



Kenya institute of highways and building technology

Diploma in Information Communication Technology

Computational Mathematics

Module I, August 2021

**Instructions**

Attempt all questions

You may use a **calculator** and mathematical **log tables**

**Duration**

2 Hours

1. (a) Table 1 below shows the amount of money in thousands of Kenya Shillings paid to retrenched employees

Benefits '000'	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of Employees	50	60	70	90	52	40	11

Determine each of the following benefits

- i. Inter-quartile range
  - ii. Maximum amount for the lower 40% of the employees
  - iii. Minimum amount for the top 10% (8 Marks)
- (b) The entry fee for a trade fair is Kshs. 2,100 for a group comprising of 12 children and 3 adults, and Kshs. 2000 for group comprising of 3 adults and 8 three children.
- i. Translate the problem into a system of linear equations
  - ii. Determine the entry fee per child and per adult (6 Marks)
- (c) Table 2 is a truth table in Boolean algebra use it to answer the question that follow

Input			Output
X	Y	Z	Q
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

- i. Translate the truth table as Boolean algebra in its minimized form
  - ii. Represent the Boolean algebra as circuit of logic gates. (6 Marks)
2. (a) Use binomial theorem to expand the following expressions (4 Marks)
- (b) Outline four properties of Poisson probability distributions. (4 Marks)
  - (c) Differentiate between diagonal matrix and non-singular matrix (6 Marks)
  - (d) Explain three methods that can be used to collect statistical primary data (6 Marks)
3. (a) Convert each of the following to the stated number systems
- i.  $63742_8$  to hexadecimal
  - ii.  $D8B_{16}$  to octal
  - iii.  $8345_{10}$  to binary (6 Marks)
- (b) The data below relates to heights of students, use it to answer the following questions.

Height	140-150	150-160	160-170	170-180	180-190	190-200	200-210
Students	15	50	100	160	120	45	10

Estimate by estimation the following measures about the height of students

- i. The median
- ii. The standard deviation
- iii. Construct a frequency polygon

- iv. Construct an ogive curve (12 Marks)
- (c) Explain the term parity as used in data representation. (2 Marks)