B.E. DEGREE EXAMINATIONS: OCTOBER/NOVEMBER - 2008

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI 304: Data Structures And Algorithms

Time : Three hours   Maximum marks:100

Answer ALL Questions: -

Part A (20 x 1 = 20 Marks)

1. Abstract data type means that
   a) The separation of the representation of data from the applications that use the data at a logical level
   b) The logical picture of a data type plus the specifications of the operations required to create the objects
   c) A collection of data elements whose organization is characterized by accessing operations
   d) None of the above

2. What is the output of the following ?

   Main(){ int a[]={2,4,6,8,5},*b;
           b=a; i=2; printf("%d",*(b+i),i[b]); }

   a) compile error   b) no output   c) 6,6   d)6, garbage value

3. The formula for accessing I, j th element in a[n][m] whose base address is b--------------
   a) b + (i+n)*m   b) b +(i-1)*m + j   c) b + (i*n) + m   d) b + (j+n)*i

4. The time complexity of binary search is ------------
   a) $O(n)$ b) $O(n\log n)$ c)$O(\log n)$ d)$O(n^2)$

5. Three algorithms do the same task. Algorithm 1 is $O(\sqrt{n})$. Algorithm 2 is $O(N)$, and Algorithm 3 is $O(\log_2 N)$. Which algorithm will execute fastest for large values of N?
   a) $O(\sqrt{n})$ b) $O(N)$ c) $O(\log_2 N)$ d) $O(N^2)$

6. Evaluate the following prefix expression +*2+/14251
   a) 23   b) 24   c) 25   d) 37

7. Which of the following can be described as a pointer ?
   a) Queue   b) Queue.Rear   c) Queue.Rear^   d) Queue.Front^.Info.

8. Run-time stack
   a) is a nonrecursive exit from the recursive routine
   b) is a path that includes a recursive call to the routine, to solve a smaller version of the original problem
   c) is a structure that keeps track of the activation records at run time, in order to preserve the values of parameters, return addresses, registers, and so on
   d) refers to the point in the compile/execution cycle when variable names are associated with addresses in memory

9. What is the maximum total number of nodes in a tree that has N levels? Note that the root is level (zero)
   a) 2^{2N} b) $2^{N+1}-1$ c)2^N-1 d)2^N-2N

10. How many ancestors does a node in the Nth level (root level=0) of a binary search tree have?
   a) N   b) N+1   c) 2^N d) 2^N+1

11. How many different binary search trees can be made from 3 nodes that contain the key values 1,2 and 3?

   a) 30   b) 20 c) 10 d) 15

12. The best average behavior is shown by

   a) Quick sort   b) Merge sort   c) Heap sort   d) Insert sort

13. A sorting procedure is called to sort a list of 100 integers that have been read from a file. If all 100 values are zero, what would the execution requirements be if the sort used was Quick sort, with the first element used as the split value ?

   a) $O(N)$ b) $O(N \log_2 N)$ c) $O(N^2)$ d) $O(1)$

14. A list is ordered from smallest to larger when a sort is called. Which sort would take the longest time to Execute ?

   a) Heap sort   b) Short sort   c) Quick sort   d) Selection sort

15. The element being searched for is in an array of 100 elements. What is the average number of comparisons needed in a sequential search to determine the position of the element if the element are completely unordered?

   a) 100   b) 75   c) 50   d) 25

16. The average number of comparisons in sequential search is

   a) n^2 b) $n(n-1)/2$ c) $n(n+1)/2$ d) $n+1/2$

17. Dijikstra's algorithm can be implemented using

   a) $O(e+n)$ b) $O((e+n)\log n)$ c) $O(n^2)$ d) $O(n\log n)$

18. If the number of vertices is 6 and number of edges are 9 then MST contains _____ edges

   a) 6   b) 9   c) 5   d) 8

19. A traversal in which all the nodes of descendants are processed before any adjacent nodes is_____

   a) Preorder traversal   b) Post order traversal   c) Depth first traversal   d) Breath first traversal

20. Round Robin algorithm requires _____

   a) $O(e\log n)$ b) $O(e\log \log n)$ c) $O(n\log n)$ d) $O(n^2)$

Part – B (5 x 16 = 90Marks)

21. a)i) Write short notes on abstract data types.   (6)

    ii) Write a program to perform Matrix Multiplication.   (6)

    iii) Define structures and Unions and compare them.   (4)

(OR)

  b) i) Write short notes on allocation of storage and scope of variables.   (4)

    ii) Write a recursive algorithm for Converting prefix to postfix expression.   (6)

    iii) Explain a simulated recursive program for factorial.   (6)

22. a)i) Write a program to evaluate a postfix expression and evaluate ABC+*CBA-+* where A=1, B=2, C=3.   (8)

    ii) Explain how insertion and deletion is performed in Queue using Linked list.   (8)
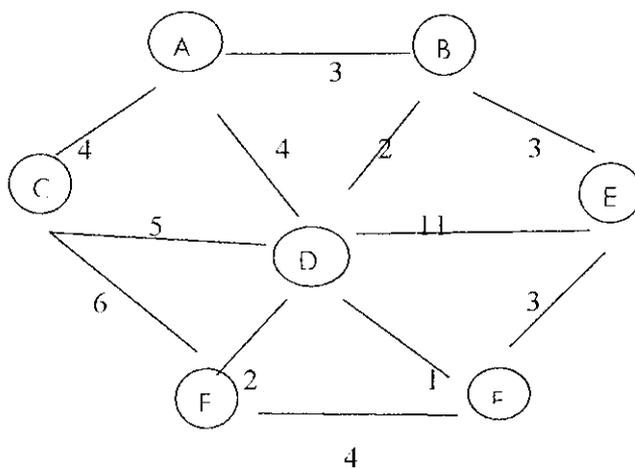
(OR)

b) i) Implement stack operations using Circular Linked lists. (8)

   ii) Write a program to perform Insertion and Deletion in a Doubly Linked List. (8)

23. a) i) Write a program for various tree traversals. (8)

   ii) Write an algorithm for building a tree from the list of inputs. (8)

(OR)

   b) i) Write a program to evaluating an expression tree. (8)

   ii) Explain how an element is deleted from BST. (8)

24. a) i) Explain Quick sort with an example. (8)
   ii) Explain Heap sort procedure. (8)

(OR)

   b) i) Write an algorithm for Binary search? Compare interpolation, Binary and Indexed
      sequential search. (6)
   ii) Describe about Merge sort with an example. (10)

25. a) i) Write Warshall's algorithm to find transitive closure. (6)
   ii) Write an algorithm to find the shortest path and find the shortest path
      from 1 to all other vertices for the graph in FIG.1 (10)
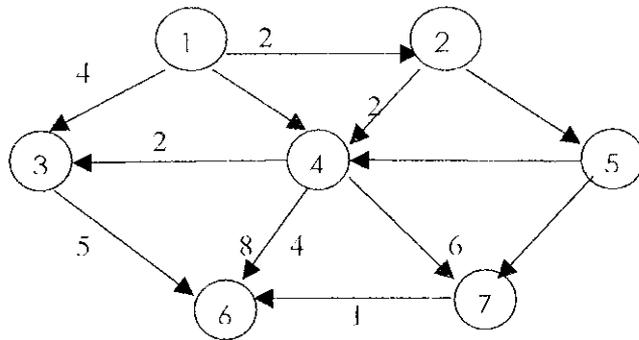
FIG : 1

(OR)

   b) i) Discuss about Depth first search traversal and its applications. (8)

   ii) Explain Krushkal's algorithm and calculate MST (Minimum spanning tree) (8)

FIG : 2

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