



GARISSA UNIVERSITY

UNIVERSITY EXAMINATION **2017/2018** ACADEMIC YEAR **ONE**
SECOND SEMESTER EXAMINATION

SCHOOL OF INFORMATION SCIENCES

FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY

COURSE CODE: CIT 106

COURSE TITLE: BASIC MATHEMATICS

EXAMINATION DURATION: 3 HOURS

DATE: 11/04/18

TIME: 09.00-12.00 PM

INSTRUCTION TO CANDIDATES

- The examination has **SIX (6)** questions
- Question **ONE (1)** is **COMPULSORY**
- Choose any other **THREE (3)** questions from the remaining **FIVE (5)** questions
- Use sketch diagrams to illustrate your answer whenever necessary
- Do not carry mobile phones or any other written materials in examination room
- Do not write on this paper

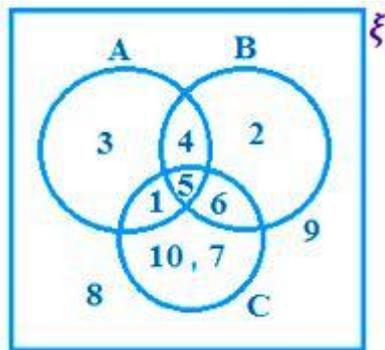
This paper consists of **FOUR (4)** printed pages

please turn over



QUESTION ONE (COMPULSORY)

- I. Evaluate : a) ${}^{10}P_4$ b) 9C_3 (4 Marks)
- II. List all the proper subsets of the set (red, blue, green, yellow). How many of them contain green and how many contain neither green nor blue? (6 Marks)
- III. Express the following statements in set notation and illustrate each by a Venn diagram.
- Not all who swim can dive, but all those who dive can also swim.
 - Some integers are not natural numbers but all integers are real numbers. (4 Marks)
- IV. Find the following sets from the adjoining Venn diagram **below** .



- (i) $B \cup C$
- (ii) $(A \cup B) \cap C$ (4 Marks)

V. Simplify:

$$\frac{17!}{12! 5!} + \frac{17!}{13! 4!} \quad (4 \text{ Marks})$$

- VI. Given the domain $(-2, -1, 0, 1, 2, 3)$; $f(x) =$ write down the range of the function $f(x) = x - x^2$ (3 Marks)

QUESTION TWO (15 Marks)

- I. If the universal set contains all the letters of the alphabet, $R=(\text{Letters in random})$ and $P=(\text{letters in panama})$, draw a Venn diagram to represent these sets, entering the number of



elements in the appropriate regions. State the number of elements in the sets (a) $P \cup R$ (b) $P' \cup R$ (c) $P \cup R'$. **(6 Marks)**

- II. From the foot of a tower 30 Metres high, the top of a flagpole has an angle of elevation of 30° . From the top of the tower, it has an angle of depression of 45° . Find the height of the flagpole and its distance from the tower. **(4 Marks)**
- III. Express $14 \times 13 \times 12 \times 11$ in factorial notation **(3 Marks)**
- IV. In how many ways can a team of 7 players be chosen from 15 players **(2 Marks)**

QUESTION THREE

- A. $E =$ (letters of alphabet), $P =$ (m, i, s, t), $Q =$ (s, c, e, n, t), $R =$ (a, l, m, o, s, t). State the number of elements in the sets (a) $P \cap R$, (b) $P \cup Q \cap R$, (c) $(P \cup R)'$. **(6 Marks)**
- B. Find the range of the functions $f(x) = 2x^2 - 3x + 4$ for the domain $(-2, 0, 2)$ **(3 Marks)**
- C. A mixed hockey team containing 5 men and 6 women is to be chosen from 7 men and 9 women. In how many ways can this be done? **(3 Marks)**
- D. In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many like both coffee and tea? **(3 Marks)**

QUESTION FOUR (15 Marks)

- (a) The sets X and Y are such that: $X = \{x: 0 < x < 27\}$. $Y = \{y: 0 < y < 1\}$ where X and Y are integers. Find $X \cap Y$. **(4 Marks)**
- (b) Find the sum of the first 20 terms of the arithmetic progression $16 + 9 + 2 + (-5) + \dots$. **(3 Marks).**
- (c) Prove that $n^3 - n$ is divisible by 3, whenever n is a positive integer. **(4 Marks)**
- (d) i) A sequence is defined by $S(n) = (-1)^n (n - 3n)$ where n is a natural number. Find the first three terms and the tenth term of the sequence. **(3 Marks)**
- ii) Find the domain of the function $f(x) = 4/x$ for the range $-4 < f(x) < -1/4$ **(1 Marks)**

QUESTION FIVE



(a) On William Street in Kampala, there are 60 shops. Of these 20 sell shoes, 25 sell electronic equipment, 30 sell textiles. 8 shops sell both shoes and textiles; 6 sell both shoes and electronic equipment; 10 sell both electronic equipment and textiles; and 4 shops sell all three items. How many of these shops do not sell any of these items? **(4 Marks)**

(b) Determine the N th term of each of the following two sequences $2, 5, 10, 17, \dots$ and $0, 2, 6, 12, \dots$. A new sequence is obtained adding the corresponding terms of the sequence. Find the 5^{th} , 7^{th} , and n^{th} terms of the new sequence. **(3 Marks)**

(c) At Kibuli Secondary School, a group of 38 students doing Sciences take Physics, Mathematics, or Chemistry. The sets P, M and C are defined as follows:

M = (those who study Mathematics)

P = (those who study Physics)

C = (those who study Chemistry)

The venn diagram below shows the relation between P, M and C.

QUESTION SIX

(a) Given that 22 students study Maths, 12 students study neither Maths nor Physics and no students, study Physics only, find:

i. X

ii. The number of students who study Physics.

iii. The number of students who study Chemistry.

iv. The number of students who study both Chemistry and Physics **(4 Marks)**

(b) Copy the diagram and shade the region representing $C \cap P' \cap M'$ where P' , M' represent the complement of P and M respectively. **(4 Marks)**

