1. **A connected graph G is an Euler graph if and only if it can be decomposed into**
   A> Subgraphs **C> Paths**
   B> Circuits **D> Walks**

2. **If we remove any one edge from a Hamiltonian circuit we are left with a path. This path is called a**
   A> Pirated path **C> Desh path**
   B> Hamiltonian path **D> Walk**

3. **The length of a Hamiltonian path of n vertices is**
   A> k **C> n-2**
   B> n+1 **D> n-1**

4. **A simple graph in which there exists an edge between every pair of vertices is called**
   A> Pirated graph **C> Complete path**
   B> Hamiltonian graph **D> Complete graph**

5. **In a complete graph with n vertices, there are (n-1)/2 edge disjoint Hamiltonian circuits if n is an odd number >=**
   A> 2 **B> 3** **C> 4** **D> 1**

6. **A sufficient condition for a simple graph G to have a Hamiltonian Circuit is that the degree of every vertex in G be atleast**
   A> n/2 **B> n/3** **C> n/4** **D> n/6**

7. **If in a graph G there is one and only one path between every pair of vertices then G is a**
   A> Path **C> Tree**
   B> Walk **D> Circuit**

8. **Which of the following is false :**
   A> A tree has n vertices has n-1 edges.
   B> Any connected graph with n vertices and n-1 edges is a tree
   C> A graph is a tree if and only if it is minimally connected.
   D> All of the above are false

9. **Which of the following are not true for tree in a graph G :**
   A> G is connected and is circuitless **C> G is circuitless and has n-1 edges**
   B> G is connected and has n-1 edges **D> G is maximally connected graph.**

10. **The distance between vertices of a connected graph is a**
    A> Unity **C> Metric**
    B> Two walks **D> Tirtiary**

11. **A tree in which one vertex (called the root) is distinguished from all the others is called**
    A> Binary tree **C> Path**
    B> Rooted tree **D> Walk**

12. The number of labelled trees with n vertices (n>=2) is

A> 2^n B> n^{n-2} C> n^2 D> n^3

13. A graph that cannot be drawn on a plane without crossover between edges is called

A> Planner
B> Non-planner
C> Path
D> Walk

14. The ring sum of two circuits in a graph G is either a circuit or an edge disjoint union of

A> Paths
B> Walks
C> Graphs
D> Circuits

15. A set of vectors $X_1, X_2, X_3, \ldots\ldots X_r$ if for scalars $C_1, C_2, C_3, \ldots C_r$ in F the expression $C_1X_1+C_2X_2+C_3X_3+\ldots C_rX_r=0$ is called

A> Linearly factor
B> Linearly dependent
C> Linearly independent
D> None of the above

16. Which of the following statement is not valid ?

A> A graph has a dual if and only if it is planer
B> An edge incident on a pendant vertex is called a pendant edge
C> The reduced incidence matrix of a tree is singular
D> The number of vertices of odd degree in a graph is always even.

17. A Planer graph may be embedded in a plane such that any specified region can be made the

A> Finite zone
B> Finite region
C> Infinite region
D> At edge

18. The number of linearly independent vectors required to span the subspace is called

A> Subspace
B> Space
C> Metric space
D> Dim. of subspace

19. In a special array, a large proportion of the elements are zero, but those which are non-zero randomly distributed. This defines the

A> Arrays
B> Sparse arrays
C> Vectors
D> Matrices

20. A tree with N nodes has

A> N edges
B> N^2 edges
C> N-1 edges
D> N-2 edges

21. A binary tree with N internal nodes has maximum of external nodes

A> N B> N+2 C> N+3 D> N+1

22. The height of a full binary tree with N internal nodes is about

A> Log_2N
B> N Log N
C> Log N
D> 2N

23. Choose the right statement(s) regarding the BST(binary search tree)

i> Each data value in its left subtree less than the root value
ii> Each data value in its right subtree greater than the root value

iii> Left and right subtree are again binary search trees
iv> It is an ordered binary tree

A> I and II are correct **C> All are correct**
B> I, II, III are correct **D> None**

24. For AVL tree, the balanced factor is calculated as
i> BF = (Height of right-subtree – Height of left-subtree)
ii> BF = (Height of left-subtree – Height of right-subtree)
iii> BF = (Height of right-subtree + Height of left-subtree)
iv> BF = Height of the tree

A> Only (i) is correct **C> All are correct**
B> Only (ii) is correct **D> None**

25. A node in a m-way tree can contain
A> R records and (R+1) children **C> R records and R children**
B> R records and (R-1) children **D> (R+1) records and R children**

26. Choose the equivalent postfix form of the following expression.
a b||c||!(e>f)(c - expression)
A> ab && c || > ef c - expression ! - || **C> ab && c || ef > c - expression ! ||**
B> ab && c || ef > c - expression - ! || **D> ab && c || ef > c - expression || !**

27. Choose the equivalent prefix form of the following expression.
[a + (b – c)] * [(d – e) / (f + g – h)]
A> * + a – bc / - ed - + fgh **C> * + a – bc / - ed + - fgh**
B> * + a – bc - / ed - + fgh **D> * + a . b - c / - ed + - fgh**

28. Given an array A(20:50, 20:40). The elements are stored in column major order. What is the starting location of A(32,26)?
A> 238 **B> 258** **C> 287** **D> 278**

29. In one use of recursive algorithm for quick sort to sort the following element in ascending order :
4, 3, 1, 6, 7, 2, 5, 8
then the order of these elements after the first pass of the algorithm is
A> 1, 2, 3, 4, 6, 7, 5, 8 **C> 4, 3, 1, 2, 5, 6, 7, 8**
B> 4, 3, 1, 2, 6, 7, 5, 8 **D> 2, 3, 1, 4, 7, 6, 5, 8**

30. A balanced order – n multi way search tree in which each non-root node contains at least (n-1)/2 keys is called
A> Perfect binary tree **C> 2 - tree**
B> Binary search tree **D> B-tree of order n**

31. Which allows deletion at only one end of the list but allows insertion at both ends of the list.
A> Deque **C> Output restricted deque**
B> Circular Queue **D> Input Restricted queue**

32. If a node has an empty subtree, the the pointer field for the subtree will contain the address of the header node instead of null values. This describes the advantages of

A> B-tree **C> Binary tree**
B> BST **D> TBT**

33. …….. is used, if the records that is to be sorted are in main memory
A> Internal sorting **C> Both of the above**
B> External sorting **D> None of the above**

34. ……"sweeps through" the graph, using a queue to remember the frontier of visited places
A> BFS **C> Both of the above**
B> DFS **D> None of the above**

35. Stacks are used in
A> Compilers in passing an expression by recursion
B> Memory management in operating system
C> Both (A) and (B)
D> None of the above

36. Given an array A(50:100, 50:75). The elements are stored in column major order. What is the starting location of A(62,56)?
A> 318 **C> 312**
B> 368 **D> None of the above**

37. Which of the following expression is in postfix equivalent of the following infix :
A – B / (C * D ^ E)
A> A B – C D * E ^ / **C> / * ^ - A B C D E**
B> A B C D * - E ^ **D> A B C D E ^ * / -**

38. A function that transforms a key into a table index is called
A> Indexing **C> Recursive function**
B> Hash function **D> Hash of key**

39. The efficiency of breadth-first traversal for the adjacency list graph representation is
A> O(n+e) **C> $O(n^2)$**
B> O(e) **D> O(n log n)**

40. The maximum height of a balanced binary search tree is
A> 0.44 $\log_2 n$ **C> 1.44 $\log_2 n$**
B> 0.25 $\log_2 n$ **D> None of the above**

41. If we draw an AVL tree using the following elements :
50, 45, 80, 95, 26, 43, 105, 2
what will be the balance factor of element (or node) 43 in the finally produced AVL tree
A> 0 **C> +1**
B> -1 **D> None of the above**

42. Suppose we want to arrange the n numbers stored in an array such that all negative values occur before all positive ones. Minimum number of exchanges required in the worst case is
A> n-1 **C> n+1**
B> n **D> None of the above**

43. If one uses straight two-way merge sort algorithm to sort the following elements in ascending order

20, 47, 15, 8, 9, 4, 40, 30, 12, 17

then the order of these elements after the second pass of the algorithm is

A> 8, 9, 15, 20, 47, 4, 12, 17, 30, 40
B> 8, 15, 20, 47, 4, 9, 30, 40, 12, 17
C> 15, 20, 47, 4, 8, 9, 12, 30, 40, 17
D> 4, 8, 15, 20, 47, 12, 17, 30, 40, 9

44. Which of the following is correct?

A> B-trees are for storing data on the disk and B+ trees are for main memory
B> Range queries are faster on B+ trees
C> B-trees for primary indexes and B+ trees for secondary indexes
D> B+ tree contains all records at its leaf nodes which is not true for B-tree
E> None of the above

45. Which of the following addressing modes permits relocation without any change what so ever in the code

A> Indirect addressing
B> Indexed addressing
C> Base register Addressing
D> PC relative Addressing

46. Which one of the following algorithm design techniques is used in finding all pairs of shortest distances in a graph

A> Dynamic Programming
B> Back Tracking
C> Greedy
D> Diode and conquer

47. Give the correct matching for the following pairs :

(a) O(log n)	**(P) Selection**
(b) O(n)	**(Q) Insertion Sort**
(c) O(n log n)	**(R) Binary Search**
(d) $O(n^2)$	**(S) Merge Sort**

A> a-R, b-P, c-Q, d-S
B> a-R, b-P, c-S, d-Q
C> a-P, b-R, c-S, d-Q
D> a-P, b-S, c-R, d-Q

48. How many sub-strings of different lengths (non-zero) can be formed from a character string of length n ?

A> n **B> n^2** **C> 2^n** **D> n(n+1)/2**

49. Which of the following statements is false?

A> A tree with n nodes has (n-1) edges
B> A labeled rooted binary tree can be uniquely constructed given its post-order and pre-order transversal result
C> A complete binary tree with one internal nodes has (n+1) leaves
D> The maximum of nodes in a binary tree of height h is (2^{h+1}-1)

50. A function can

A> Perform a task
B> Return a value
C> Change value of actual arguments, in call by reference
D> All of the above
E> None of the above

Answer Sheet for question no. TOTSOL--DSTR-02

1. B	**6. A**	**11. B**	**16. C**	**21. D**	**26. B**	**31. C**	**36. A**	**41. C**	**46. A**
2. B	**7. C**	**12. B**	**17. C**	**22. A**	**27. A**	**32. D**	**37. D**	**42. D**	**47. B**
3. D	**8. D**	**13. B**	**18. D**	**23. C**	**28. B**	**33. A**	**38. B**	**43. B**	**48. A**
4. C	**9. A**	**14. D**	**19. B**	**24. B**	**29. D**	**34. A**	**39. A**	**44. D**	**49. C**
5. B	**10. C**	**15. C**	**20. C**	**25. A**	**30. D**	**35. C**	**40. C**	**45. C**	**50. D**

Hints 28.
Given array is Array(col, row)=Array(20:50,20:40) and find location for Array(32:26)
(col-colmin)*(rowmax-rowmin+1)+row = (32-20)*(40-20+1)+(26-20) = 258

Hints 36.
Given array is Array(col, row)=Array(50:100,50:75) and find location for Array(62:56)
(col-colmin)*(rowmax-rowmin+1)+row = (56-50)*(100-50+1)+(62-50) = 318