MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

DEPARTMENT: COMPUTER SCIENCE AND INFORMATION SYSTEMS

MODULE: DESIGN AND ANALYSIS OF ALGORITHMS

CODE: BCOS224

SESSIONAL EXAMINATIONS
JUNE 2024

DURATION: 3 HOURS

EXAMINER: MR. F. CHINYASA

INSTRUCTIONS

1. Answer ALL **questions** in Section A
2. Answer Any **three (3) questions** in Section B
3. Start a new question on a fresh page
4. Total marks 100

Additional material(s): None

SECTION A:

Question 1

    a. With the aid of a diagram, describe a Graph and its basic components.   [**8 marks**]

    b. Compare and contrast Experimental and Asymptotic analysis of algorithms. [**8 marks**]

    c. Explain the steps involved in the design of algorithms.   **[12 marks]**

    d. Explain the goals for optimizing algorithms for a software developer.   **[12 marks]**

SECTION B:

Question 2

    a. Discuss the important problem types faced during Algorithm analysis.   **[8 marks]**

    b. Perform a heap sort on the following array showing all the necessary steps:

       {14, 11, 2, 20, 3, 10, 3}   **[12 marks]**

Question 3

Apply Dijkstra's algorithm in finding the shortest path to move from Mutare to Bulawayo indicating weight for each node.   **[20 marks]**

Question 4

    a. Explain the difference between Breath First Search (BFS) and Depth-First Search (DFS) algorithms.   **[8 marks]**

    b. Explain any 4 real life applications of the BFS.   **[12 marks]**

Question 5

    a. Discuss any 4 problem-solving strategies used in Algorithm Design.   **[8 marks]**

    b. Explain their strengths and weaknesses.   **[12 marks]**

END OF EXAMINATION