Question Paper

Exam Date & Time: 15-Jun-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - MAY 2023
II SEMESTER B.Sc (Applied Sciences) in Engg.

Data Structure [ICS 121 - S2]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data, if any, may be suitably assumed

1) A) Differentiate between the iterative and recursive programming approach (Any three points). Write a recursive C++ function for binary search. [main() need not to be written] (6)

B) What is Big Oh notation ? Find the value of C and n0 for the following expression:
log n + 10 (2)

C) Find the time complexity, in Big Oh notation, of the following code using the step count method: (2)

```
1. for (int i = 0; i < m; i++)
2. {
3.         for (int j = 0; j < n; j++)
4.            {
5.                cout<< i << j ;
6.            }
7.   }
```

2) A) Write a C++ program to evaluate a postfix expression and trace it to evaluate the following postfix expression: [assume that stack.h has been defined, only main( ) to be written] (6)
7 2 3 ^ + 3 - 4 / 5 *
Note: above expression contains digits 1 to 9 as operands and ^ exponent, * multiplication, / division, + addition, - subtraction

B) Describe the advantages of a function template. In which situation is it necessary to override the function template with an actual function? Explain with the help of an example code. (4)

3)		Write a complete C++ program to implement a priority queue.	(7)
	A)		
	B)	Differentiate between single and doubly linked-list with the help of Node class definition.	(3)
4)		Write a C++ program to find the sum of two polynomials using singly-linked lists. The program should include Node and Polynomial classes with necessary data members, constructors, and member functions: create( ), display( ), and sum_of_poly( ). [no need to define main( )]	(8)
	A)		
	B)	Define push( ) function for multiple stacks. Assume that all necessary functions and classes have been defined.	(2)
5)		Given a list of numbers 22, 7, 6, 1, 60, 11, 77, 59, 19, 20, 17. Show each phase of creating a Binary search tree using them, starting from 22. Describe all three cases of deletion from the binary search tree taking the resultant binary search tree into consideration.	(6)
	A)		
	B)	Define graph. What are the different memory representations of a graph? [Explain with the help of an example]	(4)

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