NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi – Abuja

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

2023_1 POP EXAMINATION[231]

Course Code: CIT310
Course Title: Algorithms and Complexity Analysis
Credit: 3 units
Time allowed: 3 Hours
Instruction: Answer Questions **ONE (1)** and any other **THREE (3)** Questions

Question One

a. Identify the major challenges of using a pseudocode in the development computer software. (3Marks)
b. Describe the major parameters used for the performance analysis of computer algorithms. (4Marks)
c. What are the main features of a Computer Algorithms. (7 Marks)
d. Write a binary search pseudocode that returns the position value of number "eleven" in the table below. (5 marks)

Position in data set	0	1	2	3	4	5	6	7	8
Data value	1	3	4	5	7	9	11	14	16

e. Briefly describe the Complexity of a Binary Search. (6 marks)

Question Two

a. As a computing student learning the skill of programming, briefly differentiate between an algorithm and a pseudocode. (6Marks)
b. Recursion is said to be a powerful tool, but it can be a tricky concept to implement. Use python programming language to create a factorial algorithm. (3 marks)
c. What is the importance of Asymptotic Notation? (2marks)
d. Write the major advantages and disadvantages associated to the adoption of binary search as an algorithm for solving computational problems. (4 marks)

Question Three

a. Describe the difference between a recursion and iteration? (6 marks)
b. Highlight the major difference between a pseudocode and an algorithm. (3 marks)

c. Use a flow chart from the top, reaching the base case, and then working your way back up to describe the evaluation of 5 factorial (i.e. 5!). (6 marks)

Question Four

a. Discuss the terms "Sorting in Ascending order" and "sorting in Descending order". (4Marks)
b. Explain the types of time complexity in an algorithm analysis? (6 marks)
c. Identify the need of an Algorithms in the field of computer science? (5 marks)

Question Five

a. Why is stable sort useful? (2 marks)

b. With examples, illustrate the following Asymptotic Notations.
   i. Big-oh notation (5 marks)
   ii. Big Omega (Ω) (4marks)
   iii. Big Theta (θ) (4marks)

Question Six

a. Discuss Prim's Algorithm. (5 marks)
b. Outline the Steps required for finding Minimum Spanning Tree using Prim's Algorithm   (6 marks)
c. What are the general properties of minimum spanning tress.(4 marks)