

**W1-2-60-1-6**

## JOMO KENYATTA UNIVERSITY

**OF AGRICULTURE AND TECHNOLOGY**

# University Examinations 2016/2017

**YEAR TWO SEMESTER ONE EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN APPLIED MATHEMATICS**

**SMA 3234: NUMERICAL ANALYSIS III**

**DATE: APRIL 2017 TIME: 3 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

a) During the design of Malysian air bus boeing 777-300 series a linear model was developed as;

x1+2x2-4x3=4

3x1+6x2+3x3=2

3x1+3x2+2x3=6

By determining first the inverse 7 the coefficient matrix solve for x1, x2, x3 (8 marks)

b) Given that  is an approximation to the linear system Ax=b and A is a non-singular matrix than for any natural norm

IIx-II=IIVII IIAII IIA-1II and

 IIIIIIAII IIA-1II IIII provided x0 and b

Where r is residue vector with respect to the system Ax=b (7 marks)

c) Using the Gants-Jordan method with partial pivoting solve the linear system;

x1+x2+3x3=7

4x1+3x2-x3=8

3x1+5x2-3x3=-11 (8 marks)

d) During an inspection to determine the stress in a building frame a linear model was developed as follows;



Solve the system starting with x(0) = 0 using Gants-Siedel intestine model (7 marks)

**QUESTION TWO (20 MARKS)**

a) Solve the linear system Ax=b given by

5x1+3t2 =24

3t1+4t2-t3=30

-t2+6t3=-24

Using the sullesive over Relaxation (SOR) with w=1.25 starting with x0=(1,1,1)t (10 marks)

b) A Robot machine in a manufacturing company is model mathematically as;

t1+t2+t3=8

4t1+(3+λ)t2-4t3=20

3t1+t2+3t3=16

And given that 1+λ21 solve the model using Gaursian-elimination procedure (10 marks)

**QUESTION THREE (20 MARKS)**

a) Solve the non-linear system

3x1-cos x2x3 – 0.5=0

-81(x2+0.1)2+sin x3 +1.06=0

-x1x2 +20x3+

Starting with x(0)=[0.1,0.1,-0.1]T and perform only 5 operations to 6 decimal points

b) Using the simplex method, find the optimum value of the linear programming problem max ~~Z~~=4 t1 +10t2 subject to the curtains;

2t1+t250

2t1+5t2

2t1+3t2

T1t2

**QUESTION FOUR (20 MARKS)**

a) Given that xkER4 be defined by x(k) =[x1(k), x2(k), x3(k), x4(k)]T=[1,2+ ]T

Find the typical values of the sequence x(1), x(2) and x(3) and hence using vector norms show that {xk}k21 approaches

[1,2,0,0] (10 marks)

b) By applying Cholestly method to determine the solution to a mathematical model of abriting late machine given by

4x1-x2=1

-x1+4x2-x3=0

-x2+4x3-x4=0

-x3+4x4=0 (10 marks)