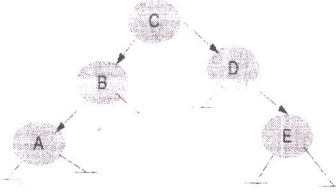




	<p><b>H</b> Draw a diagram of a singly-linked NULL terminated linked list, after following operations on it:</p> <pre> <b>init(&amp;l);</b> <b>insert(&amp;l, 0, 2);</b> // insert at position 0, value 2 <b>append(&amp;l, 5);</b> <b>insert(&amp;l, 1, 4);</b> <b>remove(&amp;l, 0);</b> // remove from position 0 <b>append(&amp;l, 10);</b> <b>insert(&amp;l, 2, 6);</b> </pre>	2
	<p><b>I</b> Show the state of the following sequence of numbers, stored in an array, after each iteration of improved bubble sort. (assume alphabetical ordering for comparison)</p> <p><b>100 50 30 20 40 60 80</b></p>	2
	<p><b>J</b> Write the inorder and postorder traversals of the tree given below</p> 	2
Q2	<p><b>A</b> Write an implementation of a queue of characters using an array and ONLY one index in the array. (Explanation: You have to write the type-definition and the functions <code>init()</code>, <code>enqueue()</code>, <code>dequeue()</code>, <code>empty()</code>; for the queue)</p>	3
	<p><b>B</b> Using the given type definition of a binary tree, write a recursive function which computes the average of all the numbers stored in the tree. (Do not assume to be a search tree).</p> <pre> <b>typedef struct node {</b>     <b>int val;</b>     <b>struct node *left, *right;</b> <b>};</b> <b>typedef struct node *tree;</b> </pre>	3
	<p><b>C</b> Draw the diagram of the hash table, using following hash function, and after the given insertions are made into it. Assume linear probing for collision resolution.</p> <pre> <b>int ht[7];</b> <b>int hash(int n) { return (n - 1) % 7; }</b> <b>insertions: 20, 5, 19, 4, 3</b> </pre>	3
	<p><b>D</b> Write a complete program which reads following structures written in a binary-file, into an array. Then the program writes the structures into a text-file. The names of the two files are given as command line arguments.</p> <pre> <b>typedef struct data {</b>     <b>char name[16];</b>     <b>int age;</b>     <b>int marks;</b> <b>};</b> </pre>	3
	<p><b>E</b> Write a function which creates transpose of a sparse matrix. The sparse matrix is stored using following type definition.</p>	5

	<pre> void transpose(spm *s); typedef struct elem {     int r, c, v; }elem; typedef struct spm {     elem arr[128];     /* elements are stored sorted in (r,c) pairs */     int nrow, ncol, nele; }spm; </pre>	
	<p><b>F</b> What is the output of the following program? Explain in 2-3 lines.</p> <pre> #include &lt;stdio.h&gt; #define A      1 #define B      2 #define C      4 #define D      8 int f(int a, int b) {     if((a &amp; A) &amp;&amp; (a &amp; B))         return A;     if((a &amp; B) &amp;&amp; (a &amp; C))         return B;     if((a &amp; D) &amp;&amp; (a &amp; C))         return C;     return b; } int main() {     printf("%d\n", f(A   B, D));     printf("%d\n", f(B   C   D, A));     printf("%d\n", f(B   D, C)); } </pre>	<b>3</b>
<b>Q3</b>	<p><b>A</b> The C type 'int' has a limitation of size. Write an implementation of a new data type which gives us "integers of unlimited size", using a linked-list type of implementation. The type will be called "Integer". Write the following functions for your type:</p> <pre> Integer *init(void); /* returns a new &amp; empty variable of type Integer */ void add_digit(Integer *i, int x); /* Adds a new digit at the end of an existing integer */ Integer *add(Integer a, Integer b); /* Adds two integers a and b, and returns the result as another "Integer" */ </pre>	<b>4</b>
	<p><b>B</b> Write a function which will print a binary tree so that it "looks like" a binary tree. Use the following typedefs:</p> <pre> typedef struct node {     char ch;     struct node *left, *right; }node; typedef struct node *tree; </pre>	<b>4</b>



	<p><b>C</b> Write a function which given 'n' as base of a number system, and 'm' as no. of positions, prints all numbers in that number system having 'm' positions. Find the time complexity of your function.</p> <p><i>Suppose the function is</i></p> <pre><b>void printall(int m, int n);</b></pre> <p><i>Then when called as printall(2, 2), it will print 00,01,10,11 (Numbers having 2 bits, in binary number system); when called as printall(2,3) it will print 00,01,02,10,11,12,20,21,22 (Numbers having 2 positions, in ternary number system).</i></p>	<b>4</b>
	<p><b>D</b> The C library has a function 'qsort' for sorting of data of any type. Write a function which imitates this function, using bubble sort. <i>Desired prototype:</i></p> <pre><b>void bsort(void *base, size_t nmemb, size_t size,            int (*compare)(const void *, const void *));</b></pre> <p><i>The function sorts an array with 'nmemb' elements of size 'size'. The 'base' argument points to the start of the array. Here 'compare' is a function pointer, for a function which compares two data elements of the data to be sorted.</i></p>	<b>4</b>
	<p><b>E</b> Design data structures for an application which manages a library. Write the type definitions and draw relevant diagrams of the data structure. No need to write any explanation, your type definitions and diagrams should be self-sufficient.</p>	<b>4</b>