EX0012

BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF COMPUTER SCIENCE

BSc HONS DEGREE IN COMPUTER SCIENCE

BSc HONS DEGREE IN INFORMATION TECHNOLOGY

DATA STRUCTURES AND ALGORITHMS -CS213/CSH114/SWE113/NWE113

DURATION: 2 hours 30 minutes TOTAL MARKS: 100

INSTRUCTION TO CANDIDATES
Answer **all** questions.

Question 1

a. i. State and explain the **three** known algorithm complexities. **[6]**

ii. Explain why worst case is the best indicator of algorithm efficiency. **[4]**

b. Describe any **six** factors you would consider when selecting an algorithm. **[6]**

c. Outline any **four** characteristics of algorithms. **[4]**

(20 Marks)

Question 2

a. i. Briefly describe circular queue. **[2]**

ii. Write algorithms for basic primitive operations for circular queue. **[5]**

b. Explain the difference between a stack and a queue. **[6]**

(13 Marks)

Question 3

a. Trace the conversion of infix **(A + B * C / D - E + F / G / (H + I)** to postfix in tabular form **[9]**

b. Evaluate the following postfix notation of expression: **25 8 3 - / 6 * 10+.** Clearly showing the contents of the stack and the corresponding output at each stage. **[9]**

c. Write an algorithm for the evaluation of postfix expression **5 4 6 + * 4 9 3 /+*** and evaluate the following expression showing every status of stack in tabular form **[5][9]**

(15 Marks)

Question 4

a. Given the following tree in Figure 4.1.

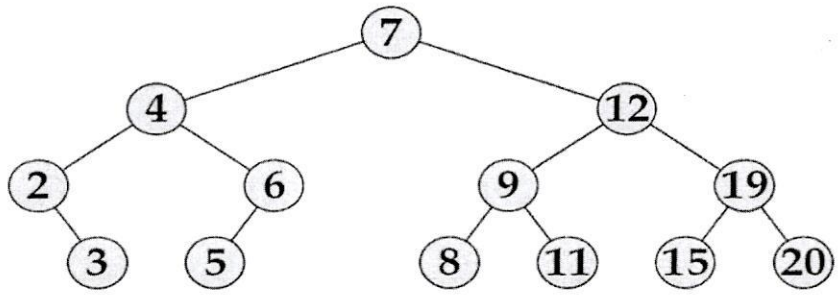

Figure 4.1

Produce the following traversals

i. Pre-Order traversals; **[5]**

ii. PostOrdertraversal; and **[5]**

iii. Inorder traversal **[5]**

(15 Marks)

Question 5

a. Explain the following terms as they are used in data structures and algorithms

i. Sorting; **[2]**

ii. Traversal; **[2]**

iii. Insert; **[2]**

iv. Push; and **[2]**

v. Search space. **[2]**

b. Write a pseudo code for binary search. **[10]**

(20 Marks)

****** END OF EXAM******