

**II B.Tech I Semester Regular Examinations, November 2006**  
**ADVANCED DATA STRUCTURES & ALGORITHMS**  
**( Common to Information Technology and Computer Science & Systems Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) What is the default data hiding type for a class? Why are data members hidden? How would you access them?  
(b) In a printf statement, what are the codes for integer? float? string? How can you choose how many numbers occur before and after the decimal point for a float? How can you pad zeroes to the beginning of an integer to make it a specific length? [8+8]
2. What do you mean by run time polymorphism and how to implement run time polymorphism using virtual functions in C++? [16]
3. (a) What are some ways try / catch / throw can improve software quality?  
(b) How can we handle a constructor that fails?  
(c) How can we handle a destructor that fails. [5+5+6]
4. (a) What are the applications of stack explain with an example.  
(b) Explain the list representation of a tree by means of an example.  
(c) Mention some common computing times for algorithms in order of increasing difficulty? [5+5+6]
5. Develop a class for hash table using linear probing and neverUsed concept to handle an erase operation. Write complete C++ code for all the methods. Include a method to reorganize the table when (say) 60% of the empty buckets have never used equal to false. The reorganization should move pairs around as necessary and leave a properly configured hash table in which neverUsed is true for every empty bucket. [16]
6. What is an AVL Tree? Write the algorithm to search for an element of an AVL Search Tree? What is its time complexity? [16]
7. (a) Explain the Binary tree in order traversal in  $O(n)$  and  $O(1)$  space.  
(b) Explain divide and conquer strategy by means of its control abstraction.  
(c) What is the difference between Greedy method and Divide and conquer. [6+6+4]
8. (a) Explain the Job sequencing with deadlines with an example using the greedy approach.

Code No: R059211201

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- (b) Describe the dynamic programming approach for the construction of OBST for a set of  $n$  keys, if all keys are equally likely to be searched for. [8+8]

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1. (a) What are the two steps that happen with delete p?  
(b) What are the advantages of new operator than malloc in C?  
(c) Explain about the C++ classes in detail and design a class for playing cards?  
[5+5+6]
2. What is template? Explain about function templates and class templates with suitable examples. [16]
3. (a) Write a program to change the case of each word in a file to initial capitals.  
(b) Write a program to concatenate the two given strings? [8+8]
4. What are the different mathematical notations used for algorithm analysis. [16]
5. Develop a class for hash table using linear probing and neverUsed concept to handle an erase operation. Write complete C++ code for all the methods. Include a method to reorganize the table when (say) 60% of the empty buckets have never used equal to false. The reorganization should move pairs around as necessary and leave a properly configured hash table in which neverUsed is true for every empty bucket. [16]
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(b) Explain divide and conquer strategy by means of its control abstraction.  
(c) What is the difference between Greedy method and Divide and conquer.  
[6+6+4]
8. (a) What are the general characteristics of greedy algorithms and the problems solved by these algorithms.  
(b) What is 0/1 Knapsack problem? Explain how principle of optimality applies to it. Also derive its dynamic recurrence relation. [8+8]

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1. (a) What do you mean by Stack unwinding?  
(b) What is the difference between `const char *myPointer` and `char *const`  
(c) Define precondition and post-condition to a member function.  
(d) What are the conditions that have to be met for a condition to be an invariant of the class? [4+4+4+4]
2. (a) Explain the need for “Virtual Destructor”.  
(b) Can we have “Virtual Constructors”? [8+8]
3. (a) What are some ways try / catch / throw can improve software quality?  
(b) How can we handle a constructor that fails?  
(c) How can we handle a destructor that fails. [5+5+6]
4. (a) What are the applications of stack explain with an example.  
(b) Explain the list representation of a tree by means of an example.  
(c) Mention some common computing times for algorithms in order of increasing difficulty? [5+5+6]
5. What is Hashing? Explain the different Hash table representations in detail? [16]
6. Define a class called **binarySearchTree** to represent a Binary search tree. Extend this class by adding a public method **outputInRange (Low,High)** that outputs, in ascending order of key, all elements in a binary search tree whose key lies between Low and High. Use recursion and avoid entering sub trees that cannot possibly contain any elements with keys in desired range. [16]
7. (a) Explain the Binary tree in order traversal in  $O(n)$  and  $O(1)$  space.  
(b) Explain divide and conquer strategy by means of its control abstraction.  
(c) What is the difference between Greedy method and Divide and conquer. [6+6+4]
8. (a) Explain the Job sequencing with deadlines with an example using the greedy approach.  
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1. (a) What is the difference between global static functions and static functions, class members.  
(b) What is common and what is the difference between implementations of the copy constructors, initialization and overloaded assignment operators?  
(c) What is the difference between modifiers register, const and volatile? [5+5+6]
2. (a) Write a program to illustrate the concept of virtual base class with example program.  
(b) How to implement run time polymorphism using virtual functions. [8+8]
3. (a) Explain about console I/O and formatted I/O streams in C++.  
(b) Write a program to count the no of lines in given text file. [8+8]
4. Write and explain UNION and find algorithms with weighting and collapsing rule. [16]
5. Develop a class for hash table using linear probing and neverUsed concept to handle an erase operation. Write complete C++ code for all the methods. Include a method to reorganize the table when (say) 60% of the empty buckets have never used equal to false. The reorganization should move pairs around as necessary and leave a properly configured hash table in which neverUsed is true for every empty bucket. [16]
6. Define a Binary Search Tree? Write the procedures to perform insertion, deletion and searching in a binary search tree? [16]
7. (a) Explain the Binary tree in order traversal in  $O(n)$  and  $O(1)$  space.  
(b) Explain divide and conquer strategy by means of its control abstraction.  
(c) What is the difference between Greedy method and Divide and conquer. [6+6+4]
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