UNDERSTAND MATHEMATICS FOR COMPUTER SCIENCE

UNIT CODE: CT/OS/CS/CR/03/6/B

UNIT DESCRIPTION

This unit covers the competencies required to understand mathematics for computer science. It involves understanding Linear Algebra, understanding Boolean Algebra, understanding Set Theory, understanding Calculus and understanding Probability and Statistics.

ELEMENT These describe the **key outcomes** which make up **workplace function**.	**PERFORMANCE CRITERIA** These are **assessable** statements which specify the required level of performance for each of the elements. ***(Bold and italicized terms are elaborated in the range.)***
1. Understand Linear Algebra	1.1 Linear Equations are explained 1.2 Linear equations are solved 1.3 Vectors are explained 1.4 ***Vector operations*** are illustrated 1.5 Matrices are explained 1.6 ***Matrix operations*** are illustrated 1.7 Inverse of a square matrix is illustrated
2. Understand Boolean Algebra	2.1 Boolean algebra is explained 2.2 ***Basic Boolean operations*** are explained 2.3 ***Secondary operations*** are explained 2.4 Writing of Boolean Expressions is illustrated 2.5 ***Methods of simplifying Boolean expressions*** are illustrated 2.6 ***Boolean Laws and Theorems*** are illustrated 2.7 Simplification rules for Boolean expressions are illustrated
3. Understand Set Theory	3.1 Sets Theory is explained 3.2 ***Methods of Set representation*** are illustrated 3.3 Cardinality of a set explained 3.4 ***Types of sets*** are illustrated 3.5 Venn Diagrams are illustrated 3.6 ***Set Operations*** are illustrated
4. Understand Calculus	4.1 Functions and graphs are explained 4.2 Differential calculus is illustrated 4.3 Integral calculus is illustrated
5. Understand Probability and Statistics	5.1 Key terminologies in Probability are explained 5.3 Probability axioms and simple counting problems are illustrated 5.4 Permutations and combinations are illustrated

	5.5 Conditional probability and the multiplication rule are illustrated 5.6 Key terminologies in Probability are explained 5.7 Data representation techniques are illustrated 5.8. ***Measures of central tendency*** are illustrated 5.9 ***Measures of spread*** are illustrated 5.10 ***Measure of Location*** are illustrated

RANGE

This section provides work conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	**Range**
Vector operations may include but not limited to:	• Addition • Multiplication • Dot product
Matrix operations may include but not limited to:	• Sum of two matrices • Sum of a matrix and a scalar • Matrix subtraction • Product of two matrices • Product of a matrix and a vector
Basic Boolean operations may include but not limited to:	• AND • OR • NOT
Secondary operations may include but not limited to:	• NAND • NOR • EX-OR • EX-NOR
Methods of simplifying Boolean expressions may include but not limited to:	• Using algebraic functions • Using Truth tables • Using Karnaugh Maps
Boolean Laws and Theorems may include but not limited to:	• AND law • OR law • Inversion law • Commutative • Associative • Distributive • De-Morgan's Theorems

Variable	Range
Methods of Set representation may include but not limited to:	• Statement form • Tabular form • Set builder notation
Types of sets may include but not limited to:	• Finite Set • Infinite Set • Subset • Proper Subset • Universal Set • Empty or Null • Equal • Equivalent Set • Singleton Set or Unit Set • Overlapping Set • Disjoint Set
Set Operations may include but not limited to:	• Set Union and Set Intersection • Set Difference/Relative Complement • Set Complement • Cartesian Product
Measures of central tendency may include but not limited to:	• Mean • Median • Mode
Measures of spread may include but not limited to:	• Variance • Standard deviation
Measures of location may include but not limited to:	• Percentile • Quartiles

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Communications (verbal and written);
- Time management;
- Problem solving;
- Planning;
- Decision Making;
- Research;

Required knowledge

- The individual needs to demonstrate knowledge of:
- Linear Algebra
- Boolean algebra
- Set Theory
- Calculus
- Probability and Statistics

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Solved Linear equations 1.2 Performed vector operations 1.3 Performed matrix operations 1.4 Performed Boolean algebra operations 1.5 Performed set operations 1.6 Explained samples spaces, events and sets 1.7 Solved problems using Probability axioms 1.8 Solved permutations and combinations 1.9 Solved problems using conditional probability 1.10 Represented data using statistical technique 1.11 Illustrated measures of central tendency 1.12 Illustrated measures of spread 1.13 Illustrated measures of location
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral questioning 3.2 Practical tests 3.3 Observation 3.4 Written test
4. Context of Assessment	Competency may be assessed 4.1 Off the job 4.2 on the job

	4.3 During industrial attachment
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.