

B.E./B.TECH Degree Examination, January 2021

Semester - III

**CS16301 - PROGRAMMING AND DATA STRUCTURES II**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. Which of the following features must be supported by any programming language to become a pure object-oriented programming language?
  - a. Encapsulation
  - b. Inheritance
  - c. Polymorphism
  - d. All of the above
  
2. Which of the following is used for implementing the late binding?
  - a. Operator Functions
  - b. Constant Functions
  - c. Virtual Functions
  - d. Both A and B
  
3. From where does the template class derived?
  - a. regular non-templated C++ class
  - b. templated class
  - c. regular non-templated C++ class or templated class
  - d. main function
  
4. A binary tree is balanced if the difference between left and right subtree of every node is not more than
  - a. 1
  - b. 3
  - c. 2
  - d. 0
  
5. Which is used for achieving Data Hiding in C++? List its types.
6. Is Abstract base class used to create objects? Justify your answer.
7. List the rotations of splay tree.
8. Compare Bellman-Ford algorithm with Floyd-Warshall's algorithm.

**PART B - (4 X16 = 64 marks)**

09. (a) Illustrate the types of inheritance supported in C++ with suitable examples. (16)

**(OR)**

- (b) (i) How run time polymorphism is achieved in C++? Illustrate with an example. (8)  
 (ii) Write a C++ program to overload the decrement operator with prefix and postfix forms. (8)

10. (a) (i) Write a function template to sort the elements of an array. (8)  
 (ii) Describe class template with suitable example. (8)

**(OR)**

- (b) (i) What is an exception? Illustrate how exceptions are handled in C++ programs with an example. (8)  
 (ii) Construct a list using STL and perform operations push back, push front, pop front, pop back, insert and erase. (8)

11. (a) Show the results of inserting 43, 11, 69, 72, 30, 90, 35, 87, 28, 9, 13, 57 and 70 into an initially empty Binary Search Tree. Perform Inorder, Preorder and Postorder traversal for the constructed tree. Show the result of deleting the nodes 11, 90 and 70 one after other of the constructed tree. (16)

**(OR)**

- (b) (i) Show a B-Tree of order 5 by inserting the elements 8, 25, 7, 21, 20, 15, 14, 10, 5, 16, 13, 12, 3, 45, 65, 29, 35 and 92 into an initially empty tree. (10)  
 (ii) Compute an optimal Huffman code for the following set of frequencies, based on the first 8 Fibonacci numbers? (6)  
 a:1 b:1 c:2 d:3 e:5 f:8 g:13 h:21

12. (a) Write Dijkstra's Algorithm to compute the shortest path and explain with an example. (16)

**(OR)**

- (b) Compute the minimum spanning tree for the given graph using both Prim's and Kruskal's algorithm. (16)

