Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

Applied Mathematics

# GENBA402

# Apply Basic Mathematical Analysis

## Competence

RQF Level: 4

Learning Hours 60

Credits: 6

Sector: **Hospitality and Tourism**

Trade: **Food and Beverages Operations Front Office and Housekeeping operations, Tourism,**

Module Type: General

**Issue Date: April 2022**

CURRICULUM: **GENBA402-TVET CERTIFICATE 4 - Hospitality and Tourism**

<table>
<tr><td>Purpose statement</td><td colspan="5">This general module describes the knowledge, skills and attitude required to apply basic mathematical analysis. The ability to do basic mathematical analysis is absolutely vital to successfully passing any field. At the end of this module, the trainee of Level Four will be able to solve algebraically and graphically linear or quadratic equations and inequalities. He/she will also be able to analyze algebraic functions, and to apply fundamentals of differentiation, as algebra and fundamentals of differentiation are tools of different field. Therefore, this module will be useful to trainees as a means of analysis and improving their understanding of Mathematics and he/she will be prepared to perform well in any fields that require some knowledge of mathematics especially algebra and fundamentals of differentiation as well as working in daily mathematical logic and problem solving, financial and economics in hospitality sector for an effective performance in critical thinking.</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group project and presentation</td><td>20%</td></tr>
<tr><td>• Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

## Elements of Competency and Performance Criteria

| Elements of competency | Performance criteria |
|---|---|
| 1. Solve algebraically or graphically linear and quadratic equations | 1.1. A linear equation and inequality are correctly solved in accordance with the required steps |
| | 1.2. The parameter from given equations is properly discussed based on established conditions |
| | 1.3. Two simultaneous linear equations are properly solved in accordance with the required steps |
| | 1.4. A quadratic equation is effectively solved in accordance with the required steps |
| 2. Analyse algebraic functions | 2.1 The domain and range of algebraic function are accurately determined based on existence condition. |
| | 2.2 Symmetry (parity) of algebraic function is adequately identified based on definitions of key words (even and odd). |

| | |
|---|---|
| | **2.3 Limits of a function are correctly determined based on theory of calculating limits.** |
| | **2.4 The asymptotes are accurately determined based on limits calculation.** |
| **3. Apply fundamentals of differentiation** | **3.1 Derivative is properly determined by using definition.** |
| | **3.2 Derivative of a function is adequately interpreted by illustrating a curve with its tangent and secant line.** |
| | **3.3 Derivative is appropriately applied based on definitions and calculation** |
| | **3.4 Curve of an algebraic function is accurately sketched based on the table of variation** |

# Course content

| **Learning outcomes** | **At the end of the module the learner will be able to:**<br>1. **Solve algebraically or graphically linear and quadratic equations or inequalities**<br>2. **Analyse algebraic functions**<br>3. **Apply fundamentals of differentiation** |
|---|---|
| Learning outcome 1: Solve algebraically or graphically linear and quadratic equations or inequalities | **Learning hours: 25** |

**Indicative content**

- **Solving linear equations and inequalities**
  - ✓ Algebraic method
  - ✓ Graphical method
- **Discussion on parameter from a given equation**
- **Solving two simultaneous linear equations**
  - ✓ Algebraic method
  - ✓ Graphical method
- **Solving a quadratic equation**
  - ✓ Algebraic method
    - Factorizing method
    - Square root property
    - Completing the square
    - Quadratic formula
  - ✓ Graphical method

- Construction of a parabola
- Determination of solutions set

| Resources required for the learning outcome | |
|---|---|
| Equipment | Computer, Internet, Projector ,Reference books |
| Materials | Geometric instruments manila paper |
| Tools | Video, Pictures |
| Facilitation techniques | • Demonstration and simulation<br>• Practical exercise<br>• Individual work<br>• Trainer guided<br>• Group discussion<br>• Brainstorming<br>• Group discussion and presentation<br>• Home work<br>• Documentary research |
| Formative assessment methods | • Written assessment<br>• Performance assessment |

| **Learning outcome 2:** Analyze algebraic functions | **Learning hours: 15** |
|---|---|

**Indicative content**

- **Determination of the domain and range of algebraic function**
  - ✓ Existence condition
  - ✓ Domain of definition of a function
  - ✓ Range of a function
- **Identification of symmetry of algebraic function**
  - ✓ Even function
  - ✓ Odd function
- **Determination of function limits**
  - ✓ Finite limits
  - ✓ Infinite limits
  - ✓ Limit at infinity
  - ✓ Remove of indeterminate cases
    - $\frac{0}{0}$
    - $\frac{\infty}{\infty}$

- $0 \cdot \infty$
- $\infty - \infty$

- **Determination of asymptotes**
  - ✓ **Rational functions**

| Resources required for the indicative content | |
|---|---|
| Equipment | Computer, Internet, Projector ,Reference books |
| Materials | Geometric instruments manila paper |
| Tools | Video, Pictures |
| Facilitation techniques | • Demonstration and simulation<br>• Individual and group work<br>• Group discussion<br>• Practical exercise<br>• Trainer guided |
| Formative assessment methods | • Written assessment<br>• Performance assessment |

| **Learning outcome 3:** Apply fundamentals of differentiation | **Learning hours: 20** |
|---|---|

**Indicative content**

- **Determination of derivatives**
  - ✓ Derivative of function at a given point
  - ✓ Derivative of a polynomial function
  - ✓ Derivative of a rational and irrational functions
  - ✓ Successive derivatives
- **Interpretation of derivative of a function**
  - ✓ Geometric interpretation
  - ✓ Kinematical meaning of a derivative
- **Application of derivative**
  - ✓ Determination of equation of tangent line at a given point
  - ✓ Determination of equation of normal line at a given point
  - ✓ Increasing and decreasing intervals for a function
  - ✓ Maximum and minimum points of a function
  - ✓ Concavity, inflection point on a graph
- **Sketching curve of algebraic function**
  - ✓ **Establishing required parameters**

| |
|---|
| ➢ Variation table<br>➢ Additional points<br>✓ Sketching graph of polynomial function<br>✓ Sketching graph of rational function |

| Resources required for the indicative content | |
|---|---|
| Equipment | Computer, Internet, Projector ,Reference books |
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| Tools | Video, Pictures |
| Facilitation techniques | • Demonstration and simulation<br>• Practical exercise<br>• Individual work<br>• Trainer guided<br>• Group discussion<br>• Brainstorming<br>• Group discussion and presentation<br>• Home work<br>• Documentary research |
| Formative assessment methods | • Written assessment<br>• Performance assessment |

## References:


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