



ELIZADE UNIVERSITY, ILARA-MOKIN,
ONDO STATE, NIGERIA

DEPARTMENT OF
MECHANICAL, AUTOMOTIVE AND PRODUCTION
ENGINEERING

SECOND SEMESTER EXAMINATIONS


2016/2017 ACADEMIC SESSION

COURSE: GNE 212 – Engineering Mathematics II (3 Units)

CLASS: 200 Level General Engineering

TIME ALLOWED: 3 Hours

INSTRUCTIONS: Answer any five questions


HOD'S SIGNATURE

Date: July/August, 2017

Question 1

- (a) Solve the following problem using Euler method (Do – 10 – Steps)

$$y' + y \tan x = \sin 2x, y(0) = 1, h = 0.1$$

(6marks)

- (b) Solve by Gauss Elimination, the system of equations.

$$4x + 2y = 8$$

$$3x + 5y = 6$$

(6marks)

Question 2

- (a) Solve the following problem using Euler method (Do – 10 – Steps)

$$y' - xy^2 = 0, y(0) = 1, h = 0.1$$

(6marks)

- (b) Find the particular solution of the following equation using the method of undetermined coefficients

$$y'' - 2y' - 3y = 4 + 2x - x^2$$

(6marks)

Question 3

Find the particular solution of the following equation using the method of undetermined coefficients

(a) $y'' - y' = 2 \sin x, y_p = A \sin x + B \cos x$

(6marks)

- (b) Solve the following ODE

$$(3x^2 y^2 + x^2)dx + (2x^3 y + y^2)dy = 0 \quad \text{Using Exact Equation}$$

(6marks)

Question 4

- (a) Solve the following ODE

$$\frac{dy}{dx} = \frac{2xy}{x^2 - y^2}$$

Using Integrating factor.

(6marks)

- (b) Solve by Gauss Elimination, the system of equations.

$$x - y - z = 0$$

$$3y - 2z = 0$$

$$7x + 2z = 8$$

(6marks)

Question 5

Solve the following by reduction of the 2nd order equation to 1st order equation

(a) $y'' = 4(y')^{3/2}y$

(6marks)

(b) $x^2y'' + (x - x^2)y' - e^{2x}y = 0$

(6marks)

Question 6

Develop the expression for the solution of the following one dimensional wave equation

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}, \quad C = \text{Constant}$$

(12 marks)

Question 7

Solve the following differential equation using method of separation of variables

(a) (i) $y' = \frac{x(2 \log(x)+1)}{\sin y + y \cos y}$

(4 marks)

(ii) $\cos(x + y) dy = dx$

(4 marks)

- (b) Solve the homogenous equation

$$2xy \frac{dy}{dx} = x^2 + y^2 \quad (\text{given } y=0 \text{ at } x=1)$$

(4 marks)