



**ELIZADE UNIVERSITY
ILARA-MOKIN, ONDO STATE**

**FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd SEMESTER EXAMINATION
2017 / 2018 ACADEMIC SESSION**

COURSE CODE: MTH 208

COURSE TITLE: Introduction to Numerical Analysis

COURSE LEADER: Dr. I. Olopade

DURATION: 2 Hours

HOD's SIGNATURE

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INSTRUCTION:

Candidates should answer any FOUR (4) Questions.

- 1** Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using
- (i) Trapezoidal Rule, when $n=6$ **5 marks**
- (ii) Simpson's $\frac{1}{3}$ Rule, when $n=6$ **5 marks**
- (iii) Suppose that you have the task of measuring the lengths of a bridge and a rivet and come up with 9999cm and 9cm respectively. If the true values are 10000cm and 10cm respectively. Compute the true error the true percentage relative error for each case. **5 marks**
- 2 (a)** Solve the following equations using Gauss-Seidel iteration method
- $$20x + y - 2z = 17$$
- $$3x + 20y - z = -18$$
- $$2x - 3y + 20z = 25$$
- 8 marks**

- (b) Apply Gauss elimination method to solve the equations
 $x + 4y - z = -5$
 $x + y - 6z = -12$
 $3x - y - z = 4$

7 marks

3 Solve the following equations:

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

By using:

(a) Cramer's rule method

5 marks

(b) Matrix inverse method

10 marks

4. Using Runge-Kutta method of fourth order to solve

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ With } y(0) = 1 \text{ at } x=0.2, \text{ and } 0.4$$

15 marks

5 (a) Complete the table below;

x	$y(x) = \sqrt{x^2}$
1.00	
1.05	
1.10	
1.15	
1.20	
1.25	
1.30	

2 marks

(b) From the table above compute:

(i) $\frac{dy}{dx}$ Using forward differencing method

2 marks

(ii) $\frac{dy}{dx}$ Using backward differencing method

2 marks

(iii) $\frac{dy}{dx}$ Using central differencing method

2 marks

(iv) $\frac{d^2y}{dx^2}$ Using second derivative method

5 marks

(c) Given that $y(x) = \sqrt{x^2}$

Find $\frac{dy}{dx}$

2 marks

6 (a) Given the values

x	0	2	3
y	8	12	29

Use the Lagrange's method to determine y at x=1

6 marks

(b) Solve the following equations using Jacobi's iteration method

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

9 marks