SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE – 35

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (UG & PG)

Second Year Computer Science and Engineering, 3rd Semester

Multiple Choice Questions

Subject Code & Name: 23IIT201 / Data Structures
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UNIT I
LINEAR STRUCTURES

1) Linked lists are best suited
A for relatively permanent collections of data.
B. for the size of the structure and the data in the structure are constantly changing.
C. data structure
D. for none of above situation

2) The operation of processing each element in the list is known as.....
A. sorting
B. merging
C. inserting
D. traversal

3) The situation when in a linked list START=NULL is....
A. Underflow
B. Overflow
C. Houseful
D. Saturated

4) Each node in singly linked list has ..... fields.
A. 2
B. 3
C. 1
D. 4

5) Which of the following is two way lists?
A. Grounded header list
B. Circular header list
C. Linked list with header and trailer nodes
D. List traversed in two directions

6) Which is the pointer associated with the availability list?

A. FIRST
B. AVAIL
C. TOP
D. REAR

7) Value of first linked list index is ....
A. 0
B. 1
C. -1
D. 2

8) In linked lists there are no NULL links in
A. single linked list
B. linear doubly linked list
C. circular linked list
D. linked list

9) Each node in a linked list must contain at least.....
A. Three fields
B. Two fields
C. Four fields
D. Five fields

10) The dummy header in linked list contain.....
A. First record of the actual data
B. last record of the actual data
C. pointer to the last record of the actual data
D. middle record of the actual data

11) In a linked list the ..... field contains the address of next element in the list.
A. Link field
B. Next element field
C. Start field
D. Info field

12) BLINK is the pointer pointing to the ...
A. successor node
B. predecessor node
C. head node
D. last node

13) ..... refers to a linear collection of data items.
A. List
B. Tree
C. Graph

D. Edge

14) A run list is .....
A. small batches of records from a file
B. number of elements having same value
C. number of records
D. number of files in external storage

15) A ..... indicates the end of the list.
A. Guard
B. Sentinel
C. End pointer
D. Last pointer

16) A ..... is a linear list in which insertions and deletions are made to from either end of the structure.
A. circular queue
B. random of queue
C. priority
D. dequeue

17) Indexing the ..... element in the list is not possible in linked lists.
A. middle
B. first
C. last
D. any where in between

18) A linear list in which the pointer points only to the successive node is .....
A. singly linked list
B. circular linked list
C. doubly linked list
D. none of the above

19) ..... may take place only when there is some minimum amount(or) no space left in free storage list.
A. Memory management
B. Garbage collection
C. Recycle bin
D. Memory management

20) A linear list in which the last node points to the first node is .....
A. singly linked list
B. circular linked list
C. doubly linked list
D. none of the above

21) To insert a new node in linked list free node will be available in .....
A. Available list
B. Avail list
C. Free node list
D. Memory space list

22) A singly linked list is also called as .....
A. linked list
B. one way chain
C. two way chain
D. right link

23) A ..... list is a header list where the node points back to the header node.
A. Circular header
B. Grounded header
C. Two way header
D. One way header

24) A doubly linked list has ..... pointers with each node.
A. 0
B. 1
C. 2
D. 3

25) Header linked lists are frequently used for maintaining ..... in memory.
A. Polynomials
B. Binomial
C. Trinomial
D. Quadratic equation

26) The pointer that points to the first node in the list is .....
A. FIRST
B. AVAIL
C. TOP
D. REAR

27) Two-way list may be maintained in memory by means of .....
A. Queues
B. Linear arrays
C. Non linear arrays
D. Stacks

28) A doubly linked list is also called as .....
A. linked list

B. one way chain
C. two way chain
D. right link

29) The list that requires two pointer variables FIRST and LAST is called .....
A. Circular list
B. Header list
C. One way list
D. Two way list

30) If the availability list is null, then the condition is said to be .....
A. nil block
B. availability list underflow
C. availability list overflow
D. memory loss

31) The list which has its own pointer is called .....
A. pointer list
B. self pointer
C. free pool
D. own pointer

32) Which of the following is two way lists?
A. Grounded header list
B. Circular header list
C. Linked list with header and trailer nodes
D. None of the above

33) A ..... is a header list where the last node contains the null pointer.
A. grounded header list
B. bottom header list
C. down header list
D. dropped header list

34) RLINK is the pointer pointing to the ...
A. successor node
B. predecessor node
C. head node
D. last node

35) A ..... is a header list where the last node points back to the header node.
A. rounded header list
B. circular header list
C. common header list
D. forward header list

36) In a linked list, insertion can be done as .....
A. beginning
B. end
C. middle
D. all of the above

37) In a two-way lists each node is divided into .....parts.
A. 1
B. 2
C. 3
D. 4

38) The disadvantage in using a circular linked list is.....
A. it is possible to get into infinite loop
B. last node points to fist node.
C. time consuming
D. requires more memory space.

39) Which of the following conditions checks available free space in avail list?
A. Avail=Null
B. Null=Avail
C. Avail=Max stack
D. Avail=Top

40) A linear list in which each node has point to the predecessor and successors nodes is called
A. singly linked list
B. circular linked list
C. doubly linked list
D. linear linked list

41) ..... 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 b
D. None of these

42) In liked representation of stack ..... holds the elements of the stack.
A. INFO fields
B. TOP fields
C. LINK fields
D. NULL fields

43) ..... form of access is used to add remove nodes from a stack.
A. LIFO

B. FIFO
C. Both A and B
D. None of these

44) In the linked representation of the stack ..... behaves as the top pointer variable of stack.
A. Stop pointer
B. Begin pointer
C. Start pointer
D. Avail pointer

45) New nodes are added to the ..... of the queue.
A. Front
B. Back
C. Middle
D. Both A and B

46) In linked representation of stack the null pointer of the last node in the list signals .....
A. Beginning of the stack
B. Bottom of the stack
C. Middle of the stack
D. In between some value

47) 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

48) A queue is a .....
A. FIFO
B. LIFO
C. FILO
D. LOFI

49) Which of the following name does not relate to stacks?
A. FIFO lists
B. LIFO lists
C. Piles
D. Push down lists

50) The retrieval of items in a stack is ..... operation.
A. push
B. pop
C. retrieval
D. access

51) The term push and pop is related to
A. Array
B. Lists
C. Stacks
D. Trees

52) Which is the pointer associated with the stack?
A. FIRST
B. FRONT
C. TOP
D. REAR

53) The elements are removal from a stack in ..... order.
A. Reverse
B. Hierarchical
C. Alternative
D. Sequential

54) The insertion operation in the stack is called .....
A. insert
B. push
C. pop
D. top

55) ..... is the term used to insert an element into stack.
A. Push
B. Pull
C. Pop
D. Pump

56) Stack follows the strategy of .....
A. LIFO
B. FIFO
C. LRU
D. RANDOM

57) ..... is the term used to delete an element from the stack.
A. Push
B. Pull
C. Pop
D. Pump

58) Deletion operation is done using ..... in a queue.
A. front

B. rear
C. top
D. list

59) A pointer variable which contains the location at the top element of the stack is called .....
A. Top
B. Last
C. Final
D. End

60) Which of the following is an application of stack?
A. finding factorial
B. tower of Hanoi
C. infix to postfix
D. all of the above

UNIT II
ADVANCED TREES

1) The post order traversal of binary tree is DEBFCA. Find out the pre order traversal.
A. ABFCDE
B. ADBFEC
C. ABDECF
D. ABDCEF

2) While 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. Intermediate nodes on extended tree

3) 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. binary heaps

4) 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

5) In a head tree .....
A. values in a node is greater than every value 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. conditions.
D. terms.

6) The in order traversal of tree will yield a sorted listing of elements of tree in ....
A. Binary trees
B. Binary search trees
C. Merging
D. AVL Trees

7) 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 node and v is an edge.
D. both u and v are edges.

8) 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. E2 tree

9) If every node u in G is adjacent to every other node v in G,A graph is said to be .....
A. isolated
B. complete
C. finite
D. strongly connected.

10) The post order traversal of a binary tree is DEBFCA. Find out the pre order Traversal.
A. ABFCDE
B. ADBFEC
C. ABDECF
D. ABDCEF

11) In a graph if e=[u,v], then u and v are called
A. endpoints of e
B. adjacent nodes
C. neighbours
D. all of the above

12) In-order traversing a tree resulted E A C K F H D B G; the pre-order traversal would return.
A. FAEKCDBHG
B. FAEKCDHGB
C. EAFKHDCBG
D. FEAKDCHBG

13) A connected graph T without any cycles is called .
A. a tree graph
B. free tree
C. a tree
D. All of above

14) In linked representation of Binary trees LEFT[k] contains the ..... of at the node N, where k is the location.
A. Data
B. Location and left child
C. Right child address
D. Null value

15) If every node u in G adjacent to every other node v in G, A graph is said to be
A. isolated
B. complete
C. finite
D. strongly connected

16) Three standards ways of traversing a binary tree T with root R .....
A. Prefix, infix, postfix
B. Pre-process, in-process, post-process
C. Pre-traversal, in-traversal, post-traversal
D. Pre-order, in-order, post-order

17) A graph is said to be ..... if every node u in G is adjacent to every other node v in G.
A. Absolute
B. Entire
C. Inclusive
D. Complete

18) In threaded binary tree ..... points to higher nodes in tree.
A. Info
B. Root
C. Threads
D. Child

19) A graph is said to be ..... if its edges are assigned data.

A. Tagged
B. Marked
C. Labeled
D. Sticked

20) If node N is a terminal node in a binary tree then its .....
A. Right tree is empty
B. Left tree is empty
C. Both left & right sub trees are empty
D. Root node is empty

UNIT III
HASHING AND SETS

1. If h is any hashing function and is used to hash n keys in to a table of size m, where n<=m, the expected number of collisions involving a particular key x is :
(A) less than 1.
(B) less than n.
(C) less than m.
(D) less than n/2.

2. The Average search time of hashing with linear probing will be less if the load factor?
A. Is far less than one
B. Equals one
C. Is far greater than one
D. None of the above

3. The searching technique that takes O (1) time to find a data is
(A)Linear Search
(B) Binary Search
(C)Hashing
(D) Tree Search

4. The goal of hashing is to produce a search that takes
(A)O(1) time
(B)O(n2)time
(C)O(log n) time
(D)O(n log n) time

UNIT IV
SORTING AND SEARCHING

1) The worst case occurs in linear search algorithm when.....
A. Item is somewhere in the middle of the array
B. Item is not in the array at all
C. Item is the last element in the array
D. Item is the last element in the array or item is not there at all

2) If the number of records to be sorted is small, then ..... sorting can be efficient.
A. Merge
B. Heap
C. Selection
D. Bubble

3**) The complexity of sorting algorithm measures the ..... as a function of the number n of items to be sorter.**
A. average time
B. running time
C. average-case complexity
D. case-complexity

4) Which of the following is not a limitation of binary search algorithm?
A. must use a sorted array
B. requirement of sorted array is expensive when a lot of insertion and deletions are needed
C. there must be a mechanism to access middle element directly
D. binary search algorithm is not efficient when the data elements more than 1500.

5) The Average case occurs in linear search algorithm .....
A. when item is somewhere in the middle of the array
B. when item is not the array at all
C. when item is the last element in the array
D. Item is the last element in the array or item is not there at all

6) Binary search algorithm cannot be applied to ...
A. sorted linked list
B. sorted binary trees
C. sorted linear array
D. pointer array

7) Complexity of linear search algorithm is .....
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)

8) Sorting algorithm can be characterized as .....
A. Simple algorithm which require the order of n2 comparisons to sort n items.
B. Sophisticated algorithms that require the O(nlog2n) comparisons to sort items.
C. Both of the above
D. None of the above

9) The complexity of bubble sort algorithm is .....
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)

10) State True or False for internal sorting algorithms.
i) Internal sorting are applied when the entire collection if data to be sorted is small enough that the sorting can take place within main memory.
ii) The time required to read or write is considered to be significant in evaluating the performance of internal sorting.
A. i-True, ii-True
B. i-True, ii-False
C. i-False, ii-True
D. i-False, ii-False

11) The complexity of merge sort algorithm is .....
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)

12) ..... is putting an element in the appropriate place in a sorted list yields a larger sorted order list.
A. Insertion
B. Extraction
C. Selection
D. Distribution

13) .....order is the best possible for array sorting algorithm which sorts n item.
A. O(n logn)
B. O(n2)
C. O(n+logn)
D. O(logn)

14) ..... is rearranging pairs of elements which are out of order, until no such pairs remain.
A. Insertion

B. Exchange
C. Selection
D. Distribution

15) ..... is the method used by card sorter.
A. Radix sort
B. Insertion
C. Heap
D. Quick

16) Which of the following sorting algorithm is of divide and conquer type?
A. Bubble sort
B. Insertion sort
C. Merge sort
D. Selection sort

17) ..... sorting algorithm is frequently used when n is small where n is total number of elements.
A. Heap
B. Insertion
C. Bubble
D. Quick

18) Which of the following sorting algorithm is of priority queue sorting type?
A. Bubble sort
B. Insertion sort
C. Merge sort
D. Selection sort

19) Which of the following is not the required condition for binary search algorithm?
A. The list must be sorted
B. There should be the direct access to the middle element in any sub list
C. There must be mechanism to delete and/or insert elements in list.
D. Number values should only be present

20) Partition and exchange sort is .....
A. quick sort
B. tree sort
C. heap sort
D. bubble sort

21) Finding the location of a given item in a collection of items is called .....
A. Discovering
B. Finding
C. Searching

D. Mining

22) Which of the following is an external sorting?
A. Insertion Sort
B. Bubble Sort
C. Merge Sort
D. Tree Sort

23) Very slow way of sorting is .....
A. Insertion sort
B. Heap sort
C. Bubble sort
D. Quick sort

24) Which of the following is an internal sorting?
A. Tape Sort
B. 2-way Merge Sort
C. Merge Sort
D. Tree Sort

25) Sorting a file F usually refers to sorting F with respect to a particular key called .....
A. Basic key
B. Primary key
C. Starting key
D. Index key

26) The time complexity of quick sort is .....
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)

27) Selection sort first finds the ..... element in the list and put it in the first position.
A. Middle element
B. Largest element
C. Last element
D. Smallest element

28) Quick sort is also known as .....
A. merge sort
B. tree sort
C. shell sort
D. partition and exchange sort

29) The operation that combines the element is of A and B in a single sorted list C with n=r+s element is called ....
A. Inserting
B. Mixing
C. Merging
D. Sharing

30) A tree sort is also known as ..... sort.
A. quick
B. shell
C. heap
D. selection

31) ..... sorting is good to use when alphabetizing large list of names.
A. Merge
B. Heap
C. Radix
D. Bubble

32) **The easiest sorting is .....**
A. quick sort
B. shell sort
C. heap sort
D. selection sort

33) Which of the following sorting algorithm is of divide and conquer type?
A. Bubble sort
B. Insertion sort
C. Quick sort
D. Merge sort

34) Merging k sorted tables into a single sorted table is called .....
A. k way merging
B. k th merge
C. k+1 merge
D. k-1 merge

35) The function used to modify the way of sorting the keys of records is called .....
A. Indexing function
B. Hash function
C. Addressing function
D. All of the above

36) If the number of record to be sorted large and the key is short, then ..... sorting can be efficient.
A. Merge
B. Heap
C. Radix
D. Bubble

37) The total number of comparisons in a bubble sort is ....
A. O(n logn)
B. O(2n)
C. O(n2)
D. O(n)

38) If the number of record to be sorted large and the key is long, then ..... sorting can be efficient.
A. Merge
B. Heap
C. Quick
D. Bubble

39) The time complexity of heap sort is ....
A. O(n)
B. O(logn)
C. O(n2)
D. O(n logn)

40) The complexity of selection sort is .....
A. O(n)
B. O(n2)
C. O(n logn)
D. O(logn)

Unit V
Graphs

1) Which of the following statements is/are TRUE for an undirected graph?
P: Number of odd degree vertices is even. Q: Sum of degrees of all vertices is even
A) P Only
B) Q Only
C) Both P and Q
D) Neither P nor Q

2) Consider an undirected random graph of eight vertices. The probability that there is an edge between a pair of vertices is 1/2. What is the expected number of unordered cycles of length three?

(A) 1/8
(B) 1
(C) 7
(D) 8

3) What is the time complexity of Bellman-Ford single-source shortest path algorithm on a complete graph of n vertices?
(A) $\Theta(n^2)$
(B) $\Theta(n^2 \text{ Logn})$
(C) $\Theta(n^3)$
(D) $\Theta(n^3 \text{ Logn})$

4) Which of the following statements are TRUE?
(1) The problem of determining whether there exists a cycle in an undirected graph is in P.
(2) The problem of determining whether there exists a cycle in an undirected graph is in NP.
(3) If a problem A is NP-Complete, there exists a non-deterministic polynomial time algorithm to solve A.
(A) 1,2 and 3
(B) 1 and 2 only
(C) 2 and 3 only
(D) 1 and 3 only

5) Which one of the following is the tightest upper bound that represents the time complexity of inserting an object into a binary search tree of n nodes?
(A) O(1)
(B) O(log n)
(C) O(n)
(D) O(n log n)

6) Which one of the following is the tightest upper bound that represents the number of swaps required to sort n numbers using selection sort?
(A) O(log n)
(B) O(n)
(C) O(n log n)
(D) O(n^2)

7) Consider the following operation along with Enqueue and Dequeue operations on queues, where k is a global parameter

```
MultiDequeue(Q){
   m = k
   while (Q is not empty and m  > 0) {
      Dequeue(Q)
      m = m - 1
   }
```

```
}
```

What is the worst case time complexity of a sequence of n MultiDequeue() operations on an initially empty queue?

(A) Θ(n)
(B) Θ(n + k)
(C) Θ(nk)
(D) $\Theta(n^2)$

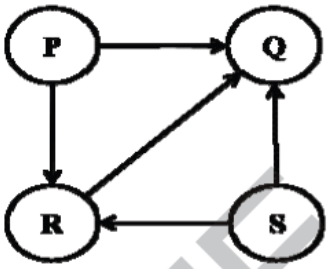
8) Let G be a graph with n vertices and m edges. What is the tightest upper bound on the running time on Depth First Search of G? Assume that the graph is represented using adjacency matrix.

(A) O(n)
(B) O(m+n)
(C) $O(n^2)$
(D) O(mn)

9) Consider a rooted Binary tree represented using pointers. The best upper bound on the time required to determine the number of subtrees having having exactly 4 nodes $O(n^a \text{ Logn }^b)$. Then the value of a + 10b is _____

Answer: 1

10) Consider the directed graph given below. Which one of the following is TRUE?



(A) The graph doesn't have any topological ordering
(B) Both PQRS and SRPQ are topological ordering
(C) Both PSRQ and SPRQ are topological ordering
(D) PSRQ is the only topological ordering

11) Let P be a QuickSort Program to sort numbers in ascending order using the first element as pivot. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and {4, 1, 5, 3, 2} respectively. Which one of the following holds?

(A) t1 = 5
(B) t1 < t2
(C) t1 > t2
(D) t1 = t2

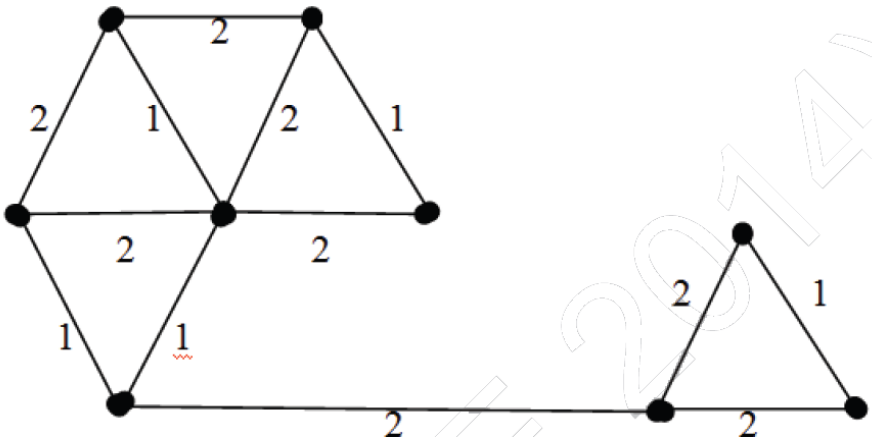
12) Consider the following C function in which size is the number of elements in the array E: The value returned by the function MyX is the

```
int MyX(int *E, unsigned int size)
```

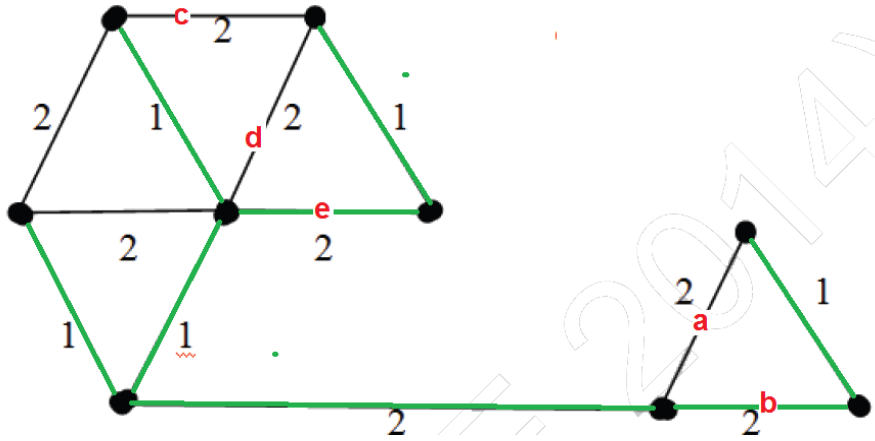
```
{
    int Y = 0;
    int Z;
    int i, j, k;

    for (i = 0; i < size; i++)
        Y = Y + E[i];

    for (i = 0; i < size; i++)
        for (j = i; j < size; j++)
        {
            Z = 0;
            for (k = i; k <= j; k++)
                Z = Z + E[k];
            if (Z > Y)
                Y = Z;
        }
    return Y;
}
```

(A) maximum possible sum of elements in any sub-array of array E.
(B) maximum element in any sub-array of array E.
(C) sum of the maximum elements in all possible sub-arrays of array E
(D) the sum of all the elements in the array E.

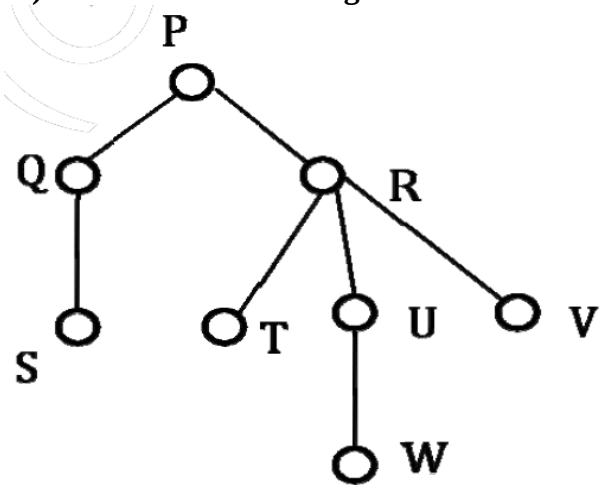
13) The number of distinct minimum spanning trees for the weighted graph below is ____



Answer: 6
Therefore, total 2*3 possible MSTs.



14) Consider the following rooted tree with the vertex P labeled as root



The order in which the nodes are visited during in-order traversal is
(A) SQPTRWUV
(B) SQPTURWV
(C) SQPTWUVR
(D) SQPTRUWV

15) Let A be a square matrix of size n x n. Consider the following program. What is the expected output?

```
C = 100
for i = 1 to n do
    for j = 1 to n do
    {
        Temp = A[i][j] + C
        A[i][j] = A[j][i]
        A[j][i] = Temp - C
    }
for i = 1 to n do
```

```
    for j = 1 to n do
        Output(A[i][j]);
```

(A) The matrix A itself
(B) Transpose of matrix A
(C) Adding 100 to the upper diagonal elements and subtracting 100 from diagonal elements of A
(D) None of the above

16) The minimum number of arithmetic operations required to evaluate the polynomial $P(X) = X^5 + 4X^3 + 6X + 5$ for a given value of X using only one temporary variable.
(A) 6
(B) 7
(C) 8
(D) 9

17) You have an array of n elements. Suppose you implement quicksort by always choosing the central element of the array as the pivot. Then the tightest upper bound for the worst case performance is
(A) $O(n^2)$
(B) O(nLogn)
(C) [Tex]\Theta[/Tex](nLogn)
(D) $O(n^3)$

18) The running time of a following
for(i=0;i<n; i++)
for(j=0;i<n; j++)
k++

a. O(N) **b.** O(N2) **c. O(N3)** **d. O(N log N)**