REPUBLIC OF KENYA

COMPETENCY BASED MODULAR CURRICULUM

FOR

COMPUTER SCIENCE

KNQF LEVEL 6

(CYCLE 3)

PROGRAMME ISCED CODE: 0613 554 A.

TVET CDACC
P.O. BOX 15745-00100
NAIROBI

MATHEMATICS FOR COMPUTER SCIENCE

ISCED UNIT CODE: 0613 554 10A

UNIT CODE: ICT/CU/CS/CR/03/6/MA

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply Mathematics for Computer Science

Duration of Unit: 170 hours

Unit description

This unit specifies the competencies required to understanding linear algebra, understanding Boolean algebra, understanding set theory, understanding calculus and understanding probability and statistics.

Summary of Learning Outcomes

Learning Outcomes	Duration (Hours)
1. Linear Algebra	30
2. Boolean Algebra	40
3. Set Theory	30
4. Calculus	30
5. Probability and Statistics	40
TOTAL	**170**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Linear Algebra	1.1 Linear Equations 1.2 Solving linear equations 1.2.1 Methods of solving 1.2.2 Formation 1.3 Vectors 1.3.1 Definition 1.3.2 Types 1.4 Vector operations 1.4.1 Addition 1.4.2 Subtraction 1.4.3 Multiplication 1.4.4 Scalar 1.4.5 Dot product 1.5 Matrices 1.5.1 Definition 1.5.2 Types 1.5.3 Determinant 1.5.4 Application 1.6 Matrix operations 1.6.1 Addition 1.6.2 Scalar multiplication 1.6.3 Transposition 1.7 Inverse of square matrix	• Practical tests • Oral tests • Written tests
2. Boolean Algebra	2.1 Boolean algebra 2.1.1 Definition of Boolean algebra 2.1.2 Uses of Boolean algebra 2.2 Boolean operations 2.2.1 Boolean value	• Practical tests • Oral tests • Written tests

	2.2.2 Boolean function 2.2.3 Digital logic 2.3 Basic Boolean operations 2.3.1 AND 2.3.2 OR 2.3.3 NOT 2.4 Secondary operations 2.4.1 NAND 2.4.2 NOR 2.4.3 EX-OR 2.4.4 EX-NOR 2.5 Writing Boolean Expressions 2.5.1 Order of basic operations 2.5.2 Symbols 2.6 Simplification of Boolean expressions 2.6.1 Using algebraic functions 2.6.2 Using Truth tables 2.6.3 Using Karnaugh Maps 2.7 Boolean Laws and Theorems 2.7.1 AND law 2.7.2 OR law 2.7.3 Inversion law 2.7.4 Commutative 2.7.5 Associative 2.7.6 Distributive 2.7.7 De-Morgan's Theorems 2.8 Simplification (Reduction) Rules for Boolean expressions	
3. Set Theory	3.1 Sets Theory	• Practical tests

	3.1.1 Definition of a Set 3.1.2 Characteristics of sets 3.2 Methods of Set representation 3.2.1 Statement form 3.2.2 Tabular form 3.2.3 Set builder notation 3.3 Cardinality of a set 3.4 Types of sets 3.4.1 Finite 3.4.2 Infinite 3.4.3 Subset 3.4.4 Universal 3.4.5 Proper 3.4.6 Singleton set 3.5 Venn Diagrams 3.6 Set Operations 3.6.1 Set Union 3.6.2 Set Intersection 3.6.3 Set Difference 3.6.4 Complement of Set 3.6.5 Cartesian Product	• Oral tests • Written tests
4. Calculus	4.1 Functions 4.1.1 Definition of function 4.1.2 Domain 4.1.3 Range 4.1.4 Linear functions 4.1.5 Power functions 4.1.6 Evaluation 4.2 Graphing of functions 4.2.1 Intercepts 4.2.2 Limits 4.3 Differential calculus	• Oral • Observation • Written

	4.3.1 Rate of change 4.3.2 Rules of derivatives 4.3.3 Optimization 4.4 First and second order differential equations 4.5 Integral calculus 4.5.1 Definite 4.5.2 Indefinite 4.6 Techniques of integration 4.6.1 By parts 4.6.2 Reserve chain rule 4.6.3 u-substitution	
5. Probability and Statistics	5.1 Key terminologies in probability 5.1.1 Samples spaces 5.1.2 events 5.1.3 sets 5.1.4 outcomes 5.2 Probability axioms and counting problems 5.3 Permutations and combinations 5.4 Conditional probability and multiplication rule 5.5 Data representation techniques 5.5.1 Histogram 5.5.2 Pie charts 5.5.3 Scatter plot 5.5.4 Bar graph 5.6 Measures of central tendency 5.6.1 Mean	• Practical tests • Oral tests • Written tests

	5.6.2 Mode 5.6.3 Median 5.7 Measures of spread 5.7.1 Variance 5.7.2 Standard deviation 5.8 Measure of Location 5.8.1 Quartile **5.8.2** Percentile	

Suggested Methods of Instruction

- Presentations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Visiting lecturer/trainer from the Mathematics field.
- Industrial visits

Recommended Resources for 25 Trainees

S/No.	Category	Item Description / Specifications	Quantity	Trainee:Item Ratio
1.	**Learning Materials**	Mathematics textbooks and handouts	25	1:1
2.		Formula sheets, solved examples, practice question booklets	25 Sets	1:1
3.		Access to math learning platforms	25 Logins	1:1
4.		Graphing calculator reference guides	25	1:1
5.	**Learning Facilities**	Well-lit classroom or computer lab with whiteboard, projector, and math tools	1 Room	Shared
6.	**Infrastructure**	High-speed internet for accessing online simulations and graphing tools	1 Setup	Shared
7.	**Tools & Equipment**	Computers with math software installed	25	1:1
8.		Scientific/Graphing calculators	15	1:1.6
9.		Rulers, protractors, and compasses for Venn diagrams and graphs	25 Sets	1:1
10.		Whiteboard compasses, markers, visual aids	1 Set	Shared

11.	**Consumable Materials**	Graph papers, notebooks, pens, printed quizzes, and assignments	25 Sets	1:1
12.		Chart papers for statistics visualizations	10	1:2.5