NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI-ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF COMPUTER SCIENCE
2023_2 EXAMINATIONS

COURSE CODE : CIT 335
COURSE TITLE : Computational Science and Numerical Methods
CREDIT UNIT : 3
TIME ALLOWED : 2½ HOURS
INSTRUCTION : Answer Question 1 and any other Three Questions

1a) Write short notes on the following operators used in programming: [4 marks]
i) **DIV** ii) **MOD**

1b) Convert the following numbers to floating point representation
i) 168,500 ii) 0.0378462 iii) - 0.00746 **[3 mks]**

1c) Convert the following binary numbers to base 10 [7 marks]
i. $(11001.10)_2$ ii. 3107_{16}

1d) Mention any two ways of reducing the number of digits in a numerical value? [2 marks]

1e) Round the following numbers to 4 decimals

i) 6.322556 = 6.3226, ii) 6.323501 = 6.3235 (2 marks)

1f. Using a well-labelled diagram, describe the black box representation of a problem [7 marks]

2a) State the formal definition of condition number: [3 marks]
condition number is formally defined as the value of the asymptotic worst-case relative change in output for a relative change in input.

2b) Convert the following numbers to base 10: [7 marks]
i) $(101.101)_2$ ii) $(ADE)_{16}$

2c) With the aid a well-labeled diagram, state the Mean Value theorem of differential calculus. [5 marks]

3a) Write short notes on the following
i) Complex floating Point number ii) rational arithmetic iii) Euclidean algorithm
iv) Interval arithmetic **[6 marks]**

3b) Explain the difference between decimal and binary number representations. [4 mks]

3c) Convert the following numbers to floating point representation
i) 168,500 ii) 0.0378462 iii) - 0.00746 **[3 mks]**

3d) Round the following numbers to 4 decimals:
i) 1.23767 Ii) 0.774539 = 0.7745, (2 marks)

4a) Briefly describe the condition number of a function (4 marks)
4b) Multiply of floating-point numbers A and B, where A=-18.0 and B=9.5 (6 marks)
4c) Convert 1/3 to floating point using seven digits of precision and compute the Absolute errors and Relative errors ?(5 marks)

i. Online auctions ii. Classifieds iii. Portals (6 marks)

b. Enumerate three (3) benefits of E-Commerce to Organizations (3 marks)

c. What are the three (3) steps of a typical payment transaction process when someone makes a purchase through a shopping cart? (3 marks)

Q6a. Discuss three (3) types of Shopping Carts citing examples as appropriate (6 marks)

b. What sequence of decisions will you recommend to a person intending to start an online store from scratch? (3 marks)

c. List any three (3) problems of a Shopping Cart (3 marks)