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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 SCIENCE**

**2018\_2 SEMESTER EXAMINATION**

**COURSE CODE: PHY 314**

**COURSE TITLE: NUMERICAL COMPUTATIONS**

**CREDIT UNIT 2**

**TIME ALLOWED (2 HRS)**

**INSTRUCTION: *Answer question 1 and any other three questions***

**QUESTION 1**

**a.** *Round off the following to the number of significant figures indicated below:*

1. 15.035942 4 significant figures (2 marks)
2. 0.0005839 3 significant figures (2 marks)
3. 305.21653 6 significant figures (2 marks)
4. *Indicate which digit is the least significant digits in the following:*
5. 0.00123 (2 marks)
6. 145690000 (2 marks)
7. 235.34200 (2 marks)

**b.** Solve the system of equations 25x+y-z=28; x+30y+2z=59; 3x-2y-20z=19, using

1. Jacobi iteration **ii)** Gauss-Seidal iteration.

From your result, state your observation. (13 marks)

**Total: 25 marks**

**QUESTION 2**

**2a.** Mention the types of errors that can be encountered in numerical work. Give brief

explanations. (4 marks)

**2b.** A length of copper wire whose actual length is 26.5 was measured to be 26.3cm.

Calculate: (**i)** the absolute error(3 marks)

**(ii)** relative error (4 marks)

(**iii)** percentage error (4 marks)

**Total: 15 marks**

**QUESTION 3**

**3a.**Derive the formula for constants, m and c, from this equation of the least square method

(7 marks)

**3b.**A researcher obtained the following data in the laboratory of a current flowing in a particular

R-C circuit. He tabulated the current flowing in the circuit against the time t – t0, such that

time t = t0, the current is 2.4A .Using the method of least squares, find the relationship

between the variables current i and time t. Find the slope and the intercept. Hence, determine

the time constant of the circuit. (8 marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *T* | 4 | 4.4 | 4.8 | 5.2 | 5.6 | 6 |
| *I* | 0.4 | 0.32 | 0.26 | 0.22 | 0.18 | 0.14 |

**Total: 15 marks**

**QUESTION 4**

**4a.**Using the Method of group averages fit a set of n values and hence, derives the slope, m and intercept, c. (7 marks)

**4b.** Using the method of group averages, solve the table below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *T* | 7 | 14 | 21 | 28 | 35 |
| *X* | 25 | 30 | 34 | 40 | 43 |

(8 marks) **Total: 15 marks**

**QUESTION 5**

**5a.**Mention, with brief explanation, the various methods for solving a system of linear algebraic (7 mks)

**5b.**Solve the system of equations x + y + z = -1, x + 2y + 2z = -4, 9x +6y + z = 7 using Gaussian elimination method.(8 mks) **Total: 15 marks**