



EDO UNIVERSITY IYAMHO

Department of Electrical/Electronic Engineering

GEE 226 Engineering Mathematics II

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Lectures: Thursday, 9am – 12 pm, LT1, phone: (+234) 7062701842

Office hours: Monday to Friday, 8am – 4pm, Office Dean's Office, Faculty of Engineering, 3rd Floor, Administrative Block.

Teaching Assistants: *Engr. S.Ogbikaya*

Description: At the completion of the lecture, it is expected that the students should be able to: Solve elementary differential equations, solve differential equations of the second order. Solve simple partial differential equations, analyse linear and non-linear equation. Solve differential equations using finite difference operators.

Prerequisites: Students should be familiar with the concepts of Calculus – Elementary differentiation, relevant theorems. Differential equations – Exact Equations and methods for second order equations. Partial differential equation. Simple cases – Applications. Numerical Analysis – linear equations, non-linear equations. Finite difference operators: Introduction to linear programming.

Assignments: Continuous assessment is based on Test =15, Quiz/Assignment =10, Attendance =5, Total = 30 Marks. Scores from continuous assessment shall normally constitute 30 % of the final marks.

Grading: In addition to continuous assessment, final examinations shall normally be given at the end of the semester. The final grade shall be based as follows: Final Examination – 70%, Continuous assessment – 30% (Quizzes, Tutorials, Homework and Tests).

Textbook: The recommended textbook for this class are as stated:

Title: Engineering Mathematics,

Authors: Strud K.A. And Booth D. J

Publisher: Palgrave Macmillian, Macmillian publishers Limited, 7th Edition

Year: 2013

Title: Engineering Mathematics,
Authors: K.A Stroud
Publisher: Macmillian Press Limited, 4th Edition
ISBN: 0-333-62022-4
Year: 1995

Title: Differential Equation,
Authors: B.C. Ugwu, B.C. Udeh and I.I. Eneh
Publisher: Cheston Ltd
ISBN: 978-35348-5-8
Year: 2000

Lectures: Below is a description of the contents:

Calculus – Elementary differentiation

Concept of Functions

The idea of function is an important ingredient in calculus. A function is a relation between two variables say x and y , such that when any value is assigned to x , then y assumes a unique value. This implies that the value of one is independent of the other.

If a function is defined by: $y = 3x + 1$, then y is a function of x . This implies that the value of y depends on the value of x . Hence the variable x is called the independent variable while the variable y is called the dependent variable. From the given function above, If $x = 1$, then $y = 4$.

A function x , can be represented by the notation $f(x)$, however other notations $h(x)$, $g(x)$ can also be used to denote a function x .

Given a function $f(x)$, the notation $f(2)$ denote the value of $f(x)$ when x is substituted by the value 2.

Example 1

If $f(x) = x - 1$, then

$$f(2) = 2 - 1 = 1$$

$$f(1) = 1 - 1 = 0$$

$$f(0) = 0 - 1 = -1$$

$$f(-1) = -1 - 1 = -2$$

$$f(1/2) = 1/2 - 1 = -1/2$$

Example 2

If $g(\theta) = \sin \theta$, where θ is in radians, then

$$g(\pi) = \sin \pi = 0$$

$$g(\pi/2) = \sin \pi/2 = 1$$

$$g(\pi/6) = \sin \pi/6 = 1/2$$

Example 3

If $f(x) = 3x^2 - x + 1$

Then,

$$F(-2) = 3(-2)^2 - (-2) + 1$$

$$= 12 + 4 + 1$$

$$= 15$$

$$f(x + h) = 3(x + h)^2 - (x + h) + 1$$

$$= 3(x^2 + 2xh + h^2) - x - h + 1$$

$$= 3x^2 + 6xh + 3h^2 - x - h + 1$$

$$f(x - h) = 3(x - h)^2 - (x - h) + 1$$

$$= 3(x^2 - 2xh + h^2) - x + h + 1$$

$$= 3x^2 - 6xh + 3h^2 - x + h + 1$$

Problems

- 1) If $f(x) = 3x^2 + 5x - 1$, Find $f(2)$, $f(1/2)$, $f(0)$, $f(-2)$, $f(1/4)$

2) If $g(x) = x^3 + x^2 + x$, Find $g(1/2)$, $g(2)$, $g(-2)$

3) If $\varphi(\theta) = 2\sin\theta$, Find $\varphi(\pi/2)$, $\varphi(\pi/4)$, $\varphi(2\pi)$, $\varphi(0)$, $\varphi(\pi/3)$

4) If $f(x) = x^2 - 2x$, Find the expression for $f(a)$, $f(x + \delta x)$, $f(x + \delta x) - f(x)$, $\frac{f(x + \delta x) - f(x)}{\delta x}$

