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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Third Semester

CS16301 – PROGRAMMING AND DATA STRUCTURES II*(Common to CS and IT)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

	CO	RBT
1. Define data encapsulation.	1	R
2. When do you declare a member of a class as static?	1	U
3. How is polymorphism achieved in C++?	2	U
4. List the operators that cannot be overloaded.	2	R
5. List out the types of containers.	3	R
6. List the various modes in opening a file.	3	R
7. What is the minimum and maximum number of elements in a heap of height 3?	4	AP
8. What is a splay tree?	4	R
9. What are the various representations of a graph? Give an example for each.	5	U
10. State the limitation of Dijkstra's shortest path algorithm.	5	U

PART B - (5 X 16 = 80 Marks)

11. (a) What is meant by constructor and destructor? Explain the different types of constructors in detail. **(16)** **1** **AP**

(OR)

- (b) (i) Explain friend function in detail with an example. **(6)** **1** **AP**
(ii) Explain the different types of storage classes of C++ with suitable example. **(10)** **1**

12. (a) Write a C++ program to add, subtract and multiply two matrices by overloading +, -, * operators. **(16)** **2** **AP**

(OR)

- (b) Explain the types of inheritance with suitable examples. **(16)** **2** **AP**

13. (a) (i) Write a function template for finding the maximum value in an array. (8) 3 AP
(ii) Write a class template to implement queue data structure. (8) 3

(OR)

- (b) Explain in detail exception handling mechanism in C++. Write a program to handle necessary exceptions in stack implementation. (16) 3 AP
14. (a) Write a C program to implement binary search tree with insert, preorder, postorder and inorder operations. Insert the following elements in binary search tree: 40,20,70,14,60,97,30. Write the inorder traversal after insertion. (Assume the tree is initially empty). (16) 4 AP

(OR)

- (b) Explain the possible AVL rotations with algorithm and examples. (16) 4 AP
15. (a) Explain the depth first and breadth first traversal algorithms in detail. Traverse the following graph G using the DFS and BFS algorithms. Let G be a directed graph with the following sets: Vertices $V = \{a, b, c, d, e\}$, Edges $E = \{(a, b), (a, d), (b, d), (b, c), (b, e), (d, e), (c, e), (d, c)\}$. (16) 5 AP

(OR)

- (b) Let G be a weighted directed graph with the following sets: $V = \{a, b, c, d, e\}$, The weights of the edges are given by $\{(a, b)=3, (a, d)=5, (b, d)=1, (b, c)=6, (b, e)=5, (d, e)=7, (c, e)=6, (d, c)=1\}$. Find the shortest path from vertex 'a' to remaining other vertices using Dijkstra's algorithm. (16) 5 AP