
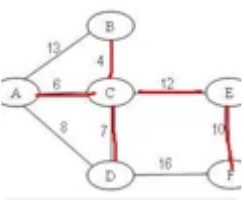
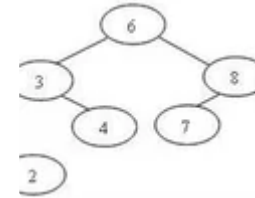
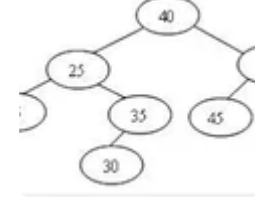
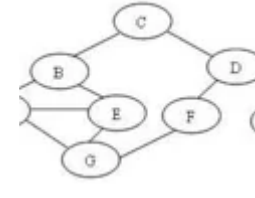


SE_Kỳ 3_CSD201 (FE)

Thuật ngữ trong học phần này (275)

A	<p>Consider the following function</p> <pre>void funt(int n) { if(n > 0) { System.out.print(" " + n % 5); fun(n); } }</pre> <p>What will happen if the statement fun(33); is run?</p> <p>A. The run-time stack overflows, halting the program</p> <p>B. The results are nondeterministic</p> <p>C. The operating system detects the infinite recursion because of the "repeated state"</p> <p>D. The program keeps running until you press Ctrl-C</p>
D	<p>Given the division hash function $h(x) = x \% M$, where $M = 10$ and Collision Resolution is linear probing. How the hash table looks like after inserting the following keys sequentially?</p> <p>25, 41, 14, 32, 191, 21</p> <p>A. (4)</p> <p>B. (1)</p> <p>C. (2)</p> <p>D. (3)</p> 
B	<p>Given a weighted graph below. What is the total edge-weight of the minimum spanning tree of G?</p> <p>A. 42</p> <p>B. 39</p> <p>C. 40</p> <p>D. 35</p> <p>E. 45</p> 
A	<p>The following is the main part of bubble sort pseudocode:</p> <pre>do swapped = false for i= 0 to n-2 if a[i] > a[i+1] then swap(a[i],a[i+1]) swapped => true end if end for while swapped</pre> <p>Consider the list of ten integers below:</p> <p>7, 4, 10, 11, 2, 9, 1, 3, 8, 6</p> <p>What is the list after the FIRST iteration (for $i = 0$ to $n-2$) in a bubble sort? (sorting from smallest to largest)</p> <p>A. 4,7,10,2,9,1,3,8,6,11</p> <p>B. 4,7,10,1,2,9,3,8,6,11</p> <p>C. 4,7,10,9,2,1,3,8,6,11</p> <p>D. 4,7,10,2,9,1,3,6,8,11</p>
A	<p>Given a raw message 'BBBUUUUBBBUUBBBBBUU' (without single quote). Run the run-length encoding algorithm for that message, what is the output?</p> <p>A. 3B4U3B2U5B2U</p> <p>B. 3B4U3B2U5B2UU</p> <p>C. 3B4U3B2U5B</p> <p>D. 3B4U4B3U2B5UU2</p>
C	<p>Select the statement that is most correct.</p> <p>Which of the following applications may not use a stack?</p> <p>A. Keeping track of local variables a trun time</p> <p>B. Undo sequence in a text editor.</p> <p>C. Multi-programming</p> <p>D. Evaluating arithmetic expressions.</p>
C	<p>Specify the statement that is most correct about a circular linked list.</p> <p>A. In circular linked-list, it is required to define both head and tail nodes</p> <p>B. Circular linked list is a normal doubly-linked list</p> <p>C. Circular linked list is a linked list in which the last node of he list points to the first node in the list</p> <p>D. Circular linked list is a normal singly linked list</p>
A	<p>Consider the following function:</p> <pre>void printOut(int count) { if(count % 2 == 0) System.err.println("StdErr: Line "+ count+ "\n"); else System.out.println("StdOut Line "+ count + "\n\n"); if(count == 0) return; else printOut(count-1); }</pre> <p>What value for X the statement printOut(X): will print EXACTLY 5 lines to standard output (Lines start with "StdOut"). in the fewest number of recursive calls?</p> <p>A. 9</p> <p>B. 11</p> <p>C. 10</p> <p>D. 8</p>
D	<p>Consider the following pseudocode:</p> <pre>declare a stack of characters while(there are more characters in the word to read) { read a character if a characteris "" then pop the stack else push the character into the stack } } while(the stack is not empty) pop and write the popped character to the screen</pre> <p>What is written to the screen for the input"Comp**ression"?</p> <p>A. nospmo</p> <p>B. iserC</p> <p>C. Cresi</p> <p>D. iserO</p>
C	<p>The operation for adding an entry to a stack is traditionally called:</p> <p>A. insert</p> <p>B. append</p> <p>C. push</p> <p>D. add</p>
E	<p>Suppose you are using the LZW algorithm to encode the message AAABDACAADA contents of the dictionary at the beginning of encoding are:</p> <p>(1)A (2)B (3)C (4)D</p> <p>What are the first 4 code words when encoding the above string?</p> <p>A. (1)(5)(1)(4)</p> <p>B. (1)(5)(6)(4)</p> <p>C. (1)(5)(3)(2)</p> <p>D. (1)(1)(1)(2)</p> <p>E. (1)(5)(2)(4)</p>
C	<p>If every node u in G is adjacent to every other node v in G, a graphs said to be</p> <p>A. finite</p> <p>B. isolated</p> <p>C. complete</p> <p>D. strongly connected</p>

D	<div>Consider the following function void fun(int n) {int m = n/2; int k = n%2; System.out.print(k + " "); if(m>0) {fun(m); } }</div> <div>Whats the output when the statement fun(8); is run?</div> <div>A. 0 1 0 1 B. 1 1 0 1 C. 1 0 1 1 D. 0 0 0 1 E. 1 0 1 0</div>
D	<div>Select the most correct statement about the complexity of quicksort A. Both best and worst cases are $O(n^2)$ B. The best case is $O(n)$, and the worst case is $O(n^2)$ C. The best case is $O(n)$, the average case is $O(n \log n)$, and the worst case is $O(n^2)$ D. Both best and average cases are $O(n \log n)$, the worst case is $O(n^2)$</div>
B	<div>Fill in blank to form a correct statement: "A recursive method is a method that invokes itself directly or indirectly. For a recursive method to terminate there must be one or more ____" A. steps B. base cases C. conditions D. limit conditions</div>
B	<div>Whats the value of the Shift Folding Hash Function if $K = 43$-35-59 and TSize = 100? A. 39 B. 37 C. 36 D. 35</div>
D	<div>Consider the following function void fun(int n) {int m = n/2; int k = n%2; if(m > 0) {fun(m); } System.out.print(k + " "); } What is the output when the statement fun(10); is run? A. 1 1 0 1 B. 0 1 0 1 C. 1 0 1 1 D. 1 0 1 0</div>
B	<div>What is the result of the breadth first traverse of the binary search tree T, after inserting the following keys into the tree sequentially (suppose T is empty before insertion) 16,7,3,1,12,20,17 A. 16, 7, 20, 3, 12, 1, 17 B. 16, 7, 20, 3, 12, 17, 1 C. 16, 7, 20, 3, 17, 12, 1 D. 16, 7, 20, 3, 17, 1, 12</div>
C	<div>Using the Huffman code tree below. Whats the result of decoding the string 1000001001? A. ABCBD B. ABBD C. ABBCD D. ABCDB</div> <div></div>
A	<div>Whats the value of the Boundary Folding Hash Function if $K = 45$-35-79-8 and TSize = 100? A. 85 B. 80 C. 89 D. 87</div>
C	<div>Consider the following pseudocode: declare a queue of characters while(there are more characters in the word to read) {read a character if a character is "" then dequeue the queue else enqueue the character into the queue } while(the queue is not empty) dequeue and write the dequeued character'o the screen</div> <div>What is written to the screen for the input "HowAre**You**To***Day" ? A. yaDoT B. oDay C. ToDay D. ToDa</div>
C	<div>Given a graph below and colors numbered 1, 2, 3, ... are assigned to vertices with the sequential coloring What is the color of the vertex G?</div> <div>A. 1 B. 4 C. 2 D. 5 E. 3</div> <div></div>
C	<div>Given a binary tree below. What is a result of postorder traverse?</div> <div>A. 1,3,4,7,5,2,8,6 B. 7,4,3,5,1,2,8,6 C. 7,4,5,3,8,6,2,1 D. 1,3,4,7,5,2,6,8</div> <div></div>
A	<div>Specify the correct statement about chainina method for handling collision A. In chaining, the linked-listis used instead of array for a hash table B. In chaining, some positions of the table is associated with a linked list or chain of structures whose info fields store keys or references to keys C. In this method, the table can never overflow if free memory is available, because the linked lists extendible. D. None of others</div>
B	<div>Suppose a doubly linked list of integers is given below and p is a reference to the node with value 10 in the list (i.e. p.info=10) (head) 27 11 6 4 3 10 8 2(tail)</div> <div>What does the list look like after the following java code snippet is run? int x= 19; Node p1, p2; p1=new Node(x); p2=p.next; p1.next+= p1; p1.prev=p; p1.next+= p2; p2.prev=p1;</div> <div>A. 27 11 6 4 3 19 10 8 2 B. 27 11 6 4 3 10 19 8 2 C. 27 19 11 6 4 3 10 8 2 D. 27 11 6 4 3 10 8 2 19 E. 19 27 11 6 4 3 10 8 2</div>

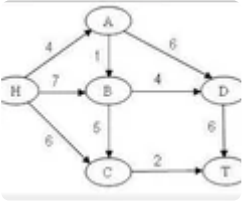
C	<p>Consider the following pseudocode: declare a stack of characters while(there are more characters in the word to read) { read a character if a character is "" then pop and write the popped character to the screen else push the character into the stack } }</p> <p>What is written to the screen for the input "GoodMornl""ng" ?</p> <p>A. dorioM B. dorinG C. dorino D. dorinM</p>
A	<p>Select the most correct statement: A. In all cases the selection sort is $O(n^2)$ B. In the average case the selection sort is $O(n^2)$, in the best case it is $O(n \log n)$ C. In the worst case the selection sort is $O(n^2)$, in the best case it is $O(n)$ D. In the worst case the selection sort is $O(n^2)$, in the best case it is $O(n \log n)$</p>
D	<p>The complexity of heap sort is A. $O(n)$ B. $O(\log n)$ C. $O(n^2)$ D. $O(n \log n)$</p>
B	<p>Consider the following pseudocode: declare a queue of characters while(there are more characters in the word to read) { read a character if character is "" then dequeue and write the dequeued character to the screen else enqueue the character into the queue } }</p> <p>What is written to the screen for the int ""GoodA""fter""Noo"n"?</p> <p>A. GoodAfte B. GoodAfter C. Adoretfoot D. odAfteroo</p>
C	<p>Consider the following pseudocode: declare a queue of characters, which is implemented by circular array of size 6. while(there are more characters in the word to read) { read a character if character is "" then dequeue the queue else enqueue the character into the queue } }</p> <p>How the queue looks like after processing the input "Hello""Worl"d"?</p> <p>A. {} B. {4} C. {3} D. {2}</p>
B	<p>Consider the list of ten integers below: 15, 13, 18, 19, 11, 17, 10, 12, 16, 14 What is the list after the FIRST TWO iterations of the large loop in a selection sort? (sorting from smallest to largest)</p> <p>A. 10, 11, 18, 19, 12, 17, 15, 13, 16, 14 B. 10, 11, 18, 19, 13, 17, 15, 12, 16, 14 C. 10, 11, 18, 19, 13, 17, 15, 13, 16, 14 D. 10, 12, 18, 19, 11, 17, 15, 13, 16, 14</p>
A	<p>Given a binary search tree T below. What is a result of the breadth-first traverse of T after you delete by merging node 3?</p> <p>A. 6, 1, 8, 2, 7, 9, 4 B. 6, 2, 8, 1, 4, 7, 9 C. 6, 1, 8, 2, 4, 7, 9 D. 6, 2, 1, 4, 8, 7, 9</p> 
D	<p>What is the breadth-first traversal of a tree below after deleting node 25 by merging?</p> <p>A. 40, 35, 15, 50, 45, 30 B. 15, 40, 35, 50, 45, 30 C. 40, 30, 15, 50, 35, 45 D. 40, 15, 50, 35, 45, 30</p> 
D	<p>Given a binary tree below. What is a result of pre-order traverse?</p> <p>A. 1, 3, 6, 7, 5, 2, 4, 8 B. 1, 3, 6, 5, 7, 2, 8, 4 C. 6, 3, 7, 5, 1, 8, 4, 2 D. 1, 3, 6, 5, 7, 2, 4, 8</p>
A	<p>Suppose we are considering a doubly linked list and p is some node in the list which has predecessor node. Select the most correct java code snippet that inserts new node with value x before the node p. (previs a link to predecessor node),</p> <p>A. Node f = p.prev; Node q = new Node(x); q.prev = f; q.next = p; f.next = q; p.prev = q;</p> <p>B. Node f = p.prev; Node q = new Node(x); q.prev = f; q.next = p; f.next = q;</p> <p>C. Node f = p.prev; Node q = new Node(x); q.prev = f; q.next = p; f.next = q;</p> <p>D. Node f = p.prev; Node q = new Node(x); q.prev = f; f.next = q; p.prev = q;</p>
D	<p>Given a graph below. What is the output of depth-first traversal from vertex B? (visit nodes in ABC order...</p> <p>A. B, A, E, G, C, D, F, H B. B, A, E, G, F, D, C C. B, A, C, E, G, F, D, H D. B, A, E, G, F, D, C, H</p> 
A	<p>The height of a complete binary tree with n nodes is 1. $n \log n$ 2. $n \log_2(n+1)$ 3. $\log_2(n)$ 4. $\log_2(n+1)$</p> <p>A. 4 B. 2 C. 1 D. 3</p>

B	<p>Consider the following function:</p> <pre>void fun(int n) { if(n<0) { fun(-n); System.out.println("n = "+n); } else if(n<15) { System.out.println(n); } else { System.out.println(n%10); fun(n/15); } }</pre> <p>What values of n are directly handled by the stopping (base) case?</p> <p>A. n<15 B. n==0 && n<15 C. n>=15 D. n<0</p>
B	<p>Suppose a singly linked list of integers is given below. (head) 7 10 12 4 2 13 8 3 (tail) What does the listlook like after the following java code snippet is tun?</p> <pre>int x= 15; Node f = head; while(f.next != tail) f = f.next; Node q = new Node(x); q.next = tail; f.next+= q;</pre> <p>A. 7 10 12 4 2 13 15 8 3 B. 7 10 12 4 2 13 8 15 3 C. 7 15 10 12 4 2 13 8 3 D. 7 10 12 4 2 13 8 3 15 E. 15 7 10 12 4 2 13 8 3</p>
C	<p>Select the statement that is most correct. Basically, the complexity of inserting a node before a given node in a doubly linked lists is</p> <p>A. $O(n^2)$ B. $O(n)$ C. $O(1)$ D. $O(\log n)$</p>
C	<p>Given the graph $G = (V,E)$ and X is a vertex of G. Suppose there exists at least one Hamilton Cycle for the... declare an empty array H (which will contain Hamilton cycle)</p> <p>(1) Putthe vertex X to H (2) Check if H is a Hamilton cycle then stop, else go to (3) (3) Consider the last vertex Y in H, if there is/are vertex(es) adjacent to Y, selectthe first adjacent vertex Z Go to (2).</p> <p>Suppose a G is given below (view picture). Which of the followings is the Hamilton cycle from the vertex</p> <p>A. b, e, a, d, c, b B. b, e, d, c, a, b C. b, a, c, d, e, b D. b. c. d. e. a. b E. b, a, e, d, c, b</p>
C	<p>Select the statement that is most correct. Basically, the complexity of finding the position of the minimum value in a doubly-linked list of integer numbers is</p> <p>A. $O(1)$ B. $O(n^2)$ C. $O(n)$ D. $O(\log n)$</p>
B	<p>Whats the minimum number of nodes in a full binary tree with height 3? (In a tree height of root is 1, and in a full binary tree every node other than the leaves has two children).</p> <p>A. 6 B. 7 C. 5 D. 4</p>
A	<p>State True or False: Definition of a balanced tree: "A balanced tree is one whose root has many more left descendents than right descendants, or vice versa."</p> <p>A. False B. True</p>
E	<p>Suppose a doubly linked list of integers is given below and p is a reference to the node with value 12 inthe list (ie. p.info=12): (head)7 16 4 3 12 8 21 (tail)</p> <p>What does the list look like after the following java code snippetis tun?</p> <pre>int x= 13; Node f=p.prev; //prev is a link to predecessor node Node q =new Node(x); q.prev = f; q.next = p; f.next = q; p.prev= q;</pre> <p>A. 7 1 6 4 3 12 13 8 21 B. 7 13 1 6 4 3 12 8 21 C. 7 1 6 4 3 12 8 21 13 D. 13 7 1 6 4 3 12 8 21 E. 7 1 6 4 3 13 12 8 21</p>
A	<p>Select the statement that is most correct. Suppose we are considering a singly linked list and p is some node in the list which has successor node. What does the java code snippet below do?</p> <pre>Node q = p.next; p.next = q.next;</pre> <p>A. It deletes the node p. B. It deletes the node after p. C. It deletes the node before p. D. It does not make any change on the list.</p>
A	<p>To implement an AVL tree, a concept balance factor is introduced (bal = height(right)-height(left). Suppose an AVL tree is created by inserting to the tree the following keys sequentially: 6, 2, 7, 1, 3, 5 What is the balance factor of the node 6? (please note that the tree is still AVL)</p> <p>A. 0 B. -1 C. 1 D. 2</p>
E	<p>Suppose a doubly linked list of integers is given below and p is a reference to the node with value 12 in the list (ie. p.info=12): (head)7 16 4 3 12 8 21 (tail)</p> <p>What does the listtook like after the following java code snippets run?</p> <pre>int x = 13; Node f = p.prev; //prev is a link to predecessor node Node q = new Node(x); q.prev = f; q.next = p; f.next = q; p.prev = q;</pre> <p>A. 7 1 6 4 3 12 13 8 21 B. 7 13 1 6 4 3 12 8 21 C. 7 1 6 4 3 12 8 21 13 D. 13 7 1 6 4 3 12 8 21 E. 7 1 6 4 3 13 12 8 21</p>
A,D	<p>Suppose a graph G is given by the adjacency matrix below. Which of the following is the Hamilton cycle?</p> <p>A. A, B, C, D, E, C, A B. A, C, D, E, B, A C. A, B, C, D, E, A D. A, B, D, E, C, A</p>

A	<p>Consider the list of eight integers below: 6, 3, 9, 10, 8, 2, 7, 5 What is the list after it has just been partitioned by the first step of quicksort and a pivot value is chosen as the first element of the list? (sorting from smallest to largest).</p> <p>[A] 2, 3, 5, 6, 7, 8, 10, 9</p> <p>[B] 2, 3, 5, 6, 8, 7, 9, 10</p> <p>[C] 2, 3, 6, 5, 8, 10, 7, 9</p> <p>[D] 2, 3, 5, 6, 8, 10, 7, 9</p>
A	<p>What does the code snippet below do?</p> <pre>public class Main { public static void main(String [] args){ Float h = null; float x = 0; x<= h.floatValue(); System.out.println("x = 5"); } }</pre> <p>[A] It throws NullPointerException</p> <p>[B] It prints on the screen "error"</p> <p>[C] It prints on the screen "x = 0"</p> <p>[D] It prints on the screen "x = 5"</p>
B	<p>Specify the correct statement about hashing algorithm (Select the best answer).</p> <p>[A] If the coalesced method is used for collision resolution, insertion and searching (and sometimes deletion) always take constant time: $O(1)$</p> <p>[B] The expected complexity of hashing algorithm is $O(1)$. However by the collision resolution, sometimes it may take $O(n)$</p> <p>[C] If the chaining method is used for collision resolution, insertion and searching (and sometimes deletion) can take constant time: $O(1)$</p> <p>[D] No matter how many data items there are, insertion and searching (and sometimes deletion) always take constant time: $O(1)$</p>
D	<p>What is the output of the code snippet below?</p> <pre>public class Main {static void foo (int x) {x = x - 10; System.out.print(x+" "); } public static void main(String [] args) {int x= 65; System.out.print("x "); foo(x); System.out.print(x+" "); System.out.println(); } }</pre> <p>[A] 65 65 65</p> <p>[B] 65 55 55</p> <p>[C] 65 55 40</p> <p>[D] 65 55 65</p>
C	<p>Given the division hash function $h(x) = x \% M$, where $M = 10$ and Collision Resolution is linear probing. How the hash table looks like after inserting the following keys sequentially? 75,12,110, 103, 32, 132</p> <p>[A] (2)</p> <p>[B] (1)</p> <p>[C] (4)</p> <p>[D] (3)</p>
D	<p>Suppose the $f(n)$ function is defined on the set of integer numbers as below. What is the value of $f(5)$?</p> <p>[A] 20</p> <p>[B] 5</p> <p>[C] 10</p> <p>[D] 15</p>
B	<p>What is the output of the code snippet below?</p> <pre>class A {int x} public class Main{ static void fun(A t){ tx +=250; System.out.print(tx+" "); } public static void main(String [] args){ A h= new A(); h.x=15; System.out.print(h.x+" "); fun(h); System.out.print(h.x+" "); System.out.println(); } }</pre> <p>[A] 15 15 15</p> <p>[B] 15 65 65</p> <p>[C] 15 65 15</p> <p>[D] 15 50 15</p>
D	<p>The complexity of merge sort algorithm is</p> <p>[A] $O(n)$</p> <p>[B] $O(\log n)$</p> <p>[C] $O(n^2)$</p> <p>[D] $O(n \log n)$</p>
A	<p>When representing any algebraic expression E which uses only binary operations in a 2-tree (every node other than the leaves has two children).</p> <p>[A] the variable in E will appear as external nodes and operations in internal nodes</p> <p>[B] the variables and operations in E will appear only in internal nodes</p> <p>[C] the variables and operations in E will appear only in external nodes</p> <p>[D] the operations in E will appear as external nodes (leaves) and variables in internal nodes</p>

D	<p>Ânh</p> <p>Given a weighted graph below and you are using the Dijkstra algorithm to find the shortest path from the vertex A to the vertex F. What are the correct order of vertices selected into the set S until the vertex F is selected? (Each step a vertex with minimal current distance is selected into S)</p> <p>A. A, B, C, E, F</p> <p>B. C, D, F</p> <p>C. C, E, F</p> <p>D. A, B, C, E, D, F</p>
D	<p>The following is the main part of selection sort pseudocode:</p> <pre>for i := 0 to n-2 // large loop find a[k], where a[k] = min {a[i] a[i+1]...a[n-1]} if k ≠ i then swap a[i] with a[k] end for</pre> <p>Consider the list of ten integers below:</p> <p>7,5, 11, 12, 3, 10, 2, 4, 8,6</p> <p>What is the list after the FIRSTTWO iterations of the large loop in a selection sort? (sorting from smallest to largest).</p> <p>A.</p> <p>2, 3, 7,5, 11, 12, 10, 4, 8, 6</p> <p>B.</p> <p>2, 3, 11, 12, 10,5, 7,4, 8,6</p> <p>C.</p> <p>2, 3, 11, 12, 5, 10, 7, 4, 6, 8</p> <p>D.</p> <p>2, 3, 11, 12, 5, 10, 7,4, 8, 6</p>
A	<p>Given the character frequencies</p> <p>B : 32%</p> <p>C : 28%</p> <p>D : 16%</p> <p>E : 6%</p> <p>F : 18%</p> <p>Using Huffman encoding, what is the code for character C? (Suppose that when constructing a sub tree from 2 nodes we always place node with higher frequency on the left; and the left branch of a node gets value 0, the right one gets value 1)</p> <p>A. 10</p> <p>B. 001</p> <p>C. 101</p> <p>D. 01</p>
A	<p>Given a raw message 'BBBBQQQB8B8QQB8B8B8BQQ' (without single quote). Run the run-length encoding algorithm for that message, what is the output?</p> <p>[A]</p> <p>4B4Q3B3Q5B2Q</p> <p>[B]</p> <p>4B4Q3B2Q5B</p> <p>[C]</p> <p>B4Q4B3Q2B5QQ2</p> <p>[D]</p> <p>4B4Q3B2Q5B2QQ</p>
A	<p>In a singly-linked list, there is no efficient way to insert a node before a given node in the middle or at the end of the list, but we can insert a node after a given node or at the beginning of the list with time complexity O(1)</p> <p>A. False</p> <p>B. True</p>
C	<p>Which of the following applications may use a stack?</p> <p>[A]</p> <p>Store all variables in a program.</p> <p>[B]</p> <p>Multi-programming.</p> <p>[C]</p> <p>Auxiliary data structure for algorithms</p> <p>[D]</p> <p>Store a waiting list of printing jobs.</p>
C	<p>Specify the correct statement about coalesced chaining method for handling collision (select the best answer).</p> <p>[A]</p> <p>Because in coalesced hashing, the linked list is created inside the hash table, thus the searching raust be carried out sequentially</p> <p>[B]</p> <p>In coalesced hashing, the linked list is created inside the hash table and a colliding key is put in the first available position of the table.</p> <p>[C]</p> <p>In coalesced hashing, the linked list is created inside the hash table. Each position pos in the table contains 2 fields: info and next. The next field contains the index of the next key that is hashed to pos</p> <p>[D]</p> <p>In coalesced hashing, the linked list is created outside the hash table and a colliding keys are put in the list connected to the colliding position of the table.</p>
D	<p>Select the correct statement</p> <p>Suppose T is a binary tree with 14 nodes. What is the minimum possible height of T?</p> <p>(Note: In a tree the height of root is 1)</p> <p>[A]</p> <p>2</p> <p>[B]</p> <p>5</p> <p>[C]</p> <p>3</p> <p>[D]</p> <p>4</p>
E	<p>Suppose a doubly linked list of integers is given below and p is a reference to the node with value 15 in the list (i.e. p.info=15):</p> <p>(head) 7 11 6 4 3 15 8 12 (tail)</p> <p>What does the list look like after the following java code snippetis run?</p> <pre>int x = 35; Node f = p.prev; // prev is a link to predecessor node Node q = new Node(x); // Create new node with value x. q.prev=f; q.next=p; f.next = q; p.prev = q;</pre> <p>A.</p> <p>7 11 6 4 3 15 8 12 35</p> <p>B.</p> <p>7 11 6 4 3 15 8 35 12</p> <p>C.</p> <p>7 11 6 4 3 15 35 8 12</p> <p>D.</p> <p>35 7 11 6 4 3 1 58 12</p> <p>E.</p> <p>7 11 6 4 3 35 15 8 12</p>
B	<p>Given a graph below. What is the output of breadth-first traversal from vertex D? (visitnodes in ABC order if there are some nodes having the same selection ability).</p> <p>A.</p> <p>D, C, F, B, E, G, A, H</p> <p>B.</p> <p>D, C, F, B, G, A, E, H</p> <p>C.</p> <p>D, C, B, A, E, G, F, H</p> <p>D.</p> <p>D, C, F, B, G, A, E</p>

A	<p>Specify the correct statement about chaining method for handling collision</p> <p>[A] In chaining, each position of the table is associated with a linked list or chain of structures whose info fields store keys or references to keys</p> <p>[B] In chaining, the linked-list is used instead of array for a hash table</p> <p>[C] In chaining, only some positions of the table is associated with a linked list or chain of structures whose info fields store keys or references to keys:</p> <p>[D] None of others</p>
B	<p>Select the statement that is most correct</p> <p>Suppose we are considering a doubly linked list and p is some node in the list which has successor node. What does the Java code snippet below do?</p> <p>Node p1, p2; p1 = p.next; p2 = p1.next; p.next = p2; if (p2 != null) p2.prev = p;</p> <p>A. It deletes the node p.</p> <p>B. It deletes the node after p.</p> <p>C. It deletes the node before p.</p> <p>D. It does not make any change on the list.</p>
C	<p>Given the character frequencies</p> <p>B : 32%</p> <p>C : 28%</p> <p>D : 16%</p> <p>E : 6%</p> <p>F : 18%</p> <p>Using Huffman encoding, what is the code for character D? (Suppose that when constructing a sub tree from 2 nodes we always place node with higher frequency on the left, and the left branch of a node gets value 0, the right one gets value 1)</p> <p>A. 001 B. 101 C. 011 D. 100</p>
D	<p>What is the value of the Boundary Folding Hash Function if K = 43-57-69 and TSize = 100?</p> <p>[A] 43</p> <p>[B] 69</p> <p>[C] 57</p> <p>[D] 87</p>
A	<p>Consider the following function:</p> <pre>int fun(int n) { if (n < 0) return (fun(-n)); else if (n < 5) return (2); else return (n * fun(n/2)); }</pre> <p>Which call will result in the most recursive calls?</p> <p>A. fun(-1012);</p> <p>B. fun(1012);</p> <p>C. fun(0);</p> <p>D. fun(100);</p>
D	<p>Consider the binary tree below. Which statement is correct? (full binary tree = proper binary tree = 2-tree)</p> <p>[A] The tree is neither complete nor full.</p> <p>[B] The tree is both full and complete.</p> <p>[C] The tree is complete but not full.</p> <p>[D] The tree is full but not complete.</p>
B	<p>What is the correct definition of a hash function? (Select the best answer)</p> <p>[A] Hash function h(x) is a function which transforms a particular key (string, or number) into an index i = h(x) in the table T, where T[i] is used for storing an item having key x or its address.</p> <p>[B] Hash function h(x) is a function which transforms a particular key x, be it a string, number, record, or the like, into an index i = h(x) in the table T, where T[i] is used for storing an item having key x or its address.</p> <p>[C] Hash function h(x) is a function which transforms a particular key x, be it a string, number, record, or the like, into a positive integer.</p> <p>[D] Hash function h(x) is a function which transforms a particular key x, be it a string, number, record, or the like, into a non-negative integer.</p>
D	<p>Consider the following pseudocode: *</p> <pre>declare a stack of characters while (there are more characters in the word to read) { read a character if a character is '™' then pop and write the popped character to the screen else push the character into the stack } </pre> <p>What is written to the screen for the input "Go*od*Morning*Sir" ?</p> <p>A. GoMonS</p> <p>B. oGdorign</p> <p>C. joGdori</p> <p>D. oGdorig</p> <p>E. oGdoriS</p>
C	<p>Suppose a singly linked list of integers is given below and p is a reference to the node with value 3 in the list (i.e. p.info = 3):</p> <p>(head) 7 11 6 14 3 9 8 12 (tail)</p> <p>What does the list look like after the following Java code snippet is run?</p> <pre>int x = 5; Node f = head; while (f.next != p) f = f.next; Node q = new Node(x); q.next = p; f.next = q;</pre> <p>A. 7 11 6 14 3 5 9 8 12</p> <p>B. 7 5 11 6 14 3 9 8 12</p> <p>C. 7 11 6 14 5 3 9 8 12</p> <p>D. 7 11 6 14 3 9 8 5 12</p> <p>E. 7 11 6 14 3 9 8 12 5</p>

B	<p>Given a weighted graph below and you are using the Dijkstra algorithm to find the shortest path from the vertex H to the vertex T. What are the correct order of vertices selected into the set S until the vertex T is selected? (Each step a vertex with minimal current distance is selected into S).</p> <p>A. H,C,T</p> <p>B. H,A,B,C,T</p> <p>C. H,A,B,D,T</p> <p>D. H,B,D,T</p> 
C	<p>Suppose a doubly linked list of integers is given below and p is a reference to the node with value 3 in the list (ie. p.info=3): (head)7 1 6 4 3 9 8 2(tail) What does the list look like after the following java code snippet is run? Node p1,p2; p1 = p.next; p2=p1.next; p.next = p2; if(p2!=null) p2.prev=p;</p> <p>[A] 7 1 6 3 9 8 2</p> <p>[B] 7 1 4 3 9 8 2</p> <p>[C] 7 1 6 4 3 8 2</p> <p>[D] 7 1 6 4 3 9 4</p> <p>[E] 1 6 4 3 9 8 2</p>
C	<p>Fill in the blank of the statement to form the most correct one: In a __, every element contains some data and a link to the next element, which allows to keep the structure.</p> <p>[A] doubly linked list</p> <p>[B] skip list</p> <p>[C] singly linked list</p> <p>[D] binary search tree</p>
D	<p>Consider the following function: void quiz(int n) {if (n> 1) {quiz(n / 2); quiz(n / 2); } System.out.print("** "); } How many asterisks are printed by the function call quiz(5)?</p> <p>A. 8 B. 4 C. 3 D. 7</p>
B	<p>Select the statement that is most correct. Suppose we are considering a doubly linked list and p is some node in the list which has successor node. What does the java code snippet below do?</p> <p>Node p1, p2; p1 = new Node(x); p2 = p.next; p2 = p.next; p.next = p1; p1.prev = p; p1.next = p2; p2.prev = p1;</p> <p>[A] It creates new node with value x at the end of the list.</p> <p>[B] It inserts new node with value x after the node p.</p> <p>[C] It inserts new node with value x before the node p.</p> <p>[D] It replaces the node p with new node with value x.</p>
A	<p>Binary search algorithm cannot be applied to</p> <p>[A] sorted linear array</p> <p>[B] Binary search tree</p> <p>[C] sorted singly linked list</p>
D	<p>Select the statement that is most correct. Basically, the complexity of inserting new element before a given node in the middle of a singly linked lists is</p> <p>[A] O(1)</p> <p>[B] O(log n)</p> <p>[C] O(n^2)</p> <p>[D] O(n)</p>
C	<p>Select the statement that is most correct. Which of the following applications may use a queue?</p> <p>[A] Store all variables in a program.</p> <p>[B] Store a waiting list of printing jobs.</p> <p>[C] Keeping track of local variables at run time.</p> <p>[D] Undo sequence in a text editor.</p>
A	<p>Consider the following function: void fun(int n) {if(n > 0) {fun(n-2); System.out.print(" *n "); } } What is the output when the statement fun(9); is run?</p> <p>[A] 1 3 5 7 9</p> <p>[B] 9 7 5 3 1</p> <p>[C] 7 5 3 1</p> <p>[D] 9 7 5 3</p>

C	<p>Select the statement that is most correct.</p> <p>Suppose we are considering a singly linked list and p is some node in the list which has both predecessor and successor nodes. What does the java code snippet below do?</p> <pre>Node f = head; while(f.next != p) f = f.next; f.next = p.next;</pre> <p>[A] It does not make any change on the list.</p> <p>[B] It deletes the node after p.</p> <p>[C] It deletes the node p.</p> <p>[D] It deletes the node before p.</p>
A	<p>Select the statement that is most correct.</p> <p>Suppose we are considering a doubly linked list which is not empty. What does the java code snippet below do?</p> <pre>Node q = new Node(x); q.prev=null; q.next = head; head.prev = q; head = q;</pre> <p>[A] It inserts new node with value x at the head of the list.</p> <p>[B] It inserts new node with value x after the head of the list.</p>
B	<p>Fill in the blank of the statement to form the most correct one:</p> <p>A ____ node contains some data and one link to its successor and one link to its predecessor in the list.</p> <p>[A] binary search tree</p> <p>[B] doubly linked list</p> <p>[C] skip list</p> <p>[D] singly linked list</p>
B	<p>Consider the fun() method in a singly linked list of integers below:</p> <pre>Integer fun() { if (isEmpty()) return null; Integer x = head.info; if (head == tail) head = tail = null; else head = head.next; return(x); }</pre> <p>Specify the correct statement about the fun() method in the code above (choose the most suitable one).</p> <p>[A] It removes and returns the second element of the list</p> <p>[B] It removes and returns the first element of the list</p> <p>[C] It removes and returns the last element of the list</p>
A	<p>Suppose we are consi ing a singly linked list and p is some node in the list which has successor node. Select the most correct java code snippet that deletes the successor node of p (the node after p).</p> <p>[A] Node q = p.next; p.next = q.next;</p> <p>[B] p = p.next; p.next = null;</p> <p>[C] Node q = p.next; q.next = p.next.next;</p> <p>[D] p.next= null;</p>
B	<p>Which of the following queue operations could result in queue underflow (become empty)?</p> <p>[A] enqueue</p> <p>[B] dequeue</p> <p>[C] isEmpty</p>
B	<p>Select the statement that is most correct.</p> <p>Suppose we are considering a singly linked list which has at least 2 nodes. What does the java code snippet below do?</p> <pre>Node f = head; while(f.next != tail) f = f.next; f.next = null; tail = f;</pre> <p>[A] it deletes some middle node in the list.</p> <p>[B] It deletes the last node.</p> <p>[C] It deletes node before the last node.</p> <p>[D] It does not make any change on the list.</p>
A	<p>Consider the following function:</p> <pre>void fun(int n) { if(n > 0) { n=n/5; fun(n); System.out.print(" "+ n); } }</pre> <p>What is the output when the statement fun(23); is run?</p> <p>[A] 0 4</p> <p>[B] 4 0</p> <p>[C] 4 1</p> <p>[D] 1 4</p>
D	<p>Suppose a singly linked list of integers is given below:</p> <p>(head) 7 11 6 4 3 12 8 2 (tail)</p> <p>What does the list look like after the following java code snippet is run?</p> <pre>int x = 5; Node f = head; while(f.next != tail) f = f.next; Node g = new Node(x); q.next = tail; f.next = g;</pre> <p>[A] 5 7 11 6 4 3 12 8 2</p> <p>[B] 7 11 6 4 3 12 8 2 5</p> <p>[C] 7 11 6 4 3 12 5 8 2</p> <p>[D] 7 11 6 4 3 12 8 5 2</p>

C	<p>Which of the following stack operations could result in stack underflow?</p> <p>A. isEmpty</p> <p>B. push</p> <p>C. pop</p> <p>D. None of these</p>
C	<p>Suppose a singly linked list of integers is given below and p is a reference to the node with value 3 in the list (i.e. p.info=3): (head) 7 1 6 4 3 9 8 2 (tail) What does the list look like after the following java code snippet is run? int x = 5; Node f = head; while(f.next != p) f = f.next; Node q = new Node(x); q.next = p; f.next = q;</p> <p>[A] 7 5 1 6 4 3 9 8 2</p> <p>[B] 7 1 6 4 3 9 8 2 5</p> <p>[C] 7 1 6 4 5 3 9 8 2</p> <p>[D] 7 1 6 4 3 9 8 5 2</p>
B,D	<p>Which statements are true (select two):</p> <p>A. In a singly-linked list there is no efficient way to insert a node before a given node in the middle of the list (the action is considered efficient if its complexity is O(1)).</p> <p>B. In a singly-linked list we can insert a node after a given node with time complexity O(n)</p> <p>C. In a singly-linked list we can insert a node before a given node in the middle of the list with time complexity O(1)</p> <p>D. In a singly-linked list we can insert a node after a given node with time complexity O(1)</p>
D	<p>Select the correct statement Suppose T is a binary tree with 14 nodes. What is the minimum possible height of T? (Note: In a tree the height of root is 1) (height of root is 0 thì chọn 3)</p> <p>[A] 3</p> <p>[B] 5</p> <p>[C] 2</p> <p>[D] 4</p>
A	<p>In a linked list, the tail node is introduced for performance purpose only.</p> <p>A. True</p> <p>B. False</p>
B	<p>Suppose you are using the LZW algorithm to encode the message AAABCADAB. Contents of the dictionary at the beginning of encoding are: (1)A (2)B (3)C (4)D What string is denoted by code word (6)?</p> <p>A. ABC</p> <p>B. AB</p> <p>C. AAB</p> <p>D. CA</p> <p>E. AA</p>
B	<p>In Huffman coding, both the sender and receiver must have a copy of the same code in order for the decoded file to match the encoded file.</p> <p>A. False</p> <p>B. True</p>
B	<p>Suppose the h(n) function is defined on the set of integer numbers as below. For the call h(3), how many calls to h will be made, including the original call? int h(int n) { if(n==0 n==1) return(1); else return(h(n-1)+h(n-2)); }</p> <p>[A] 2</p> <p>[B] 5</p> <p>[C] 3</p> <p>[D] 4</p>
A	<p>Select the statement that is most correct.</p> <p>[A] Tail recursion is a special case of recursion in which the last operation of the function, the tail call, is a recursive call.</p> <p>[B] Tail recursion is a special case of recursion in which the first operation of the function, is a recursive call.</p>
C	<p>What is the breadth-first traversal of a tree below after deleting the node 2 by merging?</p> <p>A. 5, 1, 7, 4, 3, 6, 8</p> <p>B. 5, 4, 7, 1, 3, 6, 8</p> <p>C. 5, 1, 7, 4, 6, 8, 3</p> <p>D. 5, 1, 7, 4, 6, 3, 8</p>
B	<p>Given a weighted graph below and you are using the Dijkstra algorithm to find the shortest path from the vertex B to the vertex F. What is the label of the vertex D when the shortest path from 6 to F is determined?</p> <p>A. infinity</p> <p>B. 7</p> <p>C. 20</p> <p>D. 22</p>
C	<p>To implement an AVL tree, a concept balance factor is introduced (bal. = height(right)-height(left)). Suppose an AVL tree is created by inserting to the tree the following keys sequentially: 5, 2, 6, 1, 3, 4 What is the balance factor of the node 2? (please note that the tree is still AVL)</p> <p>A. 2</p> <p>B. 1</p> <p>C. -1</p> <p>D. 0</p>
C	<p>Suppose the f(n) function is defined on the set of integer numbers as below. What is the value of f(6)?</p> <p>A. 10</p> <p>B. 3</p> <p>C. 18</p> <p>D. 15</p>

C	<p>The following is the main part of selection sort pseudocode:</p> <pre>for i=0 to n-2 // large loop find a[k], where a[k] = min {a[i], a[i+1],...a[n-1]} if k ≠ i then swap a[i] with a[k] end for</pre> <p>Consider the list of ten integers below. 8, 5, 11, 12, 4, 10, 2, 5, 9, 6 Whats the list ater the FIRSTTWO iterations of the large loop in a selection sort? (sorting from smallestto largest)</p> <p>A. 2, 4, 11, 12, 10, 5, 8, 5, 9, 6</p> <p>B. 2, 4, 11, 12, 5, 10, 8, 5, 6, 9</p> <p>C. 2, 4, 11, 12, 5, 10, 8, 5, 9, 6</p> <p>D. 2, 4, 8, 5, 11, 12, 10, 5, 9, 6</p>
A	<p>The operation for removing and returning the end element of the queue is traditionally called:</p> <p>A. dequeue</p> <p>B. remove</p> <p>C. peek</p> <p>D. delete</p>
A	<p>Consider the AVL tree below. What is the breadth first traversal of the tree after inserting a node with value 24?</p> <p>[A] 35, 22, 39, 12, 27, 37, 24, 32</p> <p>[B] 35, 22, 39, 12, 37, 27, 24, 32</p> <p>[C] 35, 22, 39, 12, 32, 37, 24,27</p> <p>[D] 35, 22, 39, 12, 32, 37, 27,24</p>
A	<p>Select the statement that is most correct.</p> <p>A. A recursive method is a method that invokes itself directly or indirectly. For a recursive method to terminate there must be one or more base cases,</p> <p>B. For a recursive method to terminate there must be one or more steps</p> <p>C. For a recursive method to terminate there must be one or more limit conditions,</p> <p>D. There is no difference between a recursive method and a non-recursive method.</p>
D	<p>Whats the value of the Shift Folding Hash Function if K = 45-65-79-8 and TSize = 100?</p> <p>A. 93</p> <p>B. 90</p> <p>C. 91</p> <p>D. 97</p>
D	<p>Select the statement thatis most correct.</p> <p>Suppose we are considering a doubly linked list which has at least 2 nodes. What does the java code snippet below do?</p> <pre>Node f,tail,prev, // prev is a link to a predecessor node f.next= null tail = f;</pre> <p>A. Itdoes not make any change on the list.</p> <p>B. It deletes node before the lastnode</p> <p>C. It deletes some middle node in the list.</p> <p>D. It deletes the last node</p>
D	<p>Why the code snippet below does not run?</p> <pre>public class Main { public static void main(String [] args) { int [] a; int n =5; for(int i=0;i<n;i++) { a[i]=i; System.out.println(a[i]); } System.out.println(" "); } }</pre> <p>A. You cannot print integer values without converting them to strings.</p> <p>B. The syntax of the "for" statement is incorrect.</p> <p>C. You cannot declare integer i inside the for-loop declaration.</p> <p>D. Array "a" is not initialized.</p>
A	<p>What is the result of the breadth first traverse of the binary search tree T, after inserting the following keys into the tree sequentially (suppose T is empty before insertion): 7, 8, 3, 1, 2, 5, 9</p> <p>A 7,3,8,1,5,9,2</p> <p>B. 7,3,8,1,5,2,9</p> <p>C. 7,3,8,1,2,5,9</p> <p>D. 7,3,1,2,5,8,9,</p>
A	<p>Consider the fun() method in a singly linked list below:</p> <pre>void fun() { if (isEmpty()) return; if(head == tail) head = tail = null; else { Node p1,p; p1=null;p=head; while(p !=tail) {p1=p;p=p.next} p1.next=null; tail=p1' } }</pre> <p>Specify the correct statement about the fun() method in the code above (choose the most suitable one)</p> <p>A. It removes a node at the end of the list</p> <p>B. It removes a node at the middle of the list</p> <p>C. It removes a node at the beginning of the list</p> <p>D. The code does not change the list</p>
B	<p>Arrays are the best data structures</p> <p>[A] for the size ofthe structure and the data in the structure are constantly changing</p> <p>[B] for relatively permanent collections of data</p>

C	<p>What is the output of the code snippet below?</p> <pre>class A {int a,b; void set(int a!, int b!) {a = a!;b=b!;} int foo() {return(a+b);} } public class Main {static void test(A h) {h.a=h.a*2; System.out.print(h.foo()+" "); } Public static void main(String [] args) {A t=new A(); t.set(3,4); System.out.print(t.foo()+" "); test(t) System.out.print(t.foo()); System.out.println(); } } A. 7 9 7 B. 7 7 9 C. 7 9 9 D. 7 7 7</pre>
C	<p>What is the output of the code snippet below?</p> <pre>public class Main {public static void main(String [] args) {int []a = {1,2,3,4}; int i,j, sum; sum = 0; for(i=0;i<a.length;i++) for(j=0;j<=i;j++) sum += a[j]; System.out.println(sum); } }</pre> <p>A. 18</p> <p>B. 24</p> <p>C. 20</p> <p>D. 22</p>
D	<p>Consider the list of eight integers below:</p> <p>6, 4, 10, 11, 9, 3, 7, 5</p> <p>What is the list after it has just been partitioned by the first step of quicksort and a pivot value is chosen as the first element of the list? (sorting from smallest to largest)</p> <p>A. 3, 4, 5, 6, 9, 7, 10, 11</p> <p>B. 3, 4, 5, 6, 7, 9, 11, 10</p> <p>C. 3, 4, 6, 5, 9, 11, 7, 10</p> <p>D. 3, 4, 5, 6, 9, 11, 7, 10</p>
B	<p>Given a raw message 'FFFOOOFFFOOFFFFFOO' (without single quote). Run the run-length encoding algorithm for that message. What's the output?</p> <p>[A]</p> <p>3F4O3F2O5F2OO</p> <p>[B]</p> <p>3F4O3F2O5F2O</p> <p>[C]</p> <p>3F4O3F2O5F</p> <p>[D]</p> <p>FFFOOOFFFOOFFFFFOO</p>
B	<p>Consider the following pseudocode:</p> <pre>declare a queue of characters while(there are more characters in the word to read) {read a character if a character is then dequeue the queue else enqueue the character into the queue } while(the queue is not empty) dequeue and write the dequeued character to the screen</pre> <p>What is written to the screen for the input "HowAre**You**To**Day" ?</p> <p>A.</p> <p>yaDoTu</p> <p>B.</p> <p>uToDay</p> <p>C.</p> <p>ouToDa</p> <p>D.</p> <p>ToDay</p>
C	<p>Specify the correct statement about bucket addressing method for handling collision (select the best answer).</p> <p>[A]</p> <p>Bucket is a linked list which holds items in the hash table.</p> <p>[B]</p> <p>A bucket is a block of space which is large enough to store all colliding items</p> <p>[C]</p> <p>Colliding elements in the same position in the hash table are placed on a bucket associated with that position</p> <p>[D]</p> <p>All of the statements are incorrect.</p>
A	<p>Consider the following pseudocode:</p> <pre>declare a stack of characters while(there are more characters in the word to read) {read a character if a character is "" then pop and write the popped character to the screen else push the character into the stack }</pre> <p>What is written to the screen for the input "GoodA**fter**Noo*n" ?</p> <p>A.</p> <p>Adretfoo</p> <p>B.</p> <p>Adoretoo</p> <p>C.</p> <p>Adretido</p> <p>D.</p> <p>Adretfon</p>
D	<p>Given the division hash function $h(x) = x \% M$, where $M = 10$ and Collision Resolution is linear probing. How does the hash table look like after inserting the following keys sequentially?</p> <p>95, 33, 221, 204, 53, 243</p> <p>[A]</p> <p>(2)</p> <p>[B]</p> <p>(1)</p> <p>[C]</p> <p>(4)</p> <p>[D]</p> <p>(3)</p>
B	<p>Select the statement that is most correct.</p> <p>Basically, the complexity of counting the number of items in a doubly-linked list is</p> <p>A. $O(1)$</p> <p>B. $O(n)$</p> <p>C. $O(n \log n)$</p> <p>D. $O(n^2)$</p>

D	<p>What is the output of the code snippet below?</p> <pre>class A {int x; A(int x){ x*x;k} } public class Main {static void foo(A t) {t.x += 100; System.out.print(t.x* " "); } public static void main(String [] args) {A h=new A(5); System.out.print(h.x* " "); foo(h); System.out.print(h.x* " "); System.out.println(); } }</pre> <p>A. 5 5 105 B. 5 5 5 C. 5 105 5 D. 5 105 105</p>
C	<p>Using the Huffman code tree below. What is the result of decoding the string: 011100000101 ?</p> <p>[A] BABABCBC</p> <p>[B] CAABABAB</p> <p>[C] CAABBBAC</p> <p>[D] CAABBCAB</p>
B	<p>The complexity of merge sort is</p> <p>1. $O(n \log_2 n)$</p> <p>2. $O(\log_2 n)$</p> <p>3. $O(n)$</p> <p>4. $O(n^2)$</p> <p>A. 3 B. 1 C. 2 D. 4</p>
A	<p>Whats the value of the Boundary Folding Hash Function if $K = 45-65-79-8$ and $TSize = 100$?</p> <p>A. 88</p> <p>B. 90</p> <p>C. 86</p> <p>D. 91</p>
D	<p>Consider the following pseudocode:</p> <p>declare a queue of characters, which is implemented by circular array of size 6.</p> <p>while(there are more characters in the word to read)</p> <p>{read a character</p> <p>if character is "" then</p> <p>dequeue the queue</p> <p>else</p> <p>enqueue the character into the queue</p> <p>}</p> <p>How the queue looks like after processing the input "Hello""Wor""ld"?</p> <p>A. (l)</p> <p>B. (4)</p> <p>C. (3)</p> <p>D. (2)</p>
A	<p>Suppose we are considering a singly linked list which has at least 2 nodes.</p> <p>Select the most correct java code snippet that deletes the last node</p> <p>[A] Node f= head; while(f.next != tail) f= f.next; f.next = null; tail = f;</p> <p>[B] Node f = head; while(f != tail) f = f.next; f.next = null; tail = f;</p> <p>[C] Node f = head; while(f.next != tail) f = f.next; tail =f;</p> <p>[D] Node f= head; while(f.next != tail) f = f.next; f.next = null;</p>
D	<p>The following is the main part of insertion sort pseudocode:</p> <p>for i := 1 to n-1</p> <p>insert a[i] into sorted sublist (a[0]...a[i-1])</p> <p>so that the sortedness is still kept</p> <p>end for</p> <p>Select the most correct solution</p> <p>Consider the list often integers below:</p> <p>16, 5, 3, 11, 10, 8, 12, 4, 8, 6</p> <p>Whatis the list after the FIRST TWO steps of insertion sort? (sorting from smallestto largest)</p> <p>[A] 3, 5, 11, 10, 8, 12, 4, 8, 6, 16</p> <p>[B] 3, 4, 16, 11, 10, 8, 12, 5, 8, 6</p> <p>[C] 3, 4, 5, 11, 10, 8, 12, 16, 8, 6</p> <p>[D] 3, 5, 16, 11, 10, 8, 12, 4, 8, 6</p>
D	<p>The following is the main part of bubble sort pseudocode:</p> <p>do</p> <p>swapped := false</p> <p>for i:= 0 to n-2</p> <p>if a[i] > a[i+1] then</p> <p>swap(a[i],a[i+1])</p> <p>swapped := true</p> <p>end if</p> <p>end for</p> <p>while swapped</p> <p>Consider the list often integers below:</p> <p>6, 4, 10, 11, 2, 9, 1, 3, 7, 5</p> <p>What is the list after the FIRST iteration (for i= 0 to n-2) in a bubble sort? (sorting from smallest to largest)</p> <p>[A] 4, 6, 10, 1, 2, 9, 3, 7, 5, 11</p> <p>[B] 4, 6, 10, 9, 2, 1, 3, 7, 5, 11</p> <p>[C] 4, 6, 10, 2, 9, 1, 3, 5, 7, 11</p> <p>[D] 4, 6, 10, 2, 9, 1, 3, 7, 5, 11</p>

A	<p>Select the statement that is most correct</p> <p>Which of the following applications may use a stack?</p> <p>[A]</p> <p>Undo sequence in a text editor.</p> <p>[B]</p> <p>Multi-programming</p> <p>[C]</p> <p>Store all variables in a program,</p> <p>[D]</p> <p>Store a waiting list of printing jobs!</p>
A	<p>Specify the correct implementation of pop() method of a stack of Integers. This stack uses java.util.LinkedList for storing data and the end of the list is treated as the top of the stack. (Choose the most suitable one)</p> <p>A.</p> <pre>Integer pop() { if (isEmpty()) return(null); return((Integer) pool.removeLast()); }</pre> <p>B.</p> <pre>Integer pop() { if (isEmpty()) return; return((Integer) pool.remove(pool.size()-1)); }</pre> <p>C.</p> <pre>Integer pop() { if (isEmpty()) return(null); return((Integer) pool.remove(pool.size())); }</pre> <p>D.</p> <pre>void pop(Integer x) { if (isEmpty()) return(null); pool.remove(pool.size()-1); }</pre>
B	<p>Consider the following pseudocode:</p> <pre>declare a stack of characters while(there are more characters in the word to read) { read a character if a character is " " then Pop the stack else push the character into the stack } while(the stack is not empty) pop and write the popped character to the screen</pre> <p>What is written to the screen for the input "Go*odMomin""g" ?</p> <p>[A]</p> <p>gMdo</p> <p>[B]</p> <p>odMg</p> <p>[C]</p> <p>gMoo</p> <p>[D]</p> <p>gMdG</p>
A	<p>(Choose 1 answer)</p> <p>Consider the following function:</p> <pre>void fun(int n) { if(n > 0) { System.out.print(" " + n % 5); fun(n); } }</pre> <p>whatwi happen if the statement fun(33); is run?</p> <p>A. The runtime stack overflows, halting the program</p> <p>B. The results are nondeterministic</p> <p>C. The operating system detects the infinite recursion because of the 'repeated state'</p> <p>D. The program keeps running until you press Ctrl-C</p>
D	<p>Which of the following Sorting algorithms use Divide and Conquer strategy?</p> <p>Choose one answer.</p> <p>a. Heap sort</p> <p>b. Radix sort</p> <p>c. Bubble sort</p> <p>d. Quick sort</p>
A	<p>What type of the hash functions that can be used in an English - Vietnamese dictionary?</p> <p>Choose one answer.</p> <p>a. Radix transformation</p> <p>b. Extraction</p> <p>c. Mid-square function</p> <p>d. Folding</p>
A	<p>A recursive method may be eliminated by using</p> <p>Choose one answer.</p> <p>a. Iteration statements</p> <p>b. Stacks</p> <p>c. All of the others.</p>
B	<p>A graph can be used to show relationships. From the following list of people belonging to the same club (vertices) and their friendships (edges):</p> <p>Peope = {George, Jim, Jean, Frank, Fred, John, Susan}</p> <p>Friendship = {(George, Jean), (Frank, Fred), (George, John), (Jim, Fred), (Jim, Frank), (Jim, Susan), (Susan, Frank)}</p> <p>Find all friends of friends of Jean.</p> <p>Choose one answer.</p> <p>a. Jim and George</p> <p>b. John and Jean</p> <p>c. Nobody</p> <p>d. Fred, Frank and Susan</p>
B	<p>Suppose we are considering a doubly linked list which is not empty.</p> <p>Select the most correct java code snippet that inserts new node with value x at the head of the list (the new node will be the first node in the list).</p> <p>Choose one answer.</p> <p>a.</p> <pre>Node q = new Node(x); q.prev=null; q.next = head; head.prev = q;</pre> <p>b.</p> <pre>Node q = new Node(x); q.prev=null; q.next = head; head.prev = q; head = q;</pre> <p>c.</p> <pre>Node q = new Node(x); q.prev=null; q.next = head; head = q;</pre> <p>d.</p> <pre>Node q = new Node(x); q.next = head; head.prev = q; head = q;</pre>
A	<p>An array contains the elements shown below. What would be the order of the elements in the array after phase 1 of the heap sort algorithm?</p> <p>3 9 7 2 11 16 4 13 12</p> <p>Choose one answer.</p> <p>a. 16 13 7 12 11 3 4 2 9</p> <p>b. 16 13 12 11 9 7 4 3 2</p> <p>c. 16 12 13 4 9 7 11 2 3</p> <p>d. 16 12 11 9 13 7 4 3 2</p>
B	<p>There are two approaches to writing repetitive algorithms:</p> <p>Choose one answer.</p> <p>a. direct recursion and indirect recursion.</p> <p>b. iteration and recursion.</p> <p>c. tail recursion and nontail recursion.</p> <p>d. nested recursion and excessive recursion.</p>
C	<p>We implement the stack as a singly linked list and use AddtoHead() method of the linked list to implement push() method. A top pointer of the stack is ...</p> <p>Choose one answer.</p> <p>a. Any one reference. Depending on the node that is accessed.</p> <p>b. Nothing. We need a doubly linked list.</p> <p>c. The head reference of the singly linked list.</p> <p>d. The tail reference of the singly linked list.</p>

B	<p>When the compiler compiles your program, how is a recursive call treated differently than a non-recursive method call?</p> <p>Choose one answer.</p> <p>a. Primitive values are all treated as reference variables.</p> <p>b. None of the others</p> <p>c. There is no duplication of local variables.</p> <p>d. Reference variables are all treated as primitive values.</p>
D	<p>The Java Collections Framework contains a Map interface. An implementation of this interface is ...</p> <p>Choose one answer.</p> <p>a. Singly Linked List</p> <p>b. Connected Graph</p> <p>c. Priority Queue</p> <p>d. HashTable</p>
A	<p>In the array implementation of the queue, which operations require constant time?</p> <p>Choose one answer.</p> <p>a. isEmpty</p> <p>b. enqueue</p> <p>c. dequeue</p> <p>d. All of the others.</p>
B	<p>Imagine we have the singly linked list, the head reference allows to manage this list. Show what would happen if we applied the following statements to this list?</p> <pre>for (temp = head; temp.next != null; temp = temp.next) { } temp.next = head;</pre> <p>Choose one answer.</p> <p>a. Insert the temp node successfully.</p> <p>b. This will create a circularly linked list.</p> <p>c. Nothing happens, the temp reference points at the end of the list.</p> <p>d. We have lost control this list, the head is overwritten by the other reference.</p>
C	<p>Suppose you are using the LZW algorithm to encode the message AABAACAABD contents of the dictionary at the beginning of encoding are:</p> <p>(1) A (2) B (3) C (4) D</p> <p>What string is denoted by code word (7)?</p> <p>Choose one answer.</p> <p>a. BAA</p> <p>b. AB</p> <p>c. BA</p> <p>d. ABA</p> <p>e. AC</p>
D	<p>In a circular singly linked list, we can use only one permanent reference, the tail. The familiar reference, the head, is:</p> <p>Choose one answer.</p> <p>a. The null reference.</p> <p>b. The predecessor of the tail.</p> <p>c. The implicit reference.</p> <p>d. The successor of the tail.</p>
B	<p>Using the coalesced hashing to put the following values in a table with 10 elements:</p> <p>A5, A2, A3, B5, A9, B2, B9, C2</p> <p>Using the extraction method to extract the number as the key.</p> <p>What is the chain to begin with A5?</p> <p>Choose one answer.</p> <p>a. A5-B2-C2</p> <p>b. A5-B5-A9-B9</p> <p>c. A5-A2-A3</p> <p>d. A5-B5</p>
C	<p>When representing any algebraic expression E which uses only binary operations in a 2-tree (every node other than the leaves has two children).</p> <p>Choose one answer.</p> <p>a. the operations in E will appear as external nodes (leaves) and variables in internal nodes.</p> <p>b. the variables and operations in E will appear only in external nodes.</p> <p>c. the variable in E will appear as external nodes (leaves) and operations in internal nodes.</p> <p>d. the variables and operations in E will appear only in internal nodes.</p>
D	<p>Consider the following pseudocode:</p> <pre>declare a queue of characters while(there are more characters in the word to read) {read a character if a character is "" then dequeue and write the dequeued character to the screen else enqueue the character into the queue }</pre> <p>What is written to the screen for the input "HowAre••You••To•••Day" ?</p> <p>Choose one answer.</p> <p>a. wAreYouTo</p> <p>b. HowAreYo</p> <p>c. owAreYouT</p> <p>d. HowAreYou</p>
A	<p>Which of these operations are likely to have a constant time for worst-case in the singly linked lists?</p> <p>Choose one answer.</p> <p>a. None of the others.</p> <p>b. removeLastOccurrence (). Removes the last occurrence of the specified element in list.</p> <p>c. get(int index):Returns the element at the specified position in this list.</p> <p>d. InsertAfter (int index) : insert a new element into after an element in the list.</p>
C	<p>Specify the correct implementation of dequeue() method of a queue. This queue uses java.util.LinkedList, here is pool, for storing data and the head of the list is treated as the head of the queue. (Choose the most suitable one)</p> <p>Choose one answer.</p> <p>a.</p> <pre>void dequeue(Object x) { if (isEmpty()) return(null); pool.remove(pool.size()-1); }</pre> <p>b.</p> <pre>Object dequeue() {if (isEmpty()) return; return(pool.remove(pool.size()-1)); }</pre> <p>c.</p> <pre>Object dequeue() { if (isEmpty()) return(null); return(pool.removeFirst()); }</pre> <p>d.</p> <pre>Object dequeue() { if (isEmpty()) return(null); return(pool.removeLast()); }</pre>
A	<p>What is the number of comparisons and swaps in the best case for creating a heap using top down method (William's method)?</p> <p>Choose one answer.</p> <p>a. The number of comparisons is n - 1 and swaps is zero.</p> <p>b. The number of comparisons is 2 [n/2] and swaps is zero.</p> <p>c. The number of comparisons is n and swaps is zero.</p> <p>d. The number of comparisons is 1gn and swaps is zero.</p>
A	<p>In run-length encoding algorithm, a run is defined as ...</p> <p>Choose one answer.</p> <p>a. number of different characters in the input.</p> <p>b. size of the result of encoding input data.</p> <p>c. amount of time required to the compression algorithm.</p> <p>d. a sequence of identical characters.</p>
D	<p>An array contains the elements shown below. The first two elements have been sorted using a bubble sort. What would be the order of the elements in the array after three more passes of the bubble sort algorithm? Use the version of bubble sort that starts from the begin and bubbles up the largest element.</p> <p>7 8 26 44 13 23 57 98</p> <p>Choose one answer.</p> <p>a. 7 8 13 26 44 23 57 98</p> <p>b. 7 8 13 44 26 23 57 98</p> <p>c. 7 8 13 23 44 26 57 98</p> <p>d. 7 8 13 23 26 44 57 98</p>
C	<p>Which of the following statements is true:</p> <p>Choose one answer.</p> <p>a. All the sorting methods implemented in java is applied to any basic data type except bool type.</p> <p>b. For objects comparison, a comparison criterion must be implemented by user.</p> <p>c. All of the others.</p>
C	<p>Suppose temp refers to some node in a doubly linked list. What boolean expression can be used to check whether temp refers to the first node of the list?</p> <p>Choose one answer.</p> <p>a. temp.previous.next.previous == null</p> <p>b. temp == null</p> <p>c. temp.previous == null</p> <p>d. All of the others.</p>
B	<p>Which of the following statements about graph coloring is true:</p> <p>Choose one answer.</p> <p>a. The complexity of sequential Coloring algorithm is O (V) , where V is number of vertices.</p> <p>b. Sequential Coloring algorithm establishes the sequence of vertices and a sequence of color before coloring them.</p> <p>c. In sequential coloring algorithm, vertices must be ordered according to indices already to the vertices.</p> <p>d. In sequential coloring algorithm, vertices must be ordered according to degree of vertices.</p>
A	<p>Which of the following Sorting algorithms have complexity of O(n) in best case ?</p> <p>Choose one answer.</p> <p>a. Insertion sort</p> <p>b. Selection sort</p> <p>c. Bubble sort</p> <p>d. All of the others.</p>

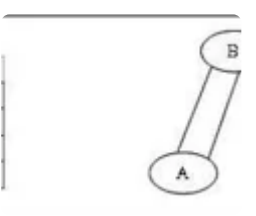
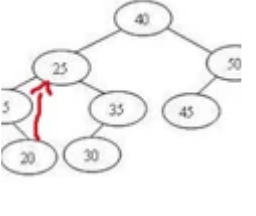
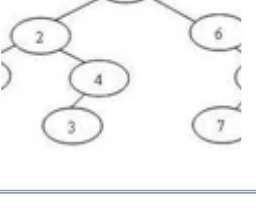
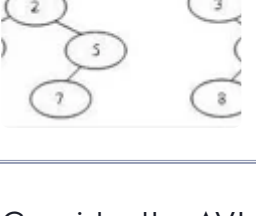
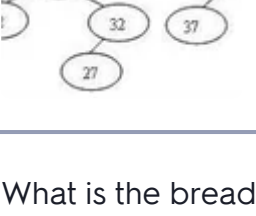
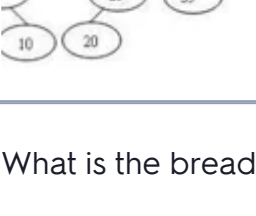
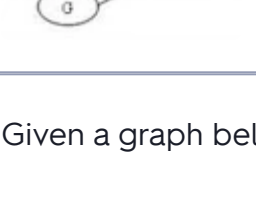
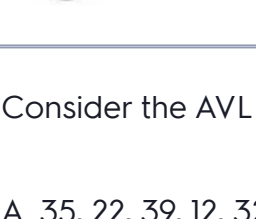
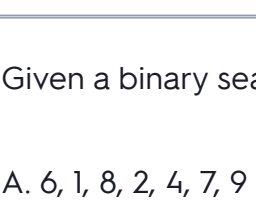
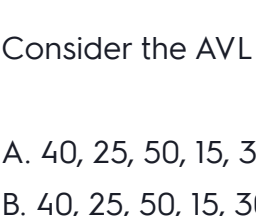
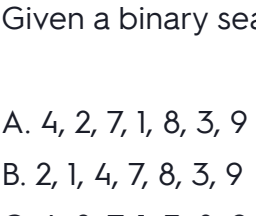
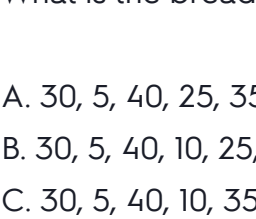
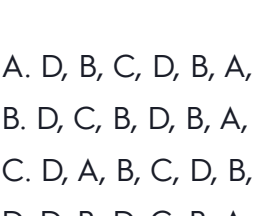
A	<p>Which traversal method is used in Adaptive Huffman tree?</p> <p>Choose one answer:</p> <p>a. Breadth First traversal</p> <p>b. Inorder traversal</p> <p>c. Postorder traversal</p> <p>d. Preorder traversal</p>
A	<p>When a method call is executed, which information does its activation record contain?</p> <p>Choose one answer:</p> <p>a. None of the others.</p> <p>b. Current depth of recursion.</p> <p>c. Global variables.</p> <p>d. Name of the method.</p> <p>e. Code of the method.</p>
A	<p>What is the worst-case time for finding an element in a Binary tree?</p> <p>Choose one answer:</p> <p>a. $O(n)$</p> <p>b. $O(n^4)$</p> <p>c. $O(\lg n)$</p> <p>d. $O(1)$</p>
D	<p>Suppose a singly linked list of integers is given below and p is a node with value 6:</p> <p>7 5 6 4 3 9 8 2</p> <p>What does the list look like after the following java code snippet is run?</p> <pre>int x = 1; Node f = head; while(f.next != p) f = f.next; Node q = new Node(x); // Create new node with value x q.next = p; f.next = q;</pre> <p>Choose one answer:</p> <p>a. 1 7 5 6 4 3 9 8 2</p> <p>b. 7 5 6 4 3 9 8 2</p> <p>c. 7 5 6 4 3 9 8 2 1</p> <p>d. 7 5 1 6 4 3 9 8 2</p> <p>e. 7 5 6 1 4 3 9 8 2</p>
C	<p>Which of the following algorithms in graphs can be implemented by extending Depth First Search algorithm?</p> <p>Choose one answer.</p> <p>a. The Chinese Postman Tour</p> <p>b. All of the others.</p> <p>c. Cycle detection.</p> <p>d. Finding the shortest path (Dijkstra algorithm)</p>
B	<p>A queue is implemented using a doubly linked list, which of the following operations require $O(n)$ time?</p> <p>Choose one answer.</p> <p>a. enqueue</p> <p>b. clear (remove all elements from the queue).</p> <p>c. None of the others.</p> <p>d. dequeue</p>
A	<p>What is output if using LZW algorithm with the table initialized with the letters a, b, c encode the string "ababcaab"?</p> <p>Choose one answer.</p> <p>a. 1 2 4 3 1 4</p> <p>b. 1 2 4 3 5 2</p> <p>c. 4 4 3 1 1 2</p> <p>d. 1 2 1 2 3 1 1 2</p>
B	<p>Select the statement that is most correct.</p> <p>Suppose we are considering a doubly linked list and p is a node in the list which has both predecessor and successor nodes. What does the java code snippet below do?</p> <pre>Node p1,p2; p1 = p.prev; // prev is a link to previous node p2=p.next; p2.prev = p1; p1.next = p2;</pre> <p>Choose one answer:</p> <p>a. It deletes the node after p.</p> <p>b. It deletes the node p.</p> <p>c. It deletes the node before p.</p> <p>d. It does not make any change on the list.</p>
B,D	<p>Selectionsort and quicksort both fall into the same category of sorting algorithms. What is this category?</p> <p>Choose at least one answer.</p> <p>a. Divide-and-conquer sorts</p> <p>b. Interchange sorts</p> <p>c. $O(n \log n)$ sorts</p> <p>d. Worst time is quadratic.</p>
C	<p>A chained hash table has an array size of 512. What is the maximum number of entries that can be placed in the table?</p> <p>Choose one answer.</p> <p>a. 256</p> <p>b. 512</p> <p>c. None of the others</p> <p>d. 511</p> <p>e. 1024</p>
A,C	<p>In the circular array version of the Queue class, which operations require $O(n)$ linear time for their worst-case behavior</p> <p>Choose at least one answer.</p> <p>a. clear()</p> <p>b. dequeue()</p> <p>c. enqueue() when the capacity has been reached</p> <p>d. firstEl()</p>
A	<p>Study the following statements:</p> <p>(1) A drawback of a balanced tree is the search-time may be out of control.</p> <p>(2) The DSW algorithm can be used to rebalance a binary tree.</p> <p>(3) An AVL tree is one in which the height of the left and the right subtrees of the every node must be same.</p> <p>The statement (1) is, the statement (2) is and the statement (3) is</p> <p>Choose one answer.</p> <p>a. False, true, false</p> <p>b. True, false, true</p> <p>c. True, true, true</p> <p>d. False, false, false</p>
D	<p>What is the value of the Boundary Folding Hash Function if $K = 43-65-76-7$ and $TSize = 100$?</p> <p>Choose one answer.</p> <p>a. 84</p> <p>b. 86</p> <p>c. 85</p> <p>d. 82</p>
D	<p>With respect to the execution of recursive function (method),</p> <p>Choose one answer.</p> <p>a. The run-time stack does not contain dynamic link to caller's activation record.</p> <p>b. All parameters will be shared in all running activation records of the called methods.</p> <p>c. The run-time stack contains an information that marks that this is a recursive call.</p> <p>d. None of the others.</p>
D	<p>Select incorrect statement:</p> <p>Choose one answer.</p> <p>a. The characteristic feature of extendible hashing is the organization of the index, which is expandable table.</p> <p>b. A reorganization of the file is avoided by using extendible hashing if the directory overflows.</p> <p>c. Extendible hashing is faster than and requires less space than Linear hashing.</p> <p>d. Linear hashing is a directoryless technique.</p>
A	<p>Select the most correct statement about the complexity of insertion sort .</p> <p>Choose one answer.</p> <p>a. The best case is $O(n)$, and the worst case is $O(n^2)$</p> <p>b. The best case is $O(n)$, and the worst case is $O(n \log n)$</p> <p>c. The best case is $O(n \log n)$, and the worst case is $O(n^2)$</p> <p>d. Both best and worst cases are $O(n^2)$</p>
C	<p>Specify the statement that is most correct about a circular linked list.</p> <p>Choose one answer.</p> <p>a. In circular linked-list, it is required to define head and tail node</p> <p>b. Circular linked list is a normal doubly-linked list</p> <p>c. Circular linked list is a linked list in which the last node of the list points to the first node in the list.</p> <p>d. Circular linked list is a normal linked list</p>
C	<p>Select the best choice about a linked structure.</p> <p>Choose one answer.</p> <p>a. Deleting an element from it is efficiently.</p> <p>b. Inserting a new element to it is efficiently.</p> <p>c. All of the others</p> <p>d. It needs more memory spaces for linking elements.</p>
C	<p>Which of the following data structure is non linear data structure?</p> <p>A.Arrays</p> <p>B. Linked lists</p> <p>C.Trees</p> <p>D.None of above</p>

C	<div>2. Which of the following data structure is linear data structure?</div> <div>A.Trees</div> <div>B. Graphs</div> <div>C. Arrays</div> <div>D.none of the above</div>
D	<div>3. The operation of processing each element in the list is known as</div> <div>A.Sorting</div> <div>B. Merging</div> <div>C. Inserting</div> <div>D.Traversal</div>
B	<div>4. Finding the location of the element with a given value is:</div> <div>A. Traversal</div> <div>B. Search</div> <div>C. Sort</div> <div>D.None of above</div>
A	<div>5. Arrays are best data structures</div> <div>A. for relatively permanent <bền vững> collections of data</div> <div>B.for the size of the structure and the data in the structure are constantly changing</div> <div>C. for both of above situation</div> <div>D. for none of above situation</div>
B	<div>6. Linked lists are best suited</div> <div>A. for relatively permanent collections of data</div> <div>B.for the size of the structure and the data in the structure are constantly changing</div> <div>C. for both of above situation</div> <div>D. for none of above situation</div>
A	<div>The elements of an array are stored successively in memory cells because</div> <div>A. by this way computer can keep track only the address of the first element and the addresses of other elements can be calculated</div> <div>B. the architecture of computer memory does not allow arrays to store other than serially</div> <div>C. both of above</div> <div>D.none of above</div>
D	<div>9. The memory address of the first element of an array is called</div> <div>A. floor address</div> <div>B.foundation address</div> <div>C. first address</div> <div>D. base address</div>
A	<div>10. The memory address of fifth element of an array can be calculated by the formula</div> <div>A. $LOC(Array[5]) = Base(Array) + w(5 - \text{lower bound})$, where w is the number of words per memory cell for the array</div> <div>B. $LOC(Array[5]) = Base(Array[5]) + (5 - \text{lower bound})$, where w is the number of words per memory cell for the array</div> <div>C. $LOC(Array[5]) = Base(Array[4]) + (5 - \text{Upper bound})$, where w is the number of words per memory cell for the array</div> <div>D. None of above</div>
A	<div>11. Which of the following data structures are indexed structures?</div> <div>A. linear arrays</div> <div>B. linked lists</div> <div>C.both of above</div> <div>D. none of above</div>
C	<div>12. Which of the following is not the required condition for binary search algorithm?</div> <div>A.The list must be sorted</div> <div>B.there should be the direct access to the middle element in any sublist</div> <div>C. There must be mechanism to delete and/or insert elements in list</div> <div>D. none of above</div>
D	<div>13. Which of the following is not a limitation of binary search algorithm?</div> <div>A. must use a sorted array</div> <div>B.requirement of sorted array is expensive when a lot of insertion and deletions are needed</div> <div>C.there must be a mechanism to access middle element directly</div> <div>D. binary search algorithm is not efficient when the data elements are more than 1000.</div>
B	<div>14. Two dimensional arrays (mảng 2 chiều) are also called</div> <div>A. tables arrays</div> <div>B. matrix arrays</div> <div>C.both of above</div> <div>D. none of above</div>
A	<div>15. A variable P is called pointer if</div> <div>A. P contains the address of an element in DATA</div> <div>B.P points to the address of first element in DATA</div> <div>C.P can store only memory addresses</div> <div>D. P contain the DATA and the address of DATA</div>
D	<div>19. The difference between linear array and a record is</div> <div>A. An array is suitable for homogeneous data but hte data items in a record may have different data type</div> <div>B. In a record, there may not be a natural ordering in opposed to linear array.</div> <div>C. A record form a hierarchical structure but a llinear array does not</div> <div>D. All of above</div>
B	<div>22. When new data are to be inserted into a data structure, but there is no available space; this situation is usually called</div> <div>A. underflow</div> <div>B.overflow</div> <div>C.housefull</div> <div>D. saturated</div>
A	<div>23. The situation when in a linked list START=NULL is</div> <div>A. underflow</div> <div>B. overflow</div> <div>C.housefull</div> <div>D. saturated</div>

19/05/23/09/2021		Thẻ ghi nhớ: SE_Kỳ 3_CSD201 (FE) Quizlet	
D		24. Which of the following is two way list?	A.grounded header list B.circular header list C. linked list with header and trailer nodes D.doubly linked list
C		25. The term "push" and "pop" is related to the	A.array B. lists C. stacks D. all of above
D		26. A data structure where elements can be added or removed at either end but not in the middle	A.Linked lists B.Stacks C.Queues D.Deque
B		27. When inorder traversing a tree resulted E A C K F H D B G, the preorder traversal would return	A. FAEKCD BHG B. FAEKCDHGB C.EAFKHDCBG D.FEAKDCHBG
B		28. Which data structure allows deleting data elements from front and inserting at rear?	A.Stacks B. Queues C. Deques D. Binary search tree
A		29. Identify the data structure which allows deletions at both ends of the list but insertion at only one en	A. Input-restricted deque B.Output-restricted deque C. Priority queues D. None of above
D		30. Which of the following data structure is non-linear type?	A. Strings B. Lists C. Stacks D. None of above
D		31. Which of the following data structure is linear type?	A. Strings B. Lists C. Queues D.All of above
C		32. To represent hierarchical relationship between elements, which data structure is suitable?	A. Deque B.Priority C. Tree D.All of above
C		33. A binary tree whose every node has either zero or two children is called	A. Complete binary tree B.Binary search tree C. Extended binary tree D. None of above
D		34. The depth of a complete binary tree is given by	A.Dn = n log2n B.Dn = n log2n+1 C. Dn = log2n D. Dn = log2n+1
A		35. When representing any algebraic expression E which uses only binary operations in a 2-tree,	A.the variable in E will appear as external nodes and operations in internal nodes B. the operations in E will appear as external nodes and variables in internal nodes C. the variables and operations in E will appear only in internal nodes D. the variables and operations in E will appear only in external nodes
D		36. A binary tree can easily be converted into q 2-tree	A. by replacing each empty sub tree by a new internal node B.by inserting an internal nodes for non-empty node C. by inserting an external nodes for non-empty node D. by replacing each empty sub tree by a new external node
A		37. When converting binary tree into extended binary tree, all the original nodes in binary tree are	A. internal nodes on extended tree B. external nodes on extended tree C. vanished on extended tree D. None of above
C		38. The post order traversal of a binary tree is DEBFC Find out the pre order traversal	A.ABFCDE B. ADBFEC C. ABDECF D. ABDCEF
C		39. Which of the following sorting algorithm is of divide-and-conquer type?	A. Bubble sort B. Insertion sort C. Quick sort D. All of above
B		40. An algorithm that calls itself directly or indirectly is known as	A. Sub algorithm B. Recursion C. Polish notation D. Traversal algorithm

B	51. Value of the first linked list index is _____. A. One B. Zero C. -1 D. None of these
A	52. A linked list index is ____ that represents the position of a node in a linked list. A. an Integer B. a variable C. a character D. a boolean
A	53. Why is the constructor of the LinkedList class empty? A. because initialization of data members of the LinkedList class is performed by the constructor of the LinkedList class. B. because initialization of data members of the LinkedList class is performed by the destructor of the LinkedList class. C. because initialization of data members of the QueueLinkedList class is performed by the constructor of the LinkedList class. D. because initialization of data members of the QueueLinkedList class is performed by the destructor of the LinkedList class
B	54. _____ form of access is used to add and remove nodes from a queue A. LIFO, Last In First Out B. FIFO , First In First Out C. Both (a) and (c) D. None of these
A	55. _____ form of access is used to add and remove nodes from a stack A. LIFO B. FIFO C. Both (a) and (b) D. None of these
B	56. New nodes are added to the _____ of the queue. A. front B. back C. middle D. Both 1 and 2
A	57. A _____ is a data structure that organizes data similar to a line in the supermarket, where the first one in line is the first one out. A. queue linked list B. stacks linked list C. both of them D. neither of them
C	58. In an array queue, data is stored in an _____ element. A. Node B. linked list C. array D. constructor
B	59. The pop() member function determines if the stack is empty by calling the _____ member function A. removeback() B. isEmpty() C. removedfront() D. hasNext()
B	60. What happens when you push a new node onto a stack? A. the new node is placed at the front of the linked list. B. the new node is placed at the back of the linked list. C. the new node is placed at the middle of the linked list. D. No Changes happens
D	41. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called A. Leaf B. branch C. path D. thread
B	42. The in order traversal of tree will yield a sorted listing of elements of tree in A. Binary trees B. Binary search trees C. Heaps D. None of above
B	43. In a Heap tree A. Values in a node is greater than every value in left sub tree and smaller than right sub tree B. Values in a node is greater than every value in children of it C. Both of above conditions applies D. None of above conditions applies
D	44. In a graph if $e = \{u, v\}$. Then u and v are called A. endpoints of e B. adjacent nodes C. neighbors D. all of above
D	45. A connected graph T without any cycles is called A. a tree graph B. free tree C. a tree D. All of above
D	46. In a graph if $e = (u, v)$ means A. u is adjacent to v but v is not adjacent to u B. e begins at u and ends at v C. u is processor and v is successor D. both b and c

B	<div>47. If every node u in G is adjacent to every other node v in G, A graph is said to be</div> <div>A. isolated</div> <div>B.complete</div> <div>C. finite</div> <div>D.strongly connected</div>
A	<div>48. The complexity of linear search algorithm is</div> <div>A.O(n)</div> <div>B.O(log n)</div> <div>C.O(n²)</div> <div>D. O(n log n)</div>
D	<div>49. The complexity of merge sort algorithm is</div> <div>a. A. O(n)</div> <div>B.O(log n)</div> <div>C.O(n²)</div> <div>D.O(n log n)</div>
D	<div>50. Which of the following case does not exist in complexity theory</div> <div>A.Best case</div> <div>B.Worst case</div> <div>C. Average case</div> <div>D.Null case</div>
A	<div>61. What happens when you push a new node onto a stack?</div> <div>A.the new node is placed at the front of the linked list.</div> <div>B.the new node is placed at the back of the linked list.</div> <div>C.the new node is placed at the middle of the linked list.</div> <div>D.No Changes</div>
B	<div>62. A Linked list can grow and shrink in size dynamically at ____</div> <div>A.Beginning</div> <div>B.run time</div> <div>C.Ending</div> <div>D.none of the above</div>
A	<div>63. What member function places a new node at the end of the linked list?</div> <div>A.appendNode()</div> <div>B.addNode()</div> <div>C.displayNode()</div> <div>D.structNode()</div>
A	<div>64. The ____ function retrieves the value of the size member of the LinkedList class</div> <div>A.getSize()</div> <div>B.giveSize()</div> <div>C.seeSize()</div> <div>D.addSize()</div>
B	<div>65. Elements of an array are stored ____ in memory</div> <div>A.Periodical</div> <div>B.Sequentially</div> <div>C.Parallelly</div> <div>D.None of the above</div>
B	<div>66. Each entry in a linked list is called a ____</div> <div>A.Link</div> <div>B.Node</div> <div>C.data structure</div> <div>D.array index</div>
C	<div>67. How many parts are there in a declaration statement?</div> <div>A.1</div> <div>B.2</div> <div>C.3</div> <div>D.4</div>
B	<div>68. ____ is the way you groups things together by placing one thing on top of another and then removing things one at a time from the top</div> <div>A.Array</div> <div>B.Stack</div> <div>C.Pointer</div> <div>D.All of the above</div>
D	<div>69. Pushdown list means:</div> <div>A.Stack</div> <div>B.Queue</div> <div>C.Linked list</div> <div>D. All of the above</div>
A	<div>70. Which of the following is the feature of stack?</div> <div>A.All operations are at one end</div> <div>B.It cannot reuse its memory</div> <div>C.All elements are of different data types</div> <div>D.Any element can be accessed from it directly</div>
D	<div>71. The five items: A, B, C, D and E are pushed in a stack,one after the other starting from A. The stack is popped four times and each element is inserted in a queue. Then two elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack. The popped item is.</div> <div>A.A</div> <div>B.B</div> <div>C.C</div> <div>D.D</div>
A	<div>72. To delete a dynamically allocated array named 'a', the correct statement is</div> <div>A.delete a;</div> <div>B.delete a[0];</div> <div>C.delete []a;</div> <div>D.delete [0]a;</div>
B	<div>73. To create a linked list, we can allocate space and make something point to it, by writing: struct-name *pointer-variable; Which of the following statement will correctly allocate the space</div> <div>A.pointer-variable = malloc(sizeof("struct-name));</div> <div>B.pointer-variable = malloc(sizeof(struct struct-name));</div> <div>C. pointer-variable = alloc(sizeof(struct struct-name));</div> <div>D.pointer-variable = alloc(sizeof("struct-name));</div>
C	<div>74. The size of a structure can be determined by</div> <div>a. size of variable name</div> <div>b. size of (struct tag)</div> <div>A.Only a</div> <div>B.Only b</div> <div>C.Both a and b</div> <div>D.None of these options</div>
A	<div>75. The reason for using pointer is ... Choose the false option from the following sentences</div> <div>A.Accessing arrays or string elements</div> <div>B.Dynamic memory allocation</div> <div>C.Implementing linked list,trees,graphs and many other data structures</div> <div>D.All are false</div>

D	<p>Suppose a multigraph G is given below (view picture). Which of the following is the Euler cycle from the vertex B created by the above algorithm?</p> <p>A. B, A, B, C, D, B B. B, A, B, D, C C. B, A, B, D, C, B D. B, D, C, B, A, B</p> 
D	<p>What is the breadth-first traversal of a tree below after deleting the node 25 by copying?</p> <p>A. 15, 20, 40, 35, 50, 45, 30 B. 40, 35, 15, 50, 45, 30, 20 C. 40, 15, 50, 35, 45, 30, 20 D. 40, 20, 50, 15, 35, 45, 30</p> 
B	<p>Given a binary search tree T below. What is a result of the breadth-first traversal of T after you delete by copying the root (node 5)?</p> <p>A. 2, 1, 4, 3, 6, 8, 7 B. 4, 2, 6, 1, 3, 8, 7 C. 4, 2, 6, 1, 3, 7, 8 D. 2, 1, 4, 3, 6, 7, 8</p> 
A	<p>Given a binary tree below. What is a result of in-order traverse?</p> <p>A. 4, 2, 7, 5, 1, 3, 8, 6 B. 4, 7, 5, 2, 8, 6, 3, 1 C. 4, 2, 5, 7, 1, 8, 6, 3 D. 4, 2, 7, 5, 1, 8, 6, 3</p> 
D	<p>Consider the AVL tree below. What is the breadth-first traversal of the tree after inserting a node with value 24?</p> <p>A. 35, 22, 39, 12, 32, 37, 24, 27 B. 35, 22, 39, 12, 32, 37, 27, 24 C. 35, 22, 39, 12, 37, 27, 24, 32 D. 35, 22, 39, 12, 27, 37, 24, 32</p> 
B	<p>What is the breadth-first traversal of a tree below after deleting the node 30 by merging?</p> <p>A. 25, 15, 40, 5, 20, 35, 10 B. 15, 5, 25, 10, 20, 40, 35 C. 15, 5, 40, 10, 35, 25, 20 D. 25, 15, 40, 5, 35, 10, 20</p> 
D	<p>What is the breadth-first traversal from the vertex F of a graph below? (visit nodes in ABC order if there are some nodes having the same selection ability)</p> <p>A. F, C, D, G, B, A, E B. F, C, B, D, G, A, E, H C. F, C, D, G, A, B, E, H D. F, C, D, G, B, A, E, H</p> 
D	<p>Given a graph below. What is the output of depth-first traversal from vertex B? (visit nodes in ABC)</p> <p>A. B, A, E, G, C, D, F, H B. B, A, E, G, F, D, C C. B, A, C, E, G, F, D, H D. B, A, E, G, F, D, C, H</p> 
C	<p>Consider the AVL tree below. What is the breadth-first traversal of the tree after inserting a node with value 28?</p> <p>A. 35, 22, 39, 12, 32, 37, 27, 28 B. 35, 22, 39, 12, 32, 37, 28, 27 C. 35, 22, 39, 12, 28, 37, 27, 32 D. 35, 22, 39, 12, 37, 28, 27, 32</p> 
B	<p>Given a binary search tree T below. What is a result of the breadth-first traverse of T after you delete by merging node 3?</p> <p>A. 6, 1, 8, 2, 4, 7, 9 B. 6, 1, 8, 2, 7, 9, 4 C. 6, 2, 8, 1, 4, 7, 9 D. 6, 2, 1, 4, 8, 7, 9</p> 
A	<p>Consider the AVL tree below. What is the breath-first traversal of the tree after inserting a node with value 33?</p> <p>A. 40, 25, 50, 15, 33, 45, 30, 35 B. 40, 25, 50, 15, 30, 45, 33, 35 C. 40, 25, 50, 15, 30, 45, 35, 33 D. 40, 25, 50, 15, 35, 45, 30, 33</p> 
C	<p>Given a binary search tree T below. What is a result of the breadth-first traverse of T after you delete by copying the root (node 5)?</p> <p>A. 4, 2, 7, 1, 8, 3, 9 B. 2, 1, 4, 7, 8, 3, 9 C. 4, 2, 7, 1, 3, 8, 9 D. 2, 1, 4, 3, 7, 8, 9</p> 
C	<p>What is the breadth-first traversal of a tree below after deleting the node 15 by merging?</p> <p>A. 30, 5, 40, 25, 35, 10, 20 B. 30, 5, 40, 10, 25, 35, 20 C. 30, 5, 40, 10, 35, 25, 20 D. 30, 25, 40, 5, 20, 10, 35</p> 
D	<p>Suppose a multigraph G is given blow (view picture). Which of the following is the Euler cycle from the vertex D, created by the above algorithm?</p> <p>A. D, B, C, D, B, A, D B. D, C, B, D, B, A, D C. D, A, B, C, D, B, D D. D, B, D, C, B, A, D E. D, A, B, C, D</p> 