APPLY DISCRETE MATHEMATICAL CONCEPTS

ISCED UNIT CODE: 0541 541 01A

TVET CDACC CODE: IT/OS/ICTA/CC/03/5/MA

UNIT DESCRIPTION:

This unit covers the competence to apply discrete mathematical concepts. It involves carrying out set theory operations, performing matrix operations, applying number systems, applying logic gates, performing sequence and series and demonstrating graph theory.

ELEMENTS AND PERFORMANCE CRETIRIA

ELEMENT These describe the key outcomes which make up workplace functions	**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. Carry out set theory	1.1 ***Sets*** are represented as per workplace requirements.

ELEMENT These describe the key outcomes which make up workplace functions	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)***
operations	1.2 Sets are applied as per workplace requirements.
	1.3 ***Set Operations*** are applied as per workplace requirements.
2. Perform matrix operations	2.1 ***Matrices*** are identified as per workplace requirements.
	2.2 ***Matrix operations*** are applied as per workplace requirements.
	2.3 Determinant of a matrix is applied as per workplace requirements.
	2.4 Inverse of a matrix is applied as per workplace requirements.
3. Apply Number Systems	3.1 Number systems are identified as per workplace requirements.
	3.2 Base conversion is performed as per workplace requirements.
	3.3 Binary arithmetic operations are performed as per workplace requirements.
	3.4 Binary codes are identified as per workplace requirements.
	3.5 Representation of decimals in BCD is carried out
	3.6 BCD arithmetic is performed as per workplace requirements.

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4. Apply Logic Gates	4.1 Logic gates are identified as per workplace requirements.
	4.2 Boolean Algebra is applied as per workplace requirements
	4.3 Logic gates are applied as per workplace requirements
5. Perform sequence and series operations	5.1 Summation of a sequence is applied as per workplace requirements.
	5.2 Arithmetic series is applied as per workplace requirements
	5.3 Geometric series is applied as per workplace requirements
6. Demonstrate graph theory	6.1 ***Key Graph terminologies*** are applied as per workplace requirements
	6.2 ***Types of graphs*** are applied as per workplace requirements
	6.3 ***Representation of graphs*** are applied as per workplace requirements
	6.4 Applications of graphs are applied as per workplace requirements.

RANGE

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

Variable	Range
1. Methods of Set representation may include but is not limited to:	• Statement form • Tabular form • Set builder notation
2. Sets may include but is 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
3. Set operations may include but is not limited to:	• Venn Diagram • Set Union and Set Intersection • Set Difference/Relative Complement • Set Complement
4. Types of matrices may include but is not limited to:	• Square • Symmetric • Skew-symmetric • Diagonal • Identity • Orthogonal

5. Matrix operations may include but not limited to:	• Sum of matrices
	  ○ 2 x 2 matrices
	  ○ 3 x 3 matrices
	• Matrix subtraction
	  ○ 2 x 2 matrices
	  ○ 3 x 3 matrices
	• · Product of two matrices

6. Number systems may include but not limited to:	• Hexadecimal number system • Octal number system • Decimal number system • Binary number system
7. Binary codes may include but not limited to:	• Binary Coded Decimal (BCD) • Gray Code • Excess-3 Code • ASCII • EBCDIC
8. Types of graphs may include but is not limited to:	• Bar graphs • Line graphs • Histogram • Ogive curves
9. Representations of graphs may include but is not limited to:	• Adjacency matrix • Adjacency list

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;
- Decision making;
- Research;
- Problem solving;

Required knowledge

The individual needs to demonstrate knowledge of:

- Set Theory
- Matrices
- Relations and Functions
- Recursion
- Sequence and Series
- Graph Theory

EVIDENCE GUIDE

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

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Applied set operations as per workplace requirements. 1.2 Performed matrix operations. 1.3 Applied types of relations as per workplace requirements. 1.4 Applied types of functions as per workplace requirements. 1.5 Applied types of recursion relations as per workplace requirements. 1.6 Applied arithmetic series as per workplace requirements. 1.7 Applied geometric series as per workplace requirements. 1.8 Applied application of graphs as per workplace requirements.
2. Resource Implications	The following resources must be provided: 2.1 Access to relevant workplace where assessment can take place. 2.2 Appropriately simulated environment where assessment can