

APPLY DISCRETE MATHEMATICAL CONCEPTS

ISCED UNIT CODE: 0613 541 11A

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UNIT DESCRIPTION:

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

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace functions	These are assessable statements which specify the required level of performance for each of the elements <i>(Bold and italicized Types of matrices are applied as per terms are elaborated in the range)</i>
1. Carry out set theory operations	1.1 <i>Characteristics of sets</i> are identified as per workplace requirements. 1.2 Methods of set representation are applied as per workplace requirements. 1.3 Cardinality of a set is applied as per workplace requirements. 1.4 <i>Types of sets</i> are applied as per workplace requirements. 1.5 Venn Diagrams are applied as per workplace requirements. 1.6 <i>Set Operations</i> are applied as per workplace requirements
2. Perform matrix operations	2.1 Matrix order applied as per workplace requirements. 2.2 Matrix operations are applied as per workplace requirements. 2.3 Transpose of a matrix is applied as per workplace requirements. 2.4 Properties of transpose of a matrix are identified as per workplace requirements. 2.5 Adjoint of a square matrix identified as per workplace requirements. 2.6 Inverse of a square matrix is identified as per workplace requirements.

3. Apply number system	3.1 Number systems are identified as per the mathematical standards 3.2 Number system conversions are performed as per the conversion procedures 3.3 Number system arithmetic is performed as per the arithmetic procedures. 3.4 Binary codes are applied based on standard mathematics procedures
4. Apply logic gates	4.1 Logic gates are identified as per the Digital Electronics principles 4.2 Logic circuits are illustrated as per the standard procedures 4.3 Logic circuits are simplified as per the standard procedures
5. Perform sequence and series operations	5.1 Key terms of sequences are applied as per workplace requirements. 5.2 Summation of a sequence is applied as per workplace requirements. 5.3 Arithmetic series is applied as per workplace requirements 5.4 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 Application 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. Characteristics of sets may include but is not limited to:	● Elements ● Size
2. Methods of Set representation may include but is not limited to:	● Statement form ● Tabular form ● Set builder notation
3. Types of 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
4. Set operations may include but is not limited to:	● Set Union and Set Intersection ● Set Difference/Relative Complement ● Set Complement ● Cartesian Product
5. Types of matrices may include but is not limited to:	● Square ● Symmetric ● Skew-symmetric ● Diagonal ● Identity ● Orthogonal ● Involuntary
6. Matrix operations may include but is 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
7. Number system may include but is not limited to:	● Decimal ● Binary ● Octal ● Hexadecimal
8. Binary codes	● ASCII ● BCD ● Non weighted ● Alphanumeric code ● Error detection codes ● Error correcting codes ● Gray code, ● Excess-3 ● EBCDIC
9. Key terms used in sequences may include but is not limited to:	● Sequence ● Arithmetic Progression ● Geometric Progression
10. Key Graph Terminologies may include but is not limited to:	● Node

	• Edge • Adjacency • Vertex
11. Types of graphs may include but is not limited to:	• Null • Simple • Multigraph • Directed graphs • Undirected
12. 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 Performed number system conversions as per the conversion procedures 1.4 Performed number system arithmetic as per the arithmetic procedures.
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	1.5 Applied binary codes based on standard mathematics procedures 1.6 Illustrated logic circuits as per the standard procedures 1.7 Simplified logic circuits as per the standard procedures 1.8 Applied arithmetic series as per workplace requirements. 1.9 Applied geometric series as per workplace requirements. 1.10 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 take place. 2.3 Resources relevant to the proposed activity or tasks.
3. Methods of Assessment	Competency may be assessed through: 3.1 Portfolio of evidence 3.2 Written tests 3.3 Interviews 3.4 Third party report 3.5 Practical assessment
4. Context of Assessment	Competency may be assessed: 4.1 On-the-job 4.2 In a simulated work environment
5. Guidance information for assessment	1.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.