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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCES**

**JULY 2018 EXAMINATIONS**

**COURSE CODE: PHY 314**

**COURSE TITLE: NUMERICAL COMPUTATIONS**

**CREDIT UNIT: 2**

**TIME ALLOWED (2 HRS)**

**INSTRUCTION: *Answer question one (1) and any other three (3) questions***

**QUESTION 1**

1. a) Define the following terms (i) Rounding errors [2 marks]

(ii) Inherent errors [2 marks]

(iii) Truncation errors [2 marks]

b) Integrate the function with respect to , and step size

= 0.5, using the (i) Trapezoidal rule [6 marks]

(ii) Simpson’s one-third rule [6 marks]

and (iii) Simpson’s three-eighth rule. Compare your results with the exact integral.

[7 marks]

**QUESTION 2**

2. a) Distinguish between the following terms (i) Absolute errors [2 marks]

(ii) Relative errors [2 marks]

(iii) Percentage errors [2 marks]

b) A student obtained the following data in the laboratory. By making use of the method of least squares, find the relationship between and .

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 5 | 12 | 19 | 26 | 33 |
|  | 23 | 28 | 32 | 38 | 41 |

[9 marks]

**QUESTION 3**

3. a) A carpenter measured the length of a wood of actual length as .

Calculate (i) the absolute error [2 marks]

(ii) the relative error [2 marks] and (iii) the percentage error [3 marks]

b) Solve the following ordinary differential equation

using the Runge-Kutta Fourth order method. Find at [8 marks]

**QUESTION 4**

4. a) Using the method of group averages, derive the equations for quantities and .

[8 marks]

b) The following data was generated from the laboratory. Use the method of group averages to find the relationship between and .

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 5 | 12 | 19 | 26 | 33 |
|  | 23 | 28 | 32 | 38 | 41 |

[7 marks]

**QUESTION 5**

5. a) Give the general set of a simultaneous linear equations and its matrix representation.

[6 marks]

b) By Gaussian elimination, obtain the solution set of the system of linear equations

[9 marks]