

265054

BCA-204

B.C.A. Second Year Examination, 2013

B.C.A.

PAPER-IV

DATA STRUCTURES USING C

Maximum Marks : 100

SECTION-A

खण्ड-अ

Marks : 50

Time : 1½ Hours

Candidates are required to first answer the Section-A (Multiple Choice Questions) by marking correct choice on OMR Sheet in prescribed time. All questions are compulsory and carry equal marks. There is no negative marking for wrong answers. सर्वप्रथम खण्ड अ के सभी वस्तुनिष्ठ प्रश्नों के उत्तर ओ. एम. आर. शीट में परीक्षार्थी को निश्चित समय में देने हैं। सभी प्रश्न अनिवार्य एवं समान अंक के हैं गलत उत्तर का ऋणात्मक मूल्यांकन नहीं किया जायेगा।

SECTION-B

खण्ड-ब

Marks : 50

Time : 1½ Hours

After depositing O.M.R. Sheet of Section-A with invigilator, the candidate are required to answer one question from each unit (each question in 250 words) in a separate answer-book provided to them. All questions carry equal marks. Attempt one question from each unit.

खण्ड अ की ओ. एम. आर. शीट पर्यवेक्षक को जमा कराने के पश्चात् परीक्षार्थी खण्ड ब के प्रत्येक इकाई से एक प्रश्न का उत्तर दी गई उत्तरपुस्तिका में देंगे। प्रत्येक प्रश्न का उत्तर लगभग 250 शब्दों में दिया जाना है एवं सभी प्रश्नों के अंक समान हैं। प्रत्येक युनिट से एक प्रश्न करना अनिवार्य है।

SECTION-A

UNIT-I

1. Representation of data structure in memory is known as :
(A) Recursive (B) Abstract data type
(C) Storage Structure (D) File Structure
2. What is the postfix form of the following prefix $*+ab-cd$:
(A) $ab+cd-*$ (B) $abc+*-$
(C) $ab+*cd-$ (D) $ab+*cd-$
3. What is the postfix form of the following prefix expression $-A/B*CSDE$:
(A) $ABCDES*/-$ (B) $A-BCDES*/-$
(C) ABCED*/-$ (D) $A-BCDES*/-$
4. The data structure required to evaluate a postfix expression is :
(A) Queue (B) Stack
(C) Array (D) Linked-List
5. The complexity of multiplying two matrices of order $m*n$ and $n*p$ is :
(A) mnp (B) mp
(C) mn (D) np
6. Arrays are best data structures :
(A) for relatively permanent collections of data
(B) for the size of the structure and the data in the structure are constantly changing
(C) for both of above situation
(D) for none of above situation
7. The data structure required to check whether an expression contains balanced parenthesis is:
(A) Stack (B) Queue
(C) Tree (D) Array
8. 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) Dequeue

9. The result of evaluating the postfix expression 5, 4, 6, +, *, 4, 9, 3, /, +, * is :
- (A) 600 (B) 350
(C) 650 (D) 588
10. If data is a circular array of CAPACITY elements, and rear is an index into that array, what is the formula for the index after rear ?
- (A) $(\text{rear} \% 1) + \text{CAPACITY}$ (B) $\text{rear} \% (1 + \text{CAPACITY})$
(C) $(\text{rear} + 1) \% \text{CAPACITY}$ (D) $\text{rear} + (1 \% \text{CAPACITY})$

UNIT-II

11. In a circular linked list :
- (A) Components are all linked together in some sequential manner
(B) There is no beginning and no end
(C) Components are arranged hierarchically
(D) Forward and backward traversal within the list is permitted
12. The operation of processing each element in the list is known as :
- (A) Sorting (B) Merging
(C) Inserting (D) Traversal
13. In a linked list with n nodes, the time taken to insert an element after an element pointed by some pointer is :
- (A) $O(1)$ (B) $O(\log n)$
(C) $O(n)$ (D) $O(n \log n)$
14. Consider a linked list of n element which is pointed by an external pointer. What is the time taken to delete the element which is successor of the element pointed to by a given pointer ?
- (A) $O(1)$ (B) $O(\log^2 n)$
(C) $O(n \log^2 n)$ (D) $O(n)$
15. Which of the following operations is performed more efficiently by doubly linked list than by linear linked list ?
- (A) Deleting a node whose location is given
(B) Searching an unsorted list for a given item
(C) Inserting a node after the node with a given location
(D) None of these

16. If address of the 8th element in a linked list of integers is 1022, then address of 9th element is :
(A) 1024 (B) 1026
(C) 1028 (D) None
17. When a new element is inserted in the middle of a linked list, then :
(A) Only elements that appear after the new element need to be moved
(B) Only elements that appear before the new element need to be moved
(C) Elements that appear before and after the new element need to be moved
(D) None of these
18. Which of the following are used to represent the sparse matrices ?
(A) Singly Linked List where each node contains non-zero elements of the matrix
(B) Circular Linked List for each row, column with each node corresponding to non-zero element
(C) Doubly Linked List
(D) Can't be represented using Linked List, but with arrays only
19. Which function is used to allocate memory dynamically :
(A) Malloc (B) Calloc
(C) Both a & b (D) None
20. Which list is most reliable :
(A) Singly (B) Doubly
(C) Circular (D) None

UNIT-III

21. The depth of a complete binary tree is given by :
(A) $D_n = n \log_2 n$ (B) $D_n = n \log_2 n + 1$
(C) $D_n = \log_2 n$ (D) $D_n = \log_2 n + 1$
22. The post order traversal of a binary tree is DEBFCA. Find out the pre^o order traversal :
(A) ABFCDE (B) ADBFEC
(C) ABDECF (D) ABDCEF
23. 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

24. 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
25. 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
26. A connected graph T without any cycles is called :
 (A) a tree graph (B) free tree
 (C) a tree (D) All of above
27. If a node having two children is deleted from a binary tree, it is replaced by its :
 (A) Inorder predecessor (B) Inorder successor
 (C) Preorder predecessor (D) None of the above
28. A full binary tree with $2n+1$ nodes contain :
 (A) n leaf nodes (B) n non-leaf nodes
 (C) n-1 leaf nodes (D) n-1 non-leaf nodes
29. A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is known as :
 (A) full binary tree (B) AVL tree
 (C) threaded tree (D) complete binary tree
30. How many nodes do a full binary tree with 'N' leaves contain ?
 (A) $2N$ nodes (B) N nodes
 (C) $2N-1$ nodes (D) $N-1$ nodes

UNIT-IV

31. For an undirected graph with n vertices and e edges, the sum of the degree of each vertex is equal to :
 (A) $2n$ (B) $(2n-1)/2$
 (C) $2e$ (D) $e/2$
32. An adjacency matrix representation of a graph cannot contain information of :
 (A) nodes (B) edges
 (C) direction of edges (D) parallel edges

33. In Breadth First Search of Graph, which of the following data structure is used ?
- (A) Stack (B) Queue
(C) Linked List (D) None of the above
34. In a graph, a vertex with degree one is known as
- (A) Pendant vertex (B) Leaf
(C) Root (D) End vertex
35. Breadth first search
- (A) Scans each incident node along with its children
(B) Scans all incident edges before moving to other node
(C) Is same as backtracking (D) Scans all the nodes in random order
36. A node of a directed graph G having no out-degree and a positive in-degree is called :
- (A) Source node (B) Sink node
(C) Sibling node (D) Null node
37. The time complexity of the shortest path algorithm can be bounded by :
- (A) $O(n^2)$ (B) $O(n^4)$
(C) $O(n^3)$ (D) $O(n)$
38. The number of loop(s) of a node in a simple graph of 'N' nodes is :
- (A) One (B) N
(C) Zero (D) Exactly two
39. In a graph, which of the following algorithms does determine the reach ability of all node pairs ?
- (A) Floyd's algorithm (B) Warshall's algorithm
(C) Kruskal's algorithm (D) Prim's algorithm
40. A complete graph with 'N' nodes will have :
- (A) $(N - 1)/2$ edges (B) $N(N - 1)$ edges
(C) $N(N + 1)$ edges (D) $N(N - 1)/2$ edges

UNIT-V

41. A technique for direct search is :
- (A) Binary Search (B) Linear Search
(C) Tree Search (D) Hashing

42. If h is any hashing function and is used to hash n keys in to a table of size m , where $n \leq m$, 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 $n/2$.
43. An algorithm is made up of two independent time complexities $f(n)$ and $g(n)$. Then the complexities of the algorithm is in the order of :
- (A) $f(n) \times g(n)$ (B) Max ($f(n), g(n)$)
(C) Min ($f(n), g(n)$) (D) $f(n) + g(n)$
44. The goal of hashing is to produce a search that takes :
- (A) $O(1)$ time (B) $O(n^2)$ time
(C) $O(\log \dots)$ time (D) $O(n \log n)$ time
45. The extra key inserted at the end of the array is called a :
- (A) End key (B) Stop key
(C) Sentinel (D) Transposition
46. Which of the following sorting algorithm is stable :
- (A) insertion sort (B) bubble sort
(C) quick sort (D) heap sort
47. Which is the fastest searching technique :
- (A) Linear Search (B) Binary Search
(C) Hashing (D) All of above
48. 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
49. Recursive algorithms are based on :
- (A) Divide and conquer approach (B) Top-down approach
(C) Bottom-up approach (D) Hierarchical approach
50. Which of following algorithm scans the list by swapping the entries whenever pair of adjacent keys are out of desired order ?
- (A) Insertion sort (B) Quick sort
(C) Shell sort (D) Bubble sort

SECTION-B

UNIT-I

1. (a) Explain Algorithm for converting Infix to Postfix.
- (b) Explain Algorithm for inserting an element in Circular Queue.

OR

2. (a) Differentiate Stack & Queue.
- (b) Explain various applications of Stack.

UNIT-II

3. (a) Explain Algorithm for inserting in a doubly linked list.
- (b) Explain dynamic memory management.

OR

4. (a) Explain various application of linked list.
- (b) Explain algorithm for reversing a linked list.

UNIT-III

5. Explain algorithm for inserting and deleting a node in binary search tree.

OR

6. Explain non recursive procedure for Preorder & Post order traversal.

UNIT-IV

7. Explain Dijkstra algorithm for finding shortest path by suitable example.

OR

8. Explain following :
 - (a) Transitive Closure
 - (b) Orthogonal Representation

UNIT-V

9. Explain Algorithm for Heap sort.

OR

10. Compare efficiency of various sorting algorithms.