

**B.E/ B.TECH DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013**  
**THIRD SEMESTER – (REGULATIONS 2012)**  
**INFORMATION TECHNOLOGY**  
**IT8303 Programming and Data Structures II**

3

Time: Three hours

Maximum: 100 marks

**Answer ALL Questions.**

**Part – A (10\*2 = 20)**

1. Differentiate between a call by value and call by reference.
2. When do we declare a member of a class as **static**? How do we initialize it?
3. What is a copy constructor?
4. Is it possible to overload the two methods '**void func() const**' and '**void func()**'? Justify your answer.
5. What is an abstract class?
6. Define namespace. What is the use of '**using**' declaration?
7. How Fibonacci heaps differ from binomial heaps?
8. What is meant by Amortized Analysis? Show that the stack operation MULTIPOP costs  $O(1)$  amortized time.
9. What is meant by a cycle and loop?
10. What is the principle behind Bellman-Ford algorithm to detect negative weight cycles?

**Part B – (16\*5 =80)**

- 11 i) Define a class **Travel** in C++ with private members **Travel\_Code**, **Place\_of\_type**, **No\_of\_travellers** and **No\_of\_buses**. A constructor to assign initial values for the members. A function **NewTravel()** which allows user to enter values. A function **ShowTravel()** to display the content from all the data members on screen. (10)
- 11 ii) When do we need to use default arguments in a function? Where does the default parameter can be placed by the user? Write a snippet code to explain. (6)
- 12 a) i) Write a program to implement a **Ratio** class with members **num**, **den**. Overload arithmetic operator "+", relational operator "=", stream operators that operate on the objects of **Ratio** and a conversion operator to convert a **Ratio** object to a double value.. (10)
- 12 a) ii) Discuss the need of a friend function with an example. (6)

**(OR)**

- 12 b) i) Define a class **Shape** with constructor, destructor and pure virtual functions **GetArea()**, **GetPerim()** and **Draw()**. Derive classes **Circle** and **Rectangle** from **Shape**. Derive another class **Square** from **Rectangle**. Implement this hierarchy with constructors, destructors and essential functions. Write a main. (10)
- 12 b ii) Explain how dynamic binding is achieved in the above hierarchy. (6)

13 a) i) Define template class **Stack**<> and implement generic methods to push and pop the elements from the stack. (10)

13 a) ii) Write the code that creates an exception object to throw a divide by zero exception. (6)

(OR)

13 b) i) Write a C++ program that writes into an existing file without destroying the existing contents and read from the file to display the file contents. (10)

13 b) ii) Discuss about the different components in STL. (6)

14 a) i) Perform the splaying operation on a binary search tree obtained by inserting the keys 1, 2, 3, 4, 5, 6, 7, 8 in this order into an initially empty tree. Write the code to do the same (splay and insert). (10)

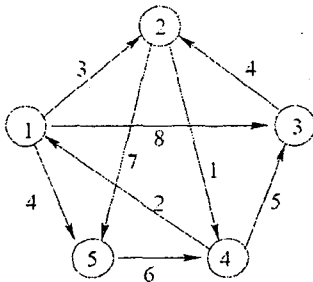
14 a) ii) On an initially empty binomial heap, carry out the following sequence of operations: insert(27), insert(17), insert(19), insert(20), insert(24), insert(12), insert(11), insert(10), insert(14), insert(18), deletemin. After each operation, draw the resulting structure of the binomial heap. (6)

(OR)

14 b) i) Construct an AVL tree with values 3, 1, 4, 5, 9, 2, 6, 8, 7, 0 into an initially empty tree. Write the code for inserting into an AVL tree. (10)

14 b) ii) Construct a B-tree with order m=3 for the key values 2, 3, 7, 9, 5, 6, 4, 8, 1. Delete the values 4 and 6. Show the tree in performing all operations. (6)

15 a) i) Find the shortest path from each vertex to all other vertices for the graph. (10)



15 a) ii) Describe how directed graphs can be traversed. (6)

(OR)

15 b) i) What is a Minimum Spanning Tree? Name any two Minimum Spanning Tree (MST) algorithms. For a graph G given below, find its minimum spanning tree by explaining any one algorithm. (16)

