM**

Instructions:

1. Answer question **One (Compulsory)** and any other **TWO** questions.
2. Clearly show your working
3. Write all your answers in the answer booklet provided.
4. Time: Two hours.

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Question One – Compulsory (36 Marks)

a) Solve the following quadratic equation;

$$0.5x^2 + 0.06x + 0.31 = 0$$ **(3 marks)**

b) Find the number of terms of the series $1 + 3 + 5 + 7 + 9 + \ldots$ that will give a sum of 361. **(3 marks)**

c) Factorize completely: $8x^2 + 6x - 9$ **(2 marks)**

d) A test given to 40 students produced the following results:

5 Students got grade A

12 Students got grade B

15 Students got grade C

5 Students got grade D

3 Students got grade E

i. Draw a pie chart to represent the above information. **(2 marks)**

ii. Find the percentage which represents those with grade C and D. **(2 marks)**

e) A sample survey carried out on the electronic devices used by different students in a class indicated the following; 70 students used Android phones, 60 students used Tablets, and 50 students used Laptops. 17 students used both Android phones and Tablets, 15 used Tablets and Laptops, 16 used both Laptops and Android phones, while 3 students used all the three devices. Use a Venn diagram to determine the total number of students in the sample.

(4 marks)

f) On a shelf in a supermarket, there are 75 cups of similar make. Of these, 9 are red, 12 blue, 18 yellow, 21 green and 15 white. If any one of the cups can be sold first, find the probability that it is neither white nor blue. **(4 marks)**

g) Solve for x; $|10x - 4| < 16$ **(4 marks)**

h) An employee started on a salary of KES 6,000 per month and received a constant monthly increment. If he earned a total of KES 32,400 by the end of five months, calculate;

(i) His monthly increment. **(3 marks)**

(ii) His salary on the 5th month. **(2 marks)**

i) Find a quadratic equation whose roots are; 3 and $-\frac{1}{2}$, expressing it in the form $ax^2 + bx + c = 0$, where a, b and c are constants. **(3 marks)**

j) Solve the following system using elimination method; $\begin{matrix} 4x - 5y = -6 \\ 3x + 2y = 7 \end{matrix}$ **(4 marks)**

Question Two – Optional (12 Marks)

a) Given that the Universal set U= {1,2,3,4,5,6,7,8,12,13,15,16,19,21,23} and its subsets A , B and C are such that A= {multiples of 2}, B= {prime numbers} and C= {factors of 24}. List the members of the set;

(i) **A, B, C** **(3 marks)**

(ii) $(\mathbf{A} \cup \mathbf{B} \cup \mathbf{C})^c$ **(2 marks)**

(iii) $\mathbf{A} \cap \mathbf{B}$ **(1 mark)**

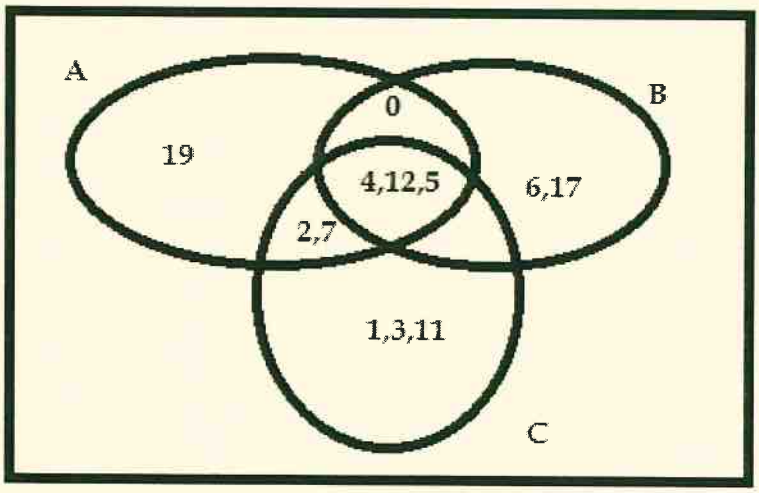
b) Represent the following sets in separate Venn diagrams (shade the appropriate region where applicable).

(i) $A \cap B$ **(1 mark)**

(ii) $X \subset Y$ **(1 mark)**

(iii) $(P \cup Q) \cap R^c$ **(1 mark)**

c) Study the following Venn diagrams and attempt the questions that follow;



List the members of;

i) $(\mathbf{A} \cap \mathbf{B})^c$ **(1 mark)**

ii) $(\mathbf{A} \cup \mathbf{C}) \cap \mathbf{B}^c$ **(1 mark)**

iii) $(\mathbf{B} \cap \mathbf{C}) \cap \mathbf{A}^c$ **(1 mark)**

Question Three – Optional (12 Marks)

In a fuel economy test, 100 cars were tested to see how far they travelled on 10 litres of a certain type of petrol. The results are shown in the table below.

Distance in km	100 - 109	110 – 119	120 – 129	130 - 139	140 - 149
No. of cars	5	15	25	35	20

Using 124.5 as the working mean calculate:

a. The mean **(6 marks)**

b. The standard deviation **(6 marks)**

Question Four – Optional (12 Marks)

The product of the first three terms of geometric progression is 64. If the first term is a, and the common ration is r.

a. Express r in terms of a **(3 marks)**

b. Given that the sum of the three terms is 14

i. Find the value of a and r and hence write down two possible sequences each up to the 4^{th} term. **(6 marks)**

ii. Find the product of the 50^{th} terms of the two sequences **(3 marks)**

Question Four – Optional (12 Marks)

a. Giving examples, distinguish between mutually exclusive and independent events as used in statistics **(4 marks)**

b. The probability of **three** darts players Akinyi, Kamau, and Juma hitting the bulls eye are 0.2, 0.3 and 0.5 respectively.

i. Draw a probability tree diagram to show the possible outcomes **(2 marks)**

ii. Find the probability that:

a. All hit the bulls eye **(2 marks)**

b. Only one of them hit the bulls eye **(2 marks)**

c. at most one missed the bull's eye **(2 marks)**