2013

(3rd Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : 301

(Data Structures using C)

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 15)

1. Tick (✓) the correct answer of the following : 1×10=10

(a) Two main measures for the efficiency of an algorithm are

(i) processor and memory ( )

(ii) complexity and capacity ( )

(iii) time and space ( )

(iv) data and space ( )

(b) Which of the following is not a linear data structure?

(i) Array ( )

(ii) Linked list ( )

(iii) Stack ( )

(iv) Tree ( )

(c) When a new element is inserted in the middle of a linked list, then

(i) only the elements that appear after the new element need to be moved ( )

(ii) only the elements that appear before the new element need to be moved ( )

(iii) the elements that appear before and after the new element need to be moved ( )

(iv) None of the above ( )

(d) A linear list in which elements can be added or removed at either end but not in the middle is called

(i) queue ( )

(ii) deque ( )

(iii) stack ( )

(iv) circular queue ( )

(e) A pointer which does not contain a valid address is called a

(i) dangling pointer ( )

(ii) garbage pointer ( )

(iii) null pointer ( )

(iv) void pointer ( )

(f) A full binary tree with n leaves contains

(i) log $2n$ nodes ( )

(ii) n nodes ( )

(iii) $2n+1$ nodes ( )

(iv) $2n-1$ nodes ( )

(g) A complete binary tree of level 5 has

(i) 15 nodes ( )

(ii) 63 nodes ( )

(iii) 25 nodes ( )

(iv) 30 nodes ( )

(h) Which of the following is useful in traversing a given graph by DFS?

(i) Stack ( )

(ii) Set ( )

(iii) Queue ( )

(iv) List ( )

(i) The five items *A*, *B*, *C*, *D* and *E* are pushed in a stack, one after the other starting from *A*. The stack is popped four times and each element is inserted in a queue. Then two elements are deleted from the queue and pushed back on the stack. The popped item is

(i) *E* ( )

(ii) *B* ( )

(iii) *C* ( )

(iv) *D* ( )

(j) The initial configuration of a queue is *a*, *b*, *c*, *d* (*a*) is the front end). To get the configuration *d*, *c*, *b*, *a* one needs a minimum of

(i) 3 deletions and 2 addition ( )

(ii) 3 deletions and 3 additions ( )

(iii) 2 deletions and 3 additions ( )

(iv) 3 deletions and 4 additions ( )

2. State whether the following statements are True (*T*) or False (*F*) : 1×5=5

(a) Printing the value of *(& a) is same as printing the value of 'a'.

(*T* / *F*)

(b) In binary search, the search begins with the element that is located in the middle of the array.

(*T* / *F*)

(c) If the address of the 8th element in a link of integer is 1022, then address of the 9th element is 1024.

(*T* / *F*)

(d) A tree is a connected graph.

(*T* / *F*)

(e) The data structure required to evaluate a postfix expression is a queue.

(*T* / *F*)

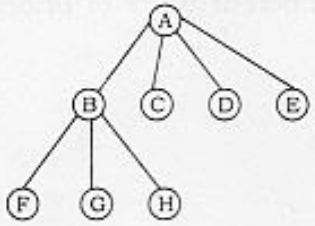
SECTION—B

(*Marks* : 10)

3. Answer the following questions : 2×5=10

(a) Explain BFS.

(b) Convert the following into a binary tree :



(c) What do you understand by priority queue? What are different types of priority queue?

(d) Write a note on adjacency matrix.

(e) Write a note on arrays of pointers.

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(3rd Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : 301

(Data Structures Using C)

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* How are malloc and calloc different from each other? 3

   (b) Explain the purpose of free( ) and realloc( ). 3

   (c) Distinguish between premitive data structure and nonpremitive data structure giving examples for each. 2

Or

(d) What are pointers? Explain how to declare a variable as a pointer using suitable example. 3

(e) How and why do we need to determine the efficiency of algorithms? 2

(f) Find the final value stored in the variable x, y and z at the end of the following programs : 3

```
void main( )
{
  int x, y, z, *p, *q;
  x=10; y=15; z=20;
  p=4x; q=4z;
  *q=*p+y-3;
  y=y-(*p);
  *p=*q-z;
}
```

2. (a) What is a circular queue? How is it different from an ordinary queue? 2

(b) Write a C programme for implementing stack using arrays. 6

Or

(c) Obtain the prefix and postfix expressions for the following : 2+2=4

(i) $(A + B) * C - ((D - E) \wedge (F + G))$

(ii) $A * B + C / D$

(d) Explain the steps involved in evaluating a valid postfix expression using stack by tracing suitable example. 4

3. (a) Explain different types of linked list with the help of suitable diagram. 4

(b) Write a C program to implement circular linked list. 6

Or

(c) Bring out the differences between singly linked list and doubly linked list. 3

(d) Write a C function to delete a node whose info field is specified in a singly linked list. 4

(e) Write a function to insert a node at the rear end in a doubly linked list. 3

4. (a) How are linear search and binary search different from each other? Write a C program to search for an item using binary search. 2+5=7

Or

(b) Write a program to sort numbers using bubble sort. 5

(c) Write a short note on quicksort. 2

5. *(a)* How is a binary search tree different from a binary tree? Write a C program to implement a binary search tree. 2+5=7

(b) Define the following terminologies : 1×3=3

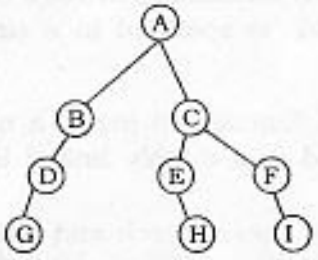
(i) Leaf

(ii) Height

(iii) Sibling

Or

(c) Traverse the following tree in inorder, preorder and postorder, and write the results : 6

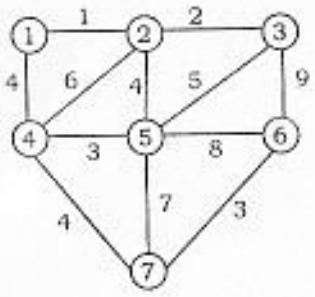


(d) What are the disadvantages of binary trees? How can they be overcome by using threaded binary tree? 4

6. *(a)* What are different techniques of representing graphs in computer memory? Explain any two with the help of suitable examples. 7

Or

(b) Define minimal spanning tree. For the following graph, calculate the minimal spaning tree by using Prim's algorithm.



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