**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 126-30/09 | **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 formula2.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 203-07/10 | 3. Transformation of product in sum4. Transformation of sum in product |  |  |  |
| Week 310-14/10 | **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 417-21/10 | 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 1999Shampiona 2005 mathematics 6 |  |
| Week 524-28/10 |  | 14.the form 15.appplications-Euler’s formula-Integration, Harmonic Motion **Summative evaluation** |  |  |  |  |
| Week 631/10-04/11 | **UNIT2. SEQUENCES****Key Unit Competence:** Understand, manipulate and use arithmetic, geometric and harmonic sequences, including convergence.  | 1.generalities on sequences2. 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 Mathematics5th Edition 2006 |  |
| Week 707-11/11 | 3.Harmonic progression (definition, general term, exercises)4.geometric progression .definition5.general term Product  | .Brain storming.Group work | Shampiona 2005 mathematics 6 |  |
| Week 814-18/11 | 6.Inserting terms7. sum of terms8.Application: population growth9.simple and compound interest10.Half life and decay11.Bacteria growth**Summative evaluation** | .Brain storming.group work.individual work.Questions and answer method | HIGHER ENGINEERING MATHEMATICS 15th edition 2006Shampiona 2005 mathematics 6 |  |
| Week 921-25/11 | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 1028/11-02/12 | 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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 1105-09/12 |  **REVIEW AND SUMMATIVE EVALUATION** |
| Week 1212-16/12 |  **EXAMS** |
| Week 1319-23/12 |  **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 109-13/01 | **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 workGroup workGroup work | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 216-20/01 | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 323-27/01 | **4.Fixed point iteration.****Summative evaluation** | .Brain storming.group work.individual work.Questions and answer method | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 430/01-03/02 | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 506-10/02 |  | (odd or even) - Periodic functions  | Brain storming.group work.individual work.Questions and answer method | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 613-17/02 |  | o Limits, including indeterminate cases: 0.∞, $\frac{0}{0}$, $\frac{\infty }{\infty }$  | Brain storming.group work.individual work.Questions and answer method | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 720-24/02 |  | 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 827/02-03/03 | **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 thevector product to solve mensuration problems in 3D | **Vector spaces** o Definitions andoperations on vectors.o Properties of vectorso Sub-vector spaces.o Linear combination ofvectors.o Basis and dimension. | **Knowledge and understanding** - Define a basis andthe dimension of avector space andgive examples ofbases of R3- Define addition ofvectors of R3 andmultiplication of avector of R3 by ascalar.- Define the dot product and the cross product of twovectors 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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 906-10/03 |  | **Euclidian Vector space**o Dot product andproperties.o Modulus or magnitudeof vectors.o Angle between twovectors.o Vector product and properties.  | Brain storming.group work.individual work.Questions and answer method | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 1013-17/03 |  **REVIEW AND SUMMATIVE EVALUATION** |
| Week 1120-24/03 |  **EXAMS** |
| Week 1227-31/03 |  **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 117-21/04 | **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 performoperations 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 onmatrices of order 3.- Illustrate theproperties ofdeterminants ofmatrices of order 3.- Show that a squarematrix of order 3 isinvertible or not.- Define a lineartransformation in 3Dby a matrix.- Define and performoperations on lineartransformations of order3- Express analyticallythe inverse of anisomorphism 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 224-28/04 | 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 301-05/05 |  | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 408-12/05 | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 515-19/05 |  | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 622-26/05 |  | **5. Problems on points and straight lines in 3D:** o Positions, angles, distance.  | . Group work. Individual work.Brain storming | Higher Engineering Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 729/05-02/06 |  | 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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6Higher Engineering  |  |
| Week 805-09/06 | **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 Mathematics5th Edition 2006Shampiona 2005 mathematics 6 |  |
| Week 912-16/06 | **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 1019-23/06 | 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 1126-30/06 |  **REVIEW AND SUMMATIVE EVALUATION** |
| Week 1203-07/07 |  **EXAMS** |
| Week 1310-14/07 |  **SCHOOL REPORT** |