**REPUBLIC OF RWANDA**

**MINEDUC**

**GASABO DISTRICT**

**SCHEME OF WORK**

**Academic year: 2022-2023 Term I School:** ………………………..**Subject: MATHEMATICS**

**Teacher’s name: ………………………………….. Class: SENIOR FIVE….. NUMBER OF PERIOD PER WEEK: 7PERIODS**

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| **DATE** | **UNIT TITLE** | **LESSON TITLES**  **+EVALUATION** | **LEARNING OBJECTIVE** | **TEACHING METHODE+TECHNIQUES + EVALUATION PROCEDURES** | **RESSOURCES/ REFERENCE** | **OBSERVATION** |
| Week 1  26-30/09 | **UNIT1: TRIGONOMETRIC FOMULAE, EQUATIONS AND INEQUALITIES**  **Key Unit Competence:** Solve trigonometric equations, inequalities and related problems using trigonometric functions and equations. | **TRANSFORMATION FORMULAES**:  1.Addition and subtractions formula  2.Double angle formulae  3. Half angles formulae | **Knowledge and understanding**  - Show how to use transformation formulas to simplify the trigonometric expressions.  - Extend the concepts of trigonometric ratios and their properties to trigonometric equations.  - Analyse and discuss the solution of trigonometric inequalities.  **Skills**  - Use trigonometric functions and equations to model and solve problems involving trigonometry concepts.  **Attitudes and values**  - Appreciate the use and importance of trigonometric functions and equations to understand problems arising in complex numbers, in integration in harmonic motion. | .Group work  .Individual work  .Brain storming | HIGHER ENGINEERING MATHEMATICS 15th edition 2006 |  |
| Week 2  03-07/10 | 3. Transformation of product in sum  4. Transformation of sum in product |  |  |  |
| Week 3  10-14/10 | **TRIGONOMETRIC EQUATION**  5.Equation of the form ,  6.Equation of the form ,  7.equation of the form ,  8. equation of the form | .Brain storming  .group work  .individual work  .Questions and answer method | Shampiona 2005 mathematics 6 |  |
| Week 4  17-21/10 | 9.Equation involving quadratic equations in cosθ  10. Equation involving quadratic equations in sinθ and tanθ    **TRIGONOMETRIC INEQUALITIES.**  11.The form  12.  13.The equation of the form |
| Questions and answer method  . Brain storming  . group work  . individual work | Schaum’s outline series trigonometry 3rd Edition 1999  Shampiona 2005 mathematics 6 |  |
| Week 5  24-28/10 |  | 14.the form  15.appplications  -Euler’s formula  -Integration, Harmonic Motion  **Summative evaluation** |  |  |  |  |
| Week 6  31/10-04/11 | **UNIT2. SEQUENCES**  **Key Unit Competence:** Understand, manipulate and use arithmetic, geometric and harmonic sequences, including convergence. | 1.generalities on sequences  2. Arithmetic sequences  (Definition, general term, sum of terms, Inserting term). | **Knowledge and understanding**  - Define a sequence and determine if a given sequence increases or decreases, converges or not.  - Define and understand arithmetic progressions and their properties.  - Determine the value of “n”, given the sum of the first “n” terms of arithmetic progressions.  **Skills**  - Use basic concepts and formulas of sequences to find the value “n”, given the sum of the first “n” terms of arithmetic progressions - the “nth” term and the sum of the first “n”terms of arithmetic progressions.  **Attitudes and values**  - Show concern for patience, mutual respect, tolerance and curiosity to discuss about sequences and their applications. | .Brain storming  .questions and answers  .questions and answers  .group work | Higher Engineering Mathematics  5th Edition 2006 |  |
| Week 7  07-11/11 | 3.Harmonic progression (definition, general term, exercises)  4.geometric progression  .definition  5.general term Product | .Brain storming  .Group work | Shampiona 2005 mathematics 6 |  |
| Week 8  14-18/11 | 6.Inserting terms  7. sum of terms  8.Application: population growth  9.simple and compound interest  10.Half life and decay  11.Bacteria growth  **Summative evaluation** | .Brain storming  .group work  .individual work  .Questions and answer method | HIGHER ENGINEERING MATHEMATICS 15th edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 9  21-25/11 | **Unit 3: Logarithmic and exponential equations**  **Key unit competence**: solve equations involving logarithms or exponentials and apply them to model and solve related problems | 1. **Logarithmic equations, including natural logarithms.** | **Knowledge and understanding**  - Define logarithm or exponential equations using properties of logarithms in any base.  - State and demonstrate properties of logarithms and exponentials.  - Carry out operations using the change of base of logarithms. | .Brain storming  .questions and answers  .questions and answers  .group work | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 10  28/11-02/12 | 2.**Exponential equations.**    3.**Application:** | **Skills**  - Use the properties of logarithms to solve logarithmic and exponential equations.  **Attitudes and values**  - Show concern on patience, mutual respect and tolerance in solving problems involving logarithmic or exponential equations. | .Brain storming  .questions and answers  .questions and answers  .group work | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 11  05-09/12 | **REVIEW AND SUMMATIVE EVALUATION** | | | | | |
| Week 12  12-16/12 | **EXAMS** | | | | | |
| Week 13  19-23/12 | **SCHOOL REPORT** | | | | | |

**Academic year:2022-2023 Term II School:** ………………………..**Subject: MATHEMATICS**

**Teacher’s name: ………………………………… Class: SENIOR FIVE NUMBER OF PERIOD PER WEEK: 7PERIODS**

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| **DATE** | **UNIT TITLE** | **LESSON TITLES**  **+EVALUATION** | | **LEARNING OBJECTIVE** | **TEACHING METHODE+TECHNIQUES + EVALUATION PROCEDURES** | **RESSOURCES/ REFERENCE** | **OBSERVATION** |
| Week 1  09-13/01 | **Unit 4: Solving equations by numerical method.**  **Key Unit Competence:** To be able to use numerical methods e.g Newton-Raphson method to approximate solution to equations. | 1.**Numerical methods:**  .Linear interpolation and extrapolation.  . Location of roots: by graphical and analytical methods. | | **Knowledge and understanding**  - Illustrate numerical techniques for approximating solutions to equations and be aware of their limitations.  **Skills**  - Use numerical methods to approximate solutions of equations.  - Select a numerical method appropriate to a given problem.  - Derive error estimates for approximate solutions to equations.  **Attitudes and values**  - Appreciate that equations can only be solved approximately using numerical methods. | .group work  Group work  Group work | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 2  16-20/01 | **2. Iterative methods: Newton Raphson Method (general formula and tolerance limit).**  **3. Bisection methods.** | | .Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 3  23-27/01 | **4.Fixed point iteration.**  **Summative evaluation** | | .Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 4  30/01-03/02 | **Unit 5: Trigonometric and inverse trigonometric functions.**  **Key Unit Competence:** Apply theorems of limits and formulas of derivatives to solve problems of refraction of light in a prism, simple harmonic motion problems, and optimisation including trigonometric or inverse trigonometric functions. | 1.**Trigonometric functions:**  o Generalities:  - Definitions  - Domain and range of a function  - Parity of a function | | **Knowledge and understanding**  - Extend the concepts of function, domain, range, period, inverse function, limits to trigonometric functions.  - Extend the concepts of limits and/or differentiation to model and solve problems involving trigonometric or inverse trigonometric functions.  **Skills:**  - Derive techniques of differentiation to model and solve problems related to trigonometry.  **Attitudes and values**  - Appreciate that questions of refraction of light in prism, simple harmonic motion problems, optimisation, involving trigonometric functions can be solved using concepts of limits and/or techniques of derivatives. | Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 5  06-10/02 |  | (odd or even)  - Periodic functions | | Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 6  13-17/02 |  | o Limits, including indeterminate cases: 0.∞, , | | Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 7  20-24/02 |  | o Differentiation of trigonometric functions – extend this to high derivatives.  **2.Inverse trigonometric functions.**  **3. Applications:**  . Refraction of light in prism.  . Simple harmonic motion problems.  **Summative evaluation** | | Brain storming  .group work  .individual work  .Questions and answer method |  |
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| Week 8  27/02-03/03 | **Unit 6: Vector space of real numbers**  **Key Unit Competence:** Study linear dependence of vectors of R3, solve problems related to angles using the scalar product in 3D and use the  vector product to solve mensuration problems in 3D | **Vector spaces**  o Definitions and  operations on vectors.  o Properties of vectors  o Sub-vector spaces.  o Linear combination of  vectors.  o Basis and dimension. | | **Knowledge and understanding**  - Define a basis and  the dimension of a  vector space and  give examples of  bases of R3  - Define addition of  vectors of R3 and  multiplication of a  vector of R3 by a  scalar.  - Define the dot product and the cross product of two  vectors in a three dimensional vector space and list  **Skills:** - Perform operations on vectors in 3 dimensions.  **Attitudes and values**  - Appreciate the importance of the dot product as a measure of parallelism and the cross  product as a measure of perpendicularity. | Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 9  06-10/03 |  | **Euclidian Vector space**  o Dot product and  properties.  o Modulus or magnitude  of vectors.  o Angle between two  vectors.  o Vector product and properties. | | Brain storming  .group work  .individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 10  13-17/03 | **REVIEW AND SUMMATIVE EVALUATION** | | | | | | |
| Week 11  20-24/03 | **EXAMS** | | | | | | |
| Week 12  27-31/03 | **SCHOOL REPPORT** | | | | | | |
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**Academic year:2022-2023 Term III School:** ………………………..**Subject: MATHEMATICS**

**Teacher’s name: ……………………………………. Class: SENIOR FIVE NUMBER OF PERIOD PER WEEK:7PERIOD**

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| **DATE** | **UNIT TITLE** | **LESSON TITLES**  **+EVALUATION** | **LEARNING OBJECTIVE** | **TEACHING METHODE+TECHNIQUES + EVALUATION PROCEDURES** | **RESSOURCES/ REFERENCE** | **OBSERVATION** |
| Week 1  17-21/04 | **Unit 7: Matrices and determinants of order 3.**  **Key Unit Competence:** Apply matrix and determinant of order 3 to solve related problems. Demonstrate that a transformation of *IR3* is linear and perform  operations on linear transformations of  *IR3* using vectors. | 1.**Matrix of a linear transformation:**  2.**Operations on matrices:**  o Equality of matrices.  o Addition. | **Knowledge and understanding**  - Define operations on  matrices of order 3.  - Illustrate the  properties of  determinants of  matrices of order 3.  - Show that a square  matrix of order 3 is  invertible or not.  - Define a linear  transformation in 3D  by a matrix.  - Define and perform  operations on linear  transformations of order  3  - Express analytically  the inverse of an  isomorphism of order 3  - Discuss with respect to a parameter the solutions of a system of three linear equations in three unknowns.  **Skills**  - Perform operations on matrices of order 3.  - Calculate the determinants of matrices of order 3.  - Explain using determinant whether a matrix of order 3 is invertible or not.  - Determine the inverse of a matrix of order 3.  - Reorganise data into matrices.  - Determine the matrix of a linear transformation in 3D.  **Attitudes and values**  - Appreciate the importance of matrices of order 3 and their determinants in organising data and solving related problems. | .Group work  .Individual work  .Brain storming | HIGHER ENGINEERING MATHEMATICS 15th edition 2006 |  |
| Week 2  24-28/04 | o Multiplication by a scalar.  o Multiplication of matrices.  o Transpose of a matrix.  o Inverse of a square matrix. | .Brain storming  .group work  .individual work  .Questions and answer method | Shampiona 2005 mathematics 6 |  |
| Week 3  01-05/05 |  | **3. Determinant of a matrix of order 3:**  **4.Applications of determinants.**  **SUMMATIVE EVALUATION** | . Brain storming  . group work  . individual work  . Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 4  08-12/05 | **Unit 8: Points, straight lines and sphere in 3D.**  **Key Unit Competence:** Use algebraic representations of points, lines, spheres and planes in 3D space and solve related problems. | **1. Points in 3D:**  - Cartesian coordinates of a point, distance between two points, mid-points of a line segment.  **3 Lines in 3D**:  - Equations of line:  - Vector, parametric equations, Cartesian equation. | **Knowledge and understanding**  - Define by its coordinates the position of a point in 3D.  - Define a line using points and direction vector.  - Define the position vectors of plane.  - Define the positions of a line and a sphere in 3D.    **SKILLS**  - Determine equations of a straight line (vector equation, parametric equation, Cartesian equation).  **Attitudes and values**  - Think critically in problem solving related to the equations of lines and planes. | . Brain storming  . group work  . individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 5  15-19/05 |  | **4.Planes in 3D**:  o Determination of a plane in 3D.  o Equations of line:  o Vector, parametric, Cartesian equation. | . Brain storming  . group work  . individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 6  22-26/05 |  | **5. Problems on points and straight lines in 3D:**  o Positions, angles,  distance. | . Group work  . Individual work  .Brain storming | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 7  29/05-02/06 |  | 6.**Sphere:**  o Definition.  o Cartesian equation of a sphere.  o Positions of sphere in 3D  **7. Point – Sphere.**  **8. Line – Sphere.**  **9. Plane – Sphere**.  **Summative evaluation** | . Group work  . Individual work  .Brain storming | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6  Higher Engineering |  |
| Week 8  05-09/06 | **Unit 9: Bivariate statistics.**  **Key Unit Competence:** Extend understanding, analysis and interpretation of bivariate data to correlation coefficients and regression lines. | 1.**Covariance.**  2. **Correlation coefficient.**  3. **Regression lines.**  4. **Applications:**  **Summative Evaluation** | **Knowledge and understanding**  - Define the covariance, coefficient of correlation and regression lines.  - Analyse, interpret data critically then infer conclusion.  **Skills**  - Determine the coefficient of correlation, covariance and regression lines of bivariate data of dispersion of a given statistical series.  **Attitudes and values**  - Appreciate the importance of regression lines and coefficient of correlation to analyse, interpret data to infer conclusion - Predict event e.g after analysing the population growth of a given country, we can make a decision about the future | . Brain storming  . group work  . individual work  .Questions and answer method | Higher Engineering Mathematics  5th Edition 2006  Shampiona 2005 mathematics 6 |  |
| Week 9  12-16/06 | **Unit 10: Conditional probability and Bayes theorem.**  **Key Unit Competence:** Solve problems using Bayes theorem and use data to make decisions about likelihood and risk. | **1. Conditional probability:**  o Probability of event B occurring when event A has already taken place.  o Basic formulae and properties of conditional probability. | **Knowledge and understanding**  - Extend the concept of probability to explain it as a measure of chance.  - Compute the probability of an event B occurring when event A has already taken place.  - Interpret data to make decision about likelihood and risk  **Skills**  - Determine and explain results from an experiment with possible outcomes  **Attitudes and values**  - Appreciate the use of probability theorem as measure of chance. | Brain storming  . group work  . individual work  .Questions and answer method | HIGHER ENGINEERING MATHEMATICS 15th edition 2006 |  |
| Week 10  19-23/06 | o Independent events.  o Probability tree diagram.  **2. Bayes theorem and its applications**.  **Summative evaluation** | Brain storming  . group work  . individual work  .Questions and answer method | -Feller, W.[1968].an introduction to probability theory and its applications, third edition, Wiley, New York |  |
| Week 11  26-30/06 | **REVIEW AND SUMMATIVE EVALUATION** | | | | | |
| Week 12  03-07/07 | **EXAMS** | | | | | |
| Week 13  10-14/07 | **SCHOOL REPORT** | | | | | |