



# AFRICA NAZARENE UNIVERSITY

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## DISTANCE LEARNING

**CENTRE:** RONGAI  
**DEPARTMENT:** COMPUTER SCIENCE  
**UNIT TITLE:** BASIC MATHEMATICS  
**UNIT CODE:** MTH 100  
**LECTURER:** E. ROCHE  
**TRIMESTER:** 2<sup>ND</sup> TRIMESTER 2014/2015  
**DATE:** 13<sup>TH</sup> APRIL, 2015  
**TIME:** 9.00AM – 11.00AM

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### Instructions:

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

**Question One: Compulsory (36 Marks)**

a. Consider the following data: 35,36,39,41,42,45,48,53,57.

Find;

i) The arithmetic mean (2 Marks)

ii) Median (1 Mark)

iii) Mode (1 Mark)

b. Solve the following matrix using the Cramer's rule;

$$3x - 5y = -9$$

$$2x + 3y = 13$$

(4 Marks)

c. Two years ago a man was 6 times as old as his daughter. In 18 years he will be twice as old as his daughter. Determine their present ages. (4 Marks)

d. A machine starts production of matchboxes at a rate of 12 000 per hour. The rate of production decreases by 40% every hour.

Calculate the total number of matchboxes produced

i. In the first two hours. (3 Marks)

ii. In the long run. (2 Marks)

e. A bag X contains 3 red marbles and 4 green marbles. Another bag Y contains 7 red marbles and 6 green marbles. A bag is chosen at random and 2 marbles drawn from it one at a time, without replacement. Find the probability of picking a red and a green marble in that order. (4 Marks)

f. The first and thirteenth terms of an Arithmetic progression are 7 and 1 respectively, find The number of terms which have a sum of zero (4 Marks)

g. Evaluate  $|x - 8| < 3$  (3 Marks)

h. Solve the simultaneous equations: (6 Marks)

$$x + y + 2z = 1$$

$$2x + 3y + 6z = 1$$

$$3x + 2y - 4z = 2$$

i. Given that  $n(A) = 50$ ,  $n(B) = 32$ ,  $n(A \cap B) = 24$ , find the value of  $n(A \cup B)$ .

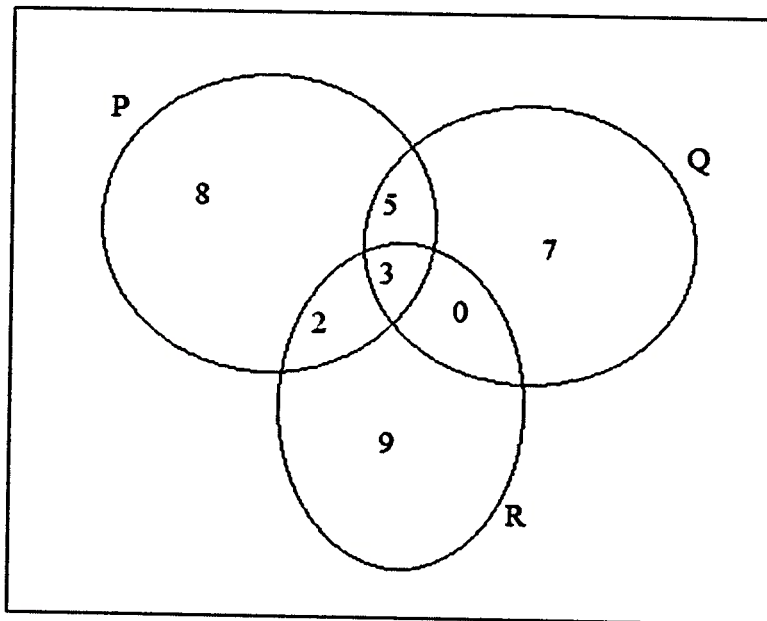
(2 Marks)

**Question Two: Optional (12 Marks)**

a. P, Q and R are three sets and the numbers of elements in the various regions are indicated in the figure below. If the universal set consists of 50 members, find the number of

elements in each of the following.

(4 Marks)



- i.  $P \cap Q$
  - ii.  $P \cap Q \cap R$
  - iii.  $(P \cup R) \cap R'$
  - iv.  $(P \cup Q)' \cap R$
- b. A study by strategic Research Consultants on the cause of business failure of 1500 micro enterprise firms gave the following results:
- 600 failed due to capital only
  - 110 failed due to lack of capital and inexperienced management
  - 140 failed due to lack of capital and a poor location
  - 230 failed due to inexperienced management only
  - 150 failed due to inexperienced management and a poor location
  - 60 failed due to all the three
  - 80 failed due to other causes but not any of the three.
- i. Present the information above in a Venn diagram (3 Marks)
  - ii. Determine the number of micro enterprise firms that failed due to:
    1. A poor location only (1 Marks)
    2. At least two of the causes mentioned above (2 Marks)
    3. Exactly one of the causes (2 Marks)

**Question Three: Optional (12 Marks)**

The following table shows marks scored in MTH 100 assignments by 40 students in a distance learning class.

Mark	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40
No. of students	3	5	6	8	7	5	4	2

For the above frequency distribution:

- Calculate the mean mark. **(4 Marks)**
- Draw the cumulative frequency graph. **(3 Marks)**
- Use the graph in (b) to estimate the median. **(2 Marks)**
- Find the percentage of the number of students who scored between 8 and 29 marks. **(3 Marks)**

**Question Four: Optional (12 Marks)**

- Factorize completely;  $2x^2 - 7x - 15$  **(2 Marks)**
- Thrice the square of a certain number is seven more than four times the number. Find the number. **(4 Marks)**
- Plot the graph of  $y = x^2 - x - 3$  over the domain  $-4 \leq x \leq 4$  **(4 Marks)**  
Hence use your graph to solve;
  - $x^2 - x - 3 = 0$  **(1 Mark)**
  - $x^2 - x + 9 = 0$  **(1 Mark)**

**Question Five: Optional (12 Marks)**

- A bag contains 5 red marbles and 7 green marbles. Two marbles are drawn randomly one at a time, and without replacement. Find the probability of picking a red and a green, without order. **(3 Marks)**

- Simplify completely

$$\frac{3x^2 - 1}{x^2 - 1} - \frac{2x + 1}{x + 1} \quad \textbf{(3 Marks)}$$

- The arithmetic progression is such that it is increasing and that the third, ninth and twenty fifth terms form the first three consecutive terms of a geometric progression.

The sum of the seventh and twice the sixth terms of the arithmetic progression is 78.  
Calculate

- i. The first term and the common difference of the arithmetic progression. **(4 Marks)**
- ii. The sum of the first nine terms of the arithmetic progression. **(2 Marks)**

