****

**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS ANDACTUARIAL SCIENCES**

**UNIVERSITY EXAMINATION FOR BED AND ACTUARIAL SCIENCES**

**2ndYEAR 2nd SEMESTER 2016/2017 ACADEMIC YEAR**

**MAIN CAMPUS**

**COURSE CODE: SMA201**

**COURSE TITLE: LINEAR ALGEBRA II**

**EXAM VENUE: AUDITORIUM STREAM: BED AND ACT SCIENCE**

**DATE: 27/04/17 EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2 HOURS**

**Instructions:**

1. **Answer question1 and any other 2 questions.**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

**Question1 [30marks]Compulsory**

1. (i)Given matrix 

Compute  the transpose of and determinant of. [5marks]

(ii)If 

Find the matrix the ***adjoint*** of **A***.* [5marks]

(b)Suppose the mapping  with 

# (i) Show that is linear. [6marks]

(ii)Determine the matrix of  with respect to the ordered basis [7 marks]

# (c) Let the binary rules,be definedon the vector space by :

# ;

# [7marks]

# (ii)State giving reasons which of the rules, is not an inner product on the vector space[7marks]

# 

**Question2 [20marks]**

(a)(i)Without using direct computation , show that eigenvalues of

the matrix . [4marks]

(ii) Verify that  [5marks]

(b) (i) For what values of the constants 

does the matrix equation hold ?[4marks]

(ii) Determine the specific values of the constants 

such that the set of 3by3 matrices is linearly independent

[7marks]

**Question3 [20marks]**

(a ) Let  be the form on  such that  is a real vector space. Define , the matrix of  w.r.t an ordered basis by .[8marks]

# (b)Suppose is a form on defined by

.

Find the matrix of **** in each of the bases

(i)  (ii) [12 marks]

Question4 [20 marks]

###### Consider the vector space of with the inner product :

###### ; ,

(a)Show that **[4 marks]**

(b)Show that **[4 marks]**

(c)Determine  **[4 marks]**

(d)Apply the Gram-Schmidt process to the set of linearly independent vectors

###### 

to obtain orthogonal set of vectors **. [8 marks]**

**Question5 [20marks]**

Let be the matrix of linear operatoron -dimensional vector spaceover with respect to the standard ordered basis for.

(a) Explain what is meant by (i) is an eigenvector of ,(ii) is an eigenvalue of , [6 marks]

(b) State the relationship between and  [2marks]

(c) If matrixfind

(i) the eigenvalues of andthe corresponding eigenvectors [8marks]

(d) Confirm that is diagonalizable. [2marks]

(e) Diagonalize matrix . [2marks]