003-007202

M.C.A. (Sem.-II) (CBCS) Examination
May-2014
Paper : CCA2002 – Data Structure and Algorithm

Faculty Code : 003
Subject Code : 007202

Time : 2½ Hours]   [Total Marks : 70

1. Attempt the following multiple choice question :   15

    (1) Array is a
        (1) linear data structure   (2) non linear data structure
        (3) complex data structure   (4) None of these

    (2) Array is
        (1) data in physical order   (2) data in logical order
        (3) (1) and (2) both   (4) None of these

    (3) List pointer variable in linked list contains address of the
        (1) following node in the list   (2) current node in the list
        (3) first node in the list   (4) None of these

    (4) In linked list, the logical order of elements
        (1) is same as their physical arrangement
        (2) is not necessarily equivalent to their physical arrangement
        (3) is determined by their physical arrangement
        (4) None of these

    (5) Linked linear list is a
        (1) linear data structure   (2) non linear data structure
        (3) can not say   (4) None of these

    (6) Queue is a
        (1) FIFO   (2) LIFO
        (3) LILO   (4) None of these

(7) Stack is a

    (1) FIFO   (2) LIFO

    (3) LILO   (4) None of these

(8) A sparse matrix is one where most of its elements are

    (1) even   (2) zero

    (3) odd   (4) None of these

(9) A spare matrix can represented using

    (1) single dimensional array   (2) Linked linear list

    (3) (1) and (2) both   (4) None of these

(10) A data structure in which elements are added and removed only at one end is known as

    (1) queue   (2) stack

    (3) array   (4) None of these

(11) A data structure in which elements are added at one end and removed from the other end is known as

    (1) queue   (2) stack

    (3) array   (4) None of these

(12) Get the value of most recently inserted node and delete the node

    (1) POP   (2) PUSH

    (3) EMPTY   (4) None of these

(13) A data structure in which insertion and deletion can take place at both ends is called

    (1) circular queue   (2) deque

    (3) stack   (4) None of these

(14) In queue which of the following condition says that the queue is empty ?

    (1) front = rear   (2) front > rear

    (3) front < rear   (4) none of these

(15) Left, root and right - the sequence represents

    (1) pre order   (2) in order

    (3) post order   (4) none of these

2. Attempt any **five** of the following : 15

   (1) Differentiate : Primitive data structure Vs Non primitive data structure

   (2) What is sparse matrix ? Explain in brief.

   (3) Only list the different applications of linked linear list.

   (4) Write a C program to convert the given string into lower case (without using any library functions)

   (5) Explain row major representation of two dimensional array.

   (6) What is stack ? List the different operations of the stack. Write a C function for any one of them.

3. Attempt any **three** of the following : 15

   (1) What is recursion ? Explain recursion with suitable example.

   (2) Write a C program to print the content of a circular queue.

   (3) Explain the bubble sort with suitable example.

   (4) Consider the following arithmetic expression

   $a + b * c/ d + e$

   Perform the postfix stack operation for the above arithmetic expression.

4. Attempt any **two** of the following : 15

   (1) What is searching ? Write a C program to find the position of a given element in the given array of size n using binary search.

   (2) What is doubly linked linear list ? Write a C function that will create a doubly linked linear list, and another function that will insert a node at the kth position in the same list.

   (3) Write a C function that will reverse the singly linked linear list.

5. Attempt any of the following : 10

   (1) Implement the quick sort using C language.

   (2) What is binary tree ? List the different tree traversal techniques. Write a C program to implement any one of them.

M.C.A. (CBCS) SEM-II Examination
May-2013
CCA2002 – Data Structure & Algorithm

Faculty Code : 003
Subject Code : 007202

Time : 2½ Hours]   [Total Marks : 70

1.   Answer the following multiple choice questions :   15

   (1)   Which of the following expressions access the $(i, j)_{th}$ element of m × n
         column major matrix ?
         (a)   n * (i – 1) + j   (b)   m * (j – 1) + i
         (c)   m * (n – j) + j   (d)   n * (m – i) + j

   (2)   The best case running time for the linear search algorithm is _____.
         (a)   O (N)   (b)   O (log N)
         (c)   O (1)   (d)   Can not be determined

   (3)   Text handling encompasses which of the following ?
         (a)   Text editing   (b)   Text formatting
         (c)   Both of the above   (d)   None of the above

   (4)   Recursion is the application of which of the following data
         structure ?
         (a)   Stack   (b)   Queue
         (c)   Linked List   (d)   Tree

   (5)   To sort N elements using bubble sort, how many maximum number
         of exchanges of elements are required ?
         (a)   N   (b)   N (N + 1) / 2
         (c)   N (N + 1) (N – 1)   (d)   N (N – 1) / 2

   (6)   Time required for binary search on N elements is _____.
         (a)   O (N)   (b)   O (N log N)
         (c)   O (log N)   (d)   O (N^2)

(7) A list of integers is read one at a time and a binary search tree is constructed then which of the following traversal will result in the original order of the input ?

(a) Preorder   (b) Inorder

(c) Postorder   (d) None of the above

(8) A binary Tree has a height N then what is the minimum number of nodes it can have ?

(a) N   (b) N – 1

(c) N / 2   (d) N (N + 1) / 2

(9) Given two sorted lists of size m and n respectively, the number of comparisons required in the worst case by the merge sort algorithm will be _____ ?

(a) m * n   (b) m – n

(c) m + n – 1   (d) m + n

(10) A hash function f is defined as f (key) = key MOD 7 with linear probing. If the keys 37, 38, 72, 48, 98, 11, 56 are inserted into a table indexed from 0 to 6 then what will be the location of 11 ?

(a) 4   (b) 5

(c) 6   (d) 3

(11) In a linked linear list, the logical order of elements

(a) is the same as their physical arrangement

(b) is determined by their physical arrangement

(c) cannot be determined from their physical arrangement

(d) none of these

(12) Underflow condition in a linked list may occur when trying to

(a) insert a new node when there is no free space for it

(b) delete a non-existent node in the list

(c) delete a node in empty list

(d) none of these

(13) In which of the following N elements queues implemented through an array in which value of rear index pointer may be less than the front index pointer ?

(a) Simple Queue   (b) Circular Queue

(c) Priority Queue   (d) Double Ended Queue

(14) N elements of a queue with only two operations available insert and delete, are to be reversed using another queue. The total number of insert and delete operations required to do so is

(a) 2 N

(b) 4 N

(c) N

(d) The task cannot be accomplished

(15) Any algorithm whose execution time grows proportionally to which of the following functions is too slow for large input size ?

(a) Polynomial function   (b) Exponential function

(c) Linear function   (d) Quadratic function

2. Attempt any **five** of the following :   **15**

(1) Define data structure and give classification of it. Explain primitive data structure.

(2) How the numbers A = 650125 and B = 425975 can be represented in linked linear list using multiple precision arithmetic ? Obtain S = A + B using multiple precision arithmetic.

(3) What is recursion ? Draw a flow chart for a mode of a recursive process.

(4) What is string ? Give the basic operations that can be performed on string.

(5) Explain weight balanced tree using suitable example.

(6) Write algorithm/program to search an element using linear search. What is the best case and worst case running time of linear search ?

3. Attempt any **three** of the following :   15

   (1) What is sparse matrix ? Explain sequential representation of sparse matrix using example.

   (2) What is circular queue and how is it useful compared to simple queue ? Write algorithm/program to insert an element and delete an element from a circular queue.

   (3) Write a non-recursive algorithm/program to traverse a binary tree in preorder.

   (4) Create heap and sort the following set of data using heap sort.

      42, 23, 74, 11, 65, 58, 94, 36, 99, 87

4. Attempt any **two** of the following :   15

   (1) Write algorithm/program to convert the given unparenthesized infix expression into reverse polish expression. Translate the infix expression a + b * c – d/ e * h into polish expression and reverse polish expression.

   (2) Construct a binary search tree for the following set of data.

      10, 8, 12, 5, 11, 9, 16, 14, 13, 15.

      Delete nodes with value 5 and 12.

      Traverse the remaining tree in inorder, preorder and postorder.

   (3) What is the advantage of doubly linked linear list with compare to singly linked linear list ? Give vector representation of doubly linked list. Write algorithm/program to insert an element in an ordered doubly linked list.

5. Attempt any **one** of the following :   10

   (1) What is hashing technique ? Explain various hashing functions with example and linear probing collision resolution technique.

   (2) What is Tree ? Explain sequential and linked storage representation of binary tree with example. Explain arithmetic expression manipulation by generating expression tree for the expression a + b * c – d / e * h and traverse the tree in inorder, preorder and postorder.

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M. C. A. (Sem. II) (CBCS) Examination

April / May – 2012

CCA - 2002 : Data Structure & Algorithm

Faculty Code : 003
Subject Code : 007202

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Q1. Attempt the following   **[15]**

(1) What is the postfix form of the following prefix expression -A/B*C$DE
   (A) **ABCDE$*/-**   (B) A-BCDE$*/-   (C) ABC$ED*/-   (D) A-BCDE$*/

(2) A full binary tree with n leaves contains
   (A) n nodes.   (B) log n 2 nodes.   (C) **2n** –1 nodes. (D) n 2 nodes.

(3) A sort which relatively passes through a list to exchange the first element with any element less
   than it and then repeats with a new first element is called
   (A) insertion sort. (B) selection sort.   (C) heap sort. (D) **quick** sort.

(4) The smallest element of an array's index is called its
   (A) **lower** bound. (B) upper bound.   (C) range.   (D) extraction.

(5) 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.

(6) The data structure required to evaluate a postfix expression is
   (A) queue (B) **stack**   (C) array   (D) linked-list

(7) The number of leaf nodes in a complete binary tree of depth d is
   (A) **2d**   (B) 2d–1+1   (C) 2d+1+1   (D) 2d+1

(8) The postfix form of A*B+C/D is
   (A) *AB/CD+   (B) **AB*CD/+** (C) A*BC+/D   (D) ABCD+/*

(9) A queue is a,
   (A) **FIFO** list. (B) LIFO list. (C)LILO list. (D) FILO list

(10)   New nodes are added to the _____ of the queue.
        (A) front (B) **back** (C)   middle (D)   Both 1 and 2

(11)   The operation of processing element is called ?
        (A) **Traversing** (B) Inserting (C) Deleting (D) Searching

(12)   The terms PUSH and POP are related to ?
        (A) Arrays (B) **Stacks** (C) Linked List (D) None

(13)   The restriction while using the binary search is ?
        (A) List should be small in number   (B) List should be large in number
        (C) **List should be sorted**   (D)No restriction

(14) The situation in linked list START=NULL is called ?
      (A) Overflow   (B)**Underflow** (C) Both of above (D) None of Above

(15) The memory address of the first element is called ?
      (A) Floor Address (B) Foundation Address (C) First Address (D) **Base Address**

Q2. Attempt any 5(FIVE) from the following   [15]
(A) Explain the mechanism of malloc() and calloc() function with suitable example.
(B) Explain the mechanism of realloc() function with suitable example.
(C) Write a program in which define a UDF mystrcpy() which should work exactly like built-in strcpy() function.
(D) Write a program in which define a UDF mystrcat() which should work exactly like built-in strcat() function.
(E) Convert the expression from infix to postfix : **4 $ 2 * 3 – 3 + 8 / 4 / (1 + 1)**
(F) Convert the expression from infix to prefix : **4 $ 2 * 3 – 3 + 8 / 4 / (1 + 1)**

Q3. Attempt any 3(THREE) from the following   [15]
(A) Explain the mechanism of bubble sort and write a program for bubble sort.
(B) What is binary search? Write a program for binary search.
(C) Explain the mechanism of selection sort and write a program for selection sort.
(D) Write a program to implement insertion and deletion operations in Circular queue using an array.
     (For Example Declare an array of int a[10] to maintain the Circular Queue.)

Q4. Attempt any 2(TWO) from the following   [15]
(A) Explain PUSH, POP and PEEP operations in Stack using an array.
     (For Example Declare an array of int a[10] to maintain the stack)
(B) Write a program in which define the functions to insert, delete and list nodes in order singly link list.
(C) Write a program to perform following operations in Queue with dynamic memory allocation.
     1) List out all the elements in the Queue
     2) Count number of elements in the Queue

Q5. Attempt any 1(ONE) from the following   [10]
(A) Write a program in which define functions to perform following operations with Doubly Linked List.
     (1) Add beginning (2) Add at particular position (3) Add node at last
(B) What is tree structure? Explain different tree traversal methods in binary tree. Also write a program in Which define function for post-order and in-order traversal.

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M.C.A. (Sem. II) Examination

May/June – 2011

CCA-2002 : Data Structure & Algorithm

Faculty Code : 003
Subject Code : 007-202

Time : 3 Hours]   [Total Marks : 70

[15]

Q. 1   Answer the following multiple questions:
    (1)   Which of the following is primitive data structure
        (a)   int
        (b)   float
        (c)   double
        (d)   All of the aboe
    (2)   Which of the following structure follows FIFO
        (a)   Stack
        (b)   Queue
        (c)   Linked list
        (d)   All of the above
    (3)   Which of the following structure follows LIFO
        (a)   Stack
        (b)   Queue
        (c)   Linked list
        (d)   All of the above
    (4)   LIFO stands for
        (a)   Last In First Out
        (b)   Latest Income Final Outcome
        (c)   (a) and (b) both
        (d)   None of these
    (5)   Which of the following are the application of stack
        (a)   Searching
        (b)   Sorting
        (c)   Tree evaluation
        (d)   None of theses
    (6)   Tree is a
        (a)   Linear data structure
        (b)   None linear data structure
        (c)   Can not say
        (d)   None of these
    (7)   _____ is bucket sort
        (a)   selection
        (b)   quick
        (c)   merge
        (d)   None of these

(8) Which of the following are not the function string.h of C
   (a) strlen()
   (b) strcpy()
   (c) strcat()
   (d) None of these
(9) To append the st2 string to the st1 which of the following is used
   (a) strcat(st1,st2)
   (b) strcat(st2,st1)
   (c) strcpy(st1,st2)
   (d) None of these
(10) C stores the array using
   (a) Row major
   (b) Column Major
   (c) (a) and (b) both
   (d) None of these
(11) The link of the last node is assigned to the first node then it is called
   (a) Doubly linked linear list
   (b) Singly liked linear list
   (c) Circular linked linear list
   (d) None of these
(12) A tree with exactly 0 or 2 child is called
   (a) Complete binary tree
   (b) Binary tree
   (c) Ordered tree
   (d) None of these
(13) Which of the following is not application of tree
   (a) Sorting
   (b) Traversal
   (c) (a) and (b) both
   (d) None of these
(14) Which of the following is not the file sort
   (a) Heap sort
   (b) Merger sort
   (c) Radix sort
   (d) None of these
(15) Which of the following is not sorting technique
   (a) Selection
   (b) Binary
   (c) Bubble
   (d) None of these

[15]

Q. 2   Attempt any five of the following:
   (1) What is sorting?
   (2) Differentiate: linear search Vs Binary search
   (3) Briefly explain non linear data structure.
   (4) What is an array? Explain the row major array storage representation.
   (5) Briefly explain priority queue.
   (6) What is simulation? Explain in brief.

Q. 3   Attempt any three of the following: [15]
        (1)   Write a C program that will create a queue.
        (2)   Explain heap sort in short.
        (3)   What is non linear data structure? Explain the storage representation and
               manipulation of binary tree.
        (4)   Explain the radix sort process with suitable example.

                                                                               [15]

Q. 4   Attempt any two of the following:
        (1)   What is stack? List the different application of stack. Explain any one of
               them with suitable example.
        (2)   Write a C program that will sort the given array in ascending order using
               quick sort.
        (3)   Write a C program that will implement the binary search algorithm.

                                                                               [10]

Q. 5   Attempt any one of the following:
        (1)   What is tree traversal? List the different types of tree traversal technique.
               Explain each in brief. Also write the program for the same.
        (2)   What is linked linear list? Write a C program that will create, insert and
               delete the node at the k'th position.