Code No: 07A3EC15 **Set No.1**

II B.Tech. I Semester Regular Examinations, November -2008
ADVANCED DATA STRUCTURES
(Common to Computer Science & Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How does a C++ structure differ from a C++ class?
   (b) What is a class? How does it accomplish the data hiding?
   (c) Write a C++ program to create a bank account which includes account number, name, account type and balance. It should include also the operations to assign initial values, to deposit, to withdraw after checking the balance? [4+4+8]

2. (a) What does inheritance mean in C++? What are the different forms of inheritance? Give an example for each?
   (b) What is an virtual function? Why we need virtual function?
   (c) Write short notes on file streams? [8+4+4]

3. (a) Define Algorithm? What are the characteristics of algorithms?
   (b) Order the following functions by growth rate: N, $\sqrt{N}$, $N^{1.5}$, N^2, N log N, 2^N, N^3?
   (c) Show the stack status and the output string at every step in converting the following infix expressions to postfix expressions insisting on the usual precedence and associativity rules? a+b*c-(d*e/f)*g [6+2+8]

4. (a) Define Dictionary and Dictionary with duplicates? List the operations performed on a dictionary?
   (b) List any two applications of dictionaries and/or dictionaries with duplicates?
   (c) Use linear probing, a hash table with b = 13 buckets, and the hash function f(k) = k mod b. start with an empty hash table and insert pairs whose keys in order are 7, 42, 25, 70, 14, 38, 8, 21, 34, 11. Draw the hash table following each insert? [4+4+8]

5. (a) Write a C++ function to remove max element form max heap.
   (b) Write a C++ function to insert an element into min heap. [8+8]

6. (a) Explain how to represent binary search tree with duplicates?
   (b) Explain the insertion operation of binary search tree with duplicates?
   (c) Start with an empty binary search tree with duplicates and insert the keys 2, 2, 2 and 2? Draw your tree following each insert? What is the tree height following the insertion of n 2s? [4+8+4]

7. Draw the order-7 b-tree resulting from the following keys into any initially empty tree:4,40,43,26,87,66,22,9,95,25,27,72,46,77,93,12. [16]

8. Write an algorithm for Brute Force pattern matching and analyze its time complexity with suitable example. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A3EC15 **Set No.2**

II B.Tech. I Semester Regular Examinations, November -2008
ADVANCED DATA STRUCTURES
(Common to Computer Science & Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) How a member function of a class is defined?
   (b) How data members of a class are defined?
   (c) Write a C++ program to demonstrate various operations of complex numbers using class? [4+4+8]

2. (a) Define the following terms:
      i. Base class
      ii. Derived class
      iii. Direct base class
      iv. Indirect base class
      v. Abstract class
      vi. Virtual base class
   (b) How do the following two statements differing the operations
      i. cin >> c;
      ii. cin.get(c); [12+4]

3. (a) What is an abstract data type?
   (b) Are basic data types are abstract data types?
   (c) Is the user defined data type "structure" is an abstract data type?
   (d) Explain various components of space complexity? [2+3+3+8]

4. What is collision in hashing? Explain various collision resolution techniques along with their advantages and disadvantages using suitable example? [16]

5. (a) Define max tree, max heap, min heap with suitable examples?
   (b) Show the result of inserting 10, 12, 1, 14, 6, 5, 8, 15, 3 and 9, one at a time into an initially empty min heap? [8+8]

6. (a) Explain any three application areas of binary search trees.
   (b) Explain various steps for AVL search tree insertion with illustration. [8+8]

7. (a) Explain deleting from an m-way search tree using an illustrative example?
   (b) What is the maximum number of disk accesses needed to delete an element that is in a no leaf node of a B-tree of order m? [8+8]

8. Write an algorithm for Boyer Moore pattern matching and analyze its time complexity with suitable example? [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A3EC15 **Set No.3**

II B.Tech. I Semester Regular Examinations, November -2008
ADVANCED DATA STRUCTURES
(Common to Computer Science & Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What do you mean by dynamic initialization of object? Why do we need to do this?
   (b) How Is dynamic initialize of objects achieved?
   (c) Write a C++ program for generating Fibonacci series? [4+4+8]
2. (a) What are all the restrictions and limitations in overloading operators?
   (b) Write a C++ program to demonstrate overloading add(+) and compare ($\leq$) operators on strings? [8+8]
3. (a) What is the key difference between algorithm and program?
   (b) Explain the eight asymptotic identity rules?
   (c) Explain the steps to implement the following operations of singly-linked list without head node using illustrative examples?
      i. removing at front
      ii. removing at end
      iii. removing node before a specified node
      iv. removing node after a specified node. [2+4+2+2+3+3]
4. (a) What is skip list? How it is different from a linear linked list?
   (b) Explain with a neat example the insertion operation?
   (c) Explain with a neat example the deletion operation? [4+6+6]
5. (a) If a d-heap is stored as an array, for an entry located in position k, where are the parents and children?
   (b) Write a C++ function to build a binary heap? How many number of comparisons required for it? [8+8]
6. Start with empty binary search tree:
   (a) Insert the keys 15,5,20,14,30,22,2,4,5,7,9,18 in this order. Draw the tree following each insert using binary search insert method.
   (b) Delete the keys 2, 4, 5 in the order and draw the tree following each deletion. [8+8]
7. (a) Define splay trees? Explain splay operation using a suitable example?

(b) Start with a splay tree that is a 10- node full binary tree; the keys are1-10. Remove the keys in the order 10, 9, 8... 1. Draw your tree immediately following each deletion. [8+8]

8. Write an Huffman coding algorithm and prove that Huffman's algorithm constructs an optimal prefix code for a string of length n with d distinct characters in O(n + d log d)? [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A3EC15 **Set No.4**

II B.Tech. I Semester Regular Examinations, November -2008
ADVANCED DATA STRUCTURES
(Common to Computer Science & Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Describe the importance of destructors?
   (b) What is the copy constructor? What are it uses?
   (c) Write a C++ function for Tower of Hanoi? [4+4+8]
2. (a) What are the rules for virtual functions?
   (b) Write a C++ program to demonstrate runtime polymorphism using virtual function? [8+8]
3. (a) What is dequeue? Explain various operations need to be supported by dequeue?
   (b) Write a C++ program to evaluate postfix expression? [6+10]
4. (a) Write an insert routine for hash tables with quadratic probing?
   (b) Write a routine to rehashing for open addressing hash tables? [10+6]
5. (a) What is priority queue? Explain any two applications of priority queue?
   (b) Show the result of inserting 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 22 and 35, one at a time into an initially empty max heap? [8+8]
6. (a) Explain the algorithm for right-to-right and left-to-left rotation.
   (b) Discuss above rotation for the following keys. 3,43,12,33,4,34,21,22,25,15,16,17. [8+8]
7. (a) Explain briefly the representation of red-black trees using an example?
   (b) Starting with a red- black tree that is 10- node full binary tree the keys are1-10, all nodes are black. Remove the keys in the order 7,6,5,10.draw your tree following each deletion and immediately after rotation or color change that is performed. label all the nodes with their color and identity their rotation types(if any) that is done. [4+12]
8. Compute a table representing the KMP failure function for pattern string "cg-tacgttcgtac". [16]

⋆ ⋆ ⋆ ⋆ ⋆