



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

FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE

2023_2 EXAMINATIONS

Course Code: CIT310
Course Title: Algorithms and Complexity Analysis
Credit: 3 units
Time allowed: 2½ Hours
Instruction: Answer Questions **ONE (1)** and any other **THREE (3)** Questions

- 1a. Write a pseudocode to implement Linear Search **(7Marks)**
- b. Hence, What is the output of a Linear Search for the number 60 on the array of numbers 23, 37, 56, 64, 75 **(3Marks)**
- c. Define binary recursion and write a recursive function to calculate nth Fibonacci number **(6Marks)**
- d. Describe the branch and bound method of solving a problem **(5Marks)**
- e. What are the advantages of Radix Sort **(4Marks)**

- 2a. Identify the application areas of Radix Sort algorithm **(6Marks)**
- b. With a suitable diagram, illustrate the divide-and-conquer approach to problem solving **(6Marks)**
- c. Mention three (3) algorithms that use the divide-and-conquer approach **(3Marks)**

- 3a. Describe the steps to perform Binary Search of an array of numbers **(7Marks)**
- b. Explain the steps to perform Binary Search for '13' from the array of numbers **(6Marks)**
- c. State the major differences between Linear Search and Binary Search **(2Marks)**

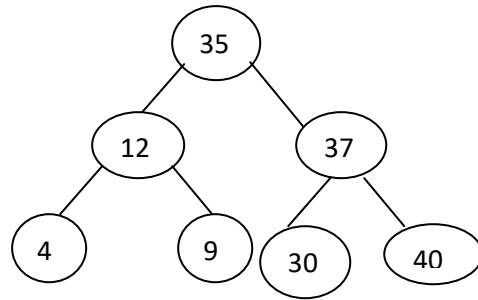
- 4a. What are the advantages of Binary Search **(4Marks)**
- b. Devise an algorithm to implement quick sort **(6Marks)**
- c. List the applications of Quick Sort **(5Marks)**

- 5a. Distinguish between Binary Search Tree and Red-Black Tree **(6Marks)**
- b. With a diagram, describe the Big-Oh notation **(6Marks)**

c. Explain the two (2) properties of a Binary Search Tree **(3Marks)**

6a. Given the Binary Search Tree below with key $[x] = 37$. State the value of key $[y]$ **(4Marks)**:

- (i) If y is a node in the left subtree of x
- (ii) If y is a node in the right subtree of x



b. List the properties of a Red-Black Tree **(5Marks)**

c. Enumerate three (3) advantages and disadvantages of Top-down approach of Dynamic Programming **(6Marks)**