



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...

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

- Identify the major challenges of using a pseudocode in the development computer software. (3Marks)
- Describe the major parameters used for the performance analysis of computer algorithms. (4Marks)
- What are the main features of a Computer Algorithms. (7 Marks)
- 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

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

Question Two

- As a computing student learning the skill of programming, briefly differentiate between an algorithm and a pseudocode. (6Marks)
- 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)
- What is the importance of Asymptotic Notation? (2marks)
- 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 trees.(4 marks)