**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya.**

 **Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.mucst.ac.ke**](http://www.mucst.ac.ke) **Email:** **info@mucst.ac.ke**

**University Examinations 2014/2015**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

AND

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN COMPUTER SCIENCE

**ICS 2211: NUMERICAL LINEAR ALGEBRA**

**DATE: DECEMBER 2014 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Given the linear system

$ 2x\_{1}$-6$∝x\_{2=}$3

$3∝x\_{1}-x\_{2}$=1.5

1. Find the value(s) of $∝$ for which the system has no solution (3 marks)
2. Find value(s) of $∝$ for which the system has an infinite number of solutions
3. marks)
4. Assuming a unique solution exists for a given $∝$, find the solution (2 marks)
5. Solve the system of equations below by matrix inversion method (10 marks)

x1+x2+x3=1

x1+2x2+3x3=6

x1+3x2+4x3=6

1. Solve by Gaussian elimination method the linear system of equations below (8 marks)

$x\_{1}+\frac{1}{2}x\_{2}$+$^{1}/\_{3}x\_{3}=1$

$^{ 1}/\_{2}x\_{1}+^{1}/\_{3}x\_{2}+^{1}/\_{4}x\_{3}$=0

$^{ 1}/\_{3}x\_{1}+^{1}/\_{4}x\_{2}+^{1}/\_{5}x\_{3}$=0

1. Find the condition for k such that the matrix

  is invertible (4 marks)

**QUESTION TWO (20 MARKS)**

1. Solve by Gauss-Seidel iterative method the equations (15 marks)

10x1+x2+x3=12

2x1+10x2+x3=13

2x1+2x2+10x3=14

1. Show that if A and B are invertible square matrices of the same order, then AB is also invertible and that  (5 marks)

**QUESTION THREE (20 MARKS**)

Solve the following linear system of equations by Crout’s method

x+y+z=9

2x-3y+4z=13

3x+4y+5z=40

**QUESTION FOUR (20 MARKS)**

1. Determine the eigen values and corresponding eigen vectors of the following system and show that the eigen vectors are linearly independent. (15 marks)

 $ 10x\_{1}+2x\_{2}+x\_{3}$=$λx\_{1}$

$ 2x\_{1}+10x\_{2}+x\_{3}$=$λx\_{2}$

$ 2x\_{1}+x\_{2}+10x\_{3}$=$λx\_{3}$

1. Find the inverse of the matrix below using Gauss-Jordan method (5 marks)

 