Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14CS2009** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Data Structures** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | | | **Course outcome** | **Marks** |
| **PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)** | | | | | | |
| 1. | Stack may be represented in the computer usually by means of a one way list or a \_\_\_\_\_\_? | | | |  |  |
|  | a. Queue | b. Linear array | c. Recursion | d. Polish notation |  | (1) |
| 2. | Which of the following is essential for converting an infix expression to the postfix form efficiently? | | | |  |  |
|  | a.operator stack | b.operand stack | c. Both a&b | d. None of these |  | (1) |
| 3. | Consider a Stack implemented in C using array.  #define MAX 10  struct STACK  {  intarr[MAX];  int top = -1;  }  In this implementation of stack maximum value of top which cannot cause overflow will be \_\_\_\_\_ | | | |  |  |
|  | a. 9 | b. 10 | c. 11 | d. None of these |  | (1) |
| 4. | Stack data structure cannot be used for \_\_\_\_\_\_\_ | | | |  |  |
|  | a. Reverse a string | b.Implementation of recursion | c.Evaluation of expression in postfix form | d.Allocating Resources and Scheduling |  | (1) |
| 5. | Which of the following data structure is non linear type? | | | |  |  |
|  | a. Stack | b. Queue | c. List | d. None of these |  | (1) |
| 6. | For transferring 4 disks from source to destination pole in Tower of Hanoi problem, how many disk movements are needed? | | | |  |  |
|  | a. 16 | b. 17 | c. 18 | d. 15 |  | (1) |
| 7. | Recursion cannot be in implemented in programming languages if \_\_\_\_\_ data structure is not there. | | | |  |  |
|  | a. Array | b. Queue | c. Stack | d. List |  | (1) |
| 8. | Postfix form of the infix expression A+B\*C is \_\_\_\_\_\_\_ | | | |  |  |
|  | a.AB+C\* | b.ABC\*+ | c.AB\*C+ | d.ABC+\* |  | (1) |
| 9. | In a circular linked list organization, insertion of a record involves the modification of | | | |  |  |
|  | a. 1 Pointer | b. 2 Pointers | c. 3 Pointers | d. No Pointer |  | (1) |
| 10. | The process of accessing data stored in a tape is similar to manipulating data on a | | | |  |  |
|  | a. Stack | b. Queue | c. List | d. Heap |  | (1) |
| 11. | Items in a priority queue are entered in a \_\_\_\_\_\_ order. | | | |  |  |
|  | a. Random | b.Order of Priority | c.FIFO | d. LIFO |  | (1) |
| 12. | If the characters 'D', 'C', 'B', 'A' are placed in a queue (in that order), and then removed one at a time, in what order will they be removed? | | | |  |  |
|  | a. ABCD | b. DCBA | c. DBAC | d. ABDC |  | (1) |
| 13. | I have implemented the queue with a circular array, keeping track of first, last, and count (the number of items in the array). Suppose first is zero, and last is CAPACITY-1. What can you tell me about count? | | | |  |  |
|  | a. Count must be zero. | b. Count must be CAPACITY. | c. Both a&b | d. None of these |  | (1) |
| 14. | Which of the following data structure can be traversed in both directions ie.from start to end as well as in reverse direction? | | | |  |  |
|  | a. Stack | b.Queue | c. Linked List | d. Doubly linked list |  | (1) |
| 15. | Which of the following is not a type of linked list? | | | |  |  |
|  | a. Linked List | b. Circular Linkly List | c. Circular Doubly Linked List | d. Hybrid Linked List |  | (1) |
| 16. | Each Node in a linked list contain minimum two fields, one field is called data field to store data and another field is of type \_\_\_\_\_ | | | |  |  |
|  | a. Pointer to an integer | b.Pointer to node | c.Pointer to character | d. Pointer to pointer |  | (1) |
| 17. | The Worst case occur in linear search algorithm when | | | |  |  |
|  | a. Item is the last element in the array or is not there at all | b.Item is somewhere in the middle of the array | c.Item is not in the array at all | d.Item is the last element in the array |  | (1) |
| 18. | The complexity of linear search algorithm is | | | |  |  |
|  | a. O(n) | b.O(n log n) | c.O(n2) | d.O(log n) |  | (1) |
| 19. | The running time of quick sort largely depends on | | | |  |  |
|  | a. Number of inputs | b.Size of elements | c.Arrangement of elements | d.Selection of pivot element |  | (1) |
| 20. | As part of maintenance work, you are entrusted with the work of rearranging the library books in a shelf in proper order, at the end of each day. The ideal choice will be \_\_\_\_\_\_? | | | |  |  |
|  | a. Quick Sort | b.Bubble Sort | c.Selection Sort | d.Insertion Sort |  | (1) |

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| 21. | Give the number of swaps needed to sort the numbers 8,7,6,5,4,3,2,1in ascending order using Bubble Sort? | | | |  |  |
|  | a. 20 | b. 23 | c. 25 | d.28 |  | (1) |
| 22. | A hash function f is defined as f(key) = key mod 7, with linear probing is used to insert the keys 8, 11, 14, 23 into a table indexed from 0 to 6. What will be the location of key 11? | | | |  |  |
|  | a. 2 | b. 3 | c.4 | d. 5 |  | (1) |
| 23. | Which of the sorting algorithm has the worst case time complexity of **n log n ?** | | | |  |  |
|  | a. Quick Sort | b.Heap Sort | c.Insertion Sort | d.Selection Sort |  | (1) |
| 24. | Consider a binary max-heap implemented using an array.Which one of the following array represents a binary max-heap? | | | |  |  |
|  | a. {25,12,16,13,10,8,14} | b.{25,14,13,16,10,8,12} | c.{25, 14, 16, 13, 10, 8, 12} | d.{25,14,12,13,10,8,16} |  | (1) |
| 25. | Which of the following data structure is non-linear type? | | | |  |  |
|  | a. Stack | b.Queue | c.Array | d.Tree |  | (1) |
| 26. | The balance factor for an AVL tree is either | | | |  |  |
|  | a. –2 or –1 | b.0, 1 or –1 | c.0, 1 or 2 | d.-2, 0 or 1 |  | (1) |
| 27. | A full binary tree with N leaf nodes has | | | |  |  |
|  | a. N +1 nodes | b.2N + 1 nodes | c.2N-1 nodes | d.N(N-1)/2 nodes |  | (1) |
| 28. | A B-Tree of order 5 has a height of 2. What is the maximum number of nodes present in it? | | | |  |  |
|  | a. 26 | b. 124 | c. 126 | d. 24 |  | (1) |
| 29. | A binary tree T has ‘n’ leaf nodes. The number of nodes of degree 2 in T is \_\_\_\_\_\_\_ | | | |  |  |
|  | a. 2n | b. n | c. log2n | d. n-1 |  | (1) |
| 30. | The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, and 16. What is the height of the binary search tree? | | | |  |  |
|  | a. 2 | b. 3 | c. 4 | d. 5 |  | (1) |
| 31. | The inorder and preorder traversal of a binary tree are d b e a f c g and a b d e c f g respectively.Thepostorder traversal of the binary tree is \_\_\_\_\_\_. | | | |  |  |
|  | a. e d b f g c a | b. d e f g b c a | c.e d b g f c a | d.d e b f g c a |  | (1) |
| 32. | **The degree of any vertex of graph is \_\_\_\_\_\_\_\_?** | | | |  |  |
|  | a. Path of the graph | b.Number of edges in a graph | c.Number of vertex in a graph | d.The number of edges incident with vertex |  | (1) |
| 33. | Maximum number of edges in a n-node undirected graph without self loop is \_\_\_\_\_\_ | | | |  |  |
|  | a. n(n-1)/2 | b.(n+1)n/2 | c.n-1 | d.n2 |  | (1) |
| 34. | The depth first traversal of a graph G with n vertices, k edges are marked as tree edges. The number of connected components in G is \_\_\_\_\_\_\_ | | | |  |  |
|  | a. n-k-1 | b.n-k | c.k+1 | d. k |  | (1) |
| 35. | In a \_\_\_\_\_\_\_ search, we begin at out search at the starting node A, and when we come across a dead end we back track. | | | |  |  |
|  | a.breadth first | b.connected | c.bubble | d.depth first |  | (1) |
| 36. | A \_\_\_\_\_ tree of a graph is just a subgraph that contains all the vertices and is a tree. | | | |  |  |
|  | a. complete | b.balanced | c. binary | d. spanning |  | (1) |
| 37. | If a graph with n vertices has less than n-1 vertices, then the graph is | | | |  |  |
|  | a. disconnected | b.directed | c.complete | d.bi-connected |  | (1) |
| 38. | The graph G is said to be \_\_\_\_\_\_ if each edge in the graph is assigned a non negative numerical value called the weight or length of the edge. | | | |  |  |
|  | a. Complete | b.balanced | c.weighted | d.tree |  | (1) |
| 39. | A graph G is \_\_\_\_\_\_ if every node u in G is adjacent to every node v in G | | | |  |  |
|  | a. balanced | b.binary | c.complete | d. spanning |  | (1) |
| 40. | If an edge has identical end points, it is called a \_\_\_\_\_\_\_ | | | |  |  |
|  | a. Loop | b.Degree | c.Path | d.Vertex |  | (1) |

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| **PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)** | | | |
| 41. | Explain asymptotic (Big-Oh, Big-Omega, Big-Theta) notations. |  | (5) |
| 42. | Evaluate the following postfix expression using stack. AB\*C-D/E+ where A=3, B=4, C=2,D=5 and E=10. |  | (5) |
| 43. | Describe the implementation of circular queue with a neat sketch and required algorithm/C++ code. |  | (5) |
| 44. | Explain the algorithm/C++ code for deletion in a doubly linked list with an example. |  | (5) |
| 45. | Demonstrate binary search with example |  | (5) |
| 46. | Write the inorder, preorder and postorder tree traversal for the following tree  C:\Users\Akshaya\Desktop\DS\download.png |  | (5) |
| 47. | Demonstrate merge sort technique to sort the numbers 54 26 13 33 52 97 43 29 88 66 in asending order. |  | (5) |
| 48. | Explain separate chaining technique for collision resolution in hashing. |  | (5) |
| 49. | Describe DFS traversal technique and apply it on the following graph. C:\Users\Akshaya\Desktop\DS\1.png |  | (5) |
| 50. | Give the adjancy matrix and adjancy list for the following graph  C:\Users\Akshaya\Desktop\DS\4.png |  | (5) |
| **PART C( 2 X 10 = 20 MARKS) (ANSWER ANY TWO)** | | | |
| 51. | Discuss the implementation of Queue data Structure using array with necessary pseudocodes/C++ code? |  | (10) |
| 52. | Construct B-tree of order 3 with the following values by inserting them one by one in the order given: 9, 7, 5, 40, 1, 19, 34, 43, 17, 20, 18, 22, 42, 11, 2, 4 |  | (10) |
| 53. | Explain Prim’s algorithm in detail and apply it on the weighted graph given below.  C:\Users\Akshaya\Desktop\DS\3.png |  | (10) |