KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE: COMP 327

COURSE TITLE: APPLIED NUMERICAL ANALYSIS

STREAM: Y3S2

DAY: WEDNESDAY

TIME: 9.00 – 11.00 A.M.

DATE: 26/03/2009

INSTRUCTIONS:

Answer question ONE and ANY TWO questions

PLEASE TURN OVER

SECTION A (answer ALL 30 marks)

Question 1.

i) What is an algorithm? State the five characteristics of a good algorithm. (6 marks)

ii) Write an algorithm and C++ program to implement the solution of a quadratic formula. (8 marks)

iii) Discuss the errors encountered in performing numerical calculations. (5 marks)

iv) Using Interhalving method find a real root of the equation x^2-25=0. (5 marks)

v) Write a comprehensive Algorithm to demonstrate how the above method can be solved in programming. (6 marks)

SECTION B (attempt any TWO 20 marks)

Question 2

i) Using the Regula falsi method find a positive root of **$f(x) = x^2$-25=0.**

(8 marks**)**

ii) Assume a set of instructions are to be given to a student to solve the following pair of equations for x and y given the values of **a, b, c, p, q** and **r**.

$$ax + by = c$$
$$px + qy = r$$

Write a relevant algorithm and its object oriented c++ program to evaluate the above set of equations. (12 marks)

Question 3

Solve by Gauss-elimination method, the following system of equations.

i)
$$2x + y + 4z = 12$$
$$8x - 3y + 2z = 20$$
$$4x - 11y - Z = 33$$
(8 marks)

ii) C++ object oriented program to solve a 3 X 3 matrix. (12 marks)

Question 4

i) Solve $x^2 – 5x + 6 = 0$ using the Newton - Raphson method start with $x_0 = 4$ carry out five iterations. (8 marks)

ii) Discuss and Compare the iterative methods i.e. Newton-Raphson method, bisection method, falsi position method, secant method. (12 marks)

Question 5

i) Write a program to implement the trapezoidal rule. (7 marks)

ii) Using Simpson's 1/3rd rule solve $\int_0^1 x^2 \, dx$ (5 marks)

iii) Write a program for the Simpson's rule in (ii) above (8 marks)