Roll No. ..... Total Printed Page - 7

F - 764

M.A./M.Sc. (Third Semester)
EXAMINATION, Dec. - Jan., 2021-22
MATHEMATICS
(Optional - A)
Paper Third
(Fundamental of Computer Science)

[Time : Three Hours] *[Maximum Marks : 70]*

Note : Attempt all sections as directed.

Section - A
(Objective/ Multiple Choice Questions)

(1 mark each)

Note : Attempt all questions.

Choose the correct answers:

1. Which feature of OOP indicates code reusability?
   (A) Abstraction
   (B) Polymorphism
   (C) Inheritance
   (D) Encapsulation

2. Which access specifier is usually used for data members of a class ?
   (A) Protected
   (B) Private
   (C) Public
   (D) Default
3. Which feature of OOP reduces the use of nested classes?
   (A) Inheritance
   (B) Binding
   (C) Abstraction
   (D) Encapsulation
4. _____is not an operator overloaded by the C^{++}language.
   (A) <<
   (B) +
   (C) pow()
   (D) >>
5. How many types of templates are there in C^{++}.
   (A) 1
   (B) 2
   (C) 3
   (D) 4

6. C^{++} Inheritance relationship is -

   (A) Association

   (B) Is - A

   (C) Has - A

   (D) None

7. A virtual member function is a member function that can:

   (A) Be overridden by a subclass

   (B) Be derived from another class

   (C) Move to any class

   (D) None of them

8. Algorithm can be represented as:

   (A) Pseudocode

   (B) Flowchart

   (C) None of the above

   (D) Both (A) and (B)

9. Which data structure is used for implementing a FIFO branch and bound strategy?

   (A) Stack

   (B) Queue

   (C) Array

   (D) Linked List

10. The number of edges from the node to the deepest leaf is called.....of the tree:

    (A) Height

    (B) Depth

    (C) Length

    (D) Width

11. In a full binary tree if there are L leaves, then total number of nodes N are?

    (A) $N = 2 * L$

    (B) $N = L + 1$

    (C) $N = L - 1$

    (D) $N = 2 * L - 1$

12. What is the speciality about the inorder traversal of a binary search tree:

    (A) It traverses in a non increasing order

    (B) It traverses in an increasing order

    (C) It traverses in a random fashion

    (D) It traverses based on priority of the node.

13. Quick sort algorithm is an example of:

    (A) Greedy approach

    (B) Improved binary search

    (C) Dynamic programming

    (D) Divide and conquer

14. A tree sort is also known as.....sort .
    (A) Quick
    (B) Shell
    (C) Heap
    (D) Selection
15. The time complexity of heap sort is.....
    (A) O (n)
    (B) O (logn)
    (C) O (n_2)
    (D) O (nlogn)

Section - B

(Very Short Answer Type Questions)

(1½ marks each)

Note : Attempt all questions.

1. What is nested classes?
2. Define the constructor.
3. What do you mean by operator overloading?
4. Define virtual function.
5. What is algorithm analysis in data structure?
6. Give some application of stack.

7. List some uses of tree data structure.
8. What is prefix and infix notation?
9. How does bubble sort work?
10. What is sorting in data structure? Write its type.

Section - C

(Short Answer Type Questions)

(2½ marks each)

Note : Attempt any six questions.

1. Explain access specifiers for classes in C++.
2. Explain function overloading with example.
3. What is templates? Explain its types.
4. Explain preorder and post order tree traversal algorithm by taking suitable example.
5. Define Hashing. Explain the different hash function.
6. Write an algorithm to perform insertion operation in queue.
7. Write characteristic of object oriented programming.
8. Differentiate between linear and non - linear Data struture.

Section - D

(Long Answer Type Questions)

(5 Marks each)

Note : Attempt any five questions.

1. What is object oriented programming? Write difference between object oriented programming and procedure oriented programming.
2. What is polymorphism? Explain compile time and run time polymorphism.
3. Define stack. Write an algorithm to implement stack using linked list.
4. What is binary search? Write and explain algorithm for searching an element using binary search.
5. Explain shell sort and quick - sort.
6. Write short notes on:
   (i) Virtual function & pure virtual function
   (ii) Heap - sort