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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR TWO**

**FIRST SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: MAT 212**

**COURSE TITLE: LINEAR ALGEBRA 1**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 05/02/2020 TIME: 09.00-11.00 AM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Define the following terms as used in Linear Algebra
2. Elementary matrix (1 mark)
3. Transpose of a matrix (1 mark)
4. Vector subspace, (2 marks)
5. Gauss-Jordan form of a matrix (2 marks)
6. Reduce the augmented matrix to

Echelon form and hence solve the equations

(6 marks)

Find the angle between and (5 marks)

1. Show that if are vectors in then (5 marks)
2. Obtain the rank of the matrix and state whether it is invertible given that (5 marks)
3. Prove that for any vector and any scalar , (3 mark

**QUESTION TWO (20 MARKS)**

1. Apply the rank test to determine the nature of the solutions to the set of equations (9 marks)
2. Use to solve the simultaneous equations (11 marks)

**QUESTION THREE (20 MARKS)**

1. Let be two subspaces of . Show that (3 marks)
2. Let . Show that is a subspace of where

(4 marks)

1. Determine the three square elementary matrices corresponding to the operations : (3 marks)
2. Use Gaussian-Elimination method to solve the set of equations

**QUESTION FOUR (20 MARKS)**

1. (i) Define linear combination of vectors (2 marks)

(ii) Let be a vector space. Let ) and . Express as a linear combination of and (4 marks)

1. (i) Define linear dependence (LD) of vectors (2 marks)

(ii) Show that the vectors in are linearly dependent (7 marks)

1. Show that is a vector subspace of (5 marks)

**QUESTION FIVE (20 MARKS)**

1. Suppose is the set of real valued functions of
2. Show that is the Wroskian of Hence or otherwise prove that (6 marks)
3. If are linearly independent vectors in a vector space then prove that the set is LD. (5 marks)
4. A linear transformation is defined on the vector space of by .
5. Give a rule for the inverse transformation (4 marks)
6. Obtain (2 marks)
7. Show that is linear (3 marks)