

**2014**

**( 3rd Semester )**

**BACHELOR OF COMPUTER APPLICATION**

**Paper No. : BCA-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) What do you mean by dynamic memory allocation? Mention the different functions used for this. Explain the function that is used for allocating the required size of memory with example. 6

*Or*

- (b) What are linear and nonlinear data structures? 2
- (c) Write a program to illustrate pointer and function. 4

2. (a) Explain different types of queue with appropriate diagram. 7

Or

- (b) Show the detailed contents of the stack for given postfix expression to evaluate

6 2 3 + - 3 8 2 / + \* 2 \$ 3 +

3. (a) Write a C program to perform the following operations on stack using an array : 7

- (i) Push
- (ii) Pop
- (iii) Display

Or

- (b) What are the postfix and prefix of the following?

- (i)  $((A + B * C - (D - E)) $(F + G))$
- (ii)  $A * (B + D) / E - F * (G + H / K)$

4. (a) What is singly linked list? Write a C program to insert an element after a given node in a singly linked list. 10

Or

- (b) Write a C program to simulate the working of a queue of integers using linked list. Provide the following operations :

- (i) Insert
- (ii) Delete
- (iii) Display

5. (a) What is searching? Write a program of binary search.

6

Or

- (b) Sort the following number by using  
(i) selection sort, (ii) shell sort and  
(iii) insertion sort :

120 17 96 4 28 41

6. (a) Write the algorithm of preorder, inorder and postorder of binary traversal method.

7

Or

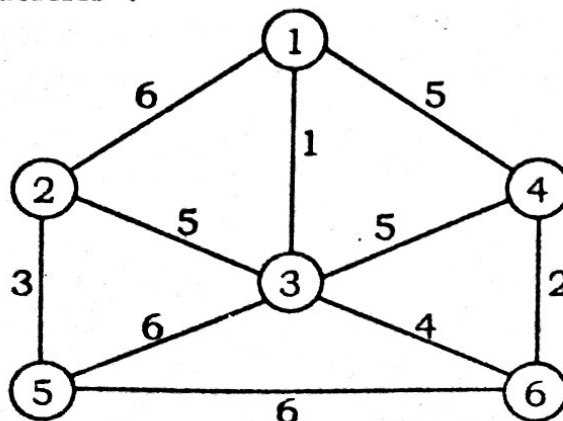
- (b) A binary tree  $T$  has 9 nodes. The inorder and preorder traversals of  $T$  yield the following sequences of nodes :

Inorder	D	G	B	A	H	E	I	C	F
Preorder	A	B	D	G	C	E	H	I	F

Draw the binary tree.

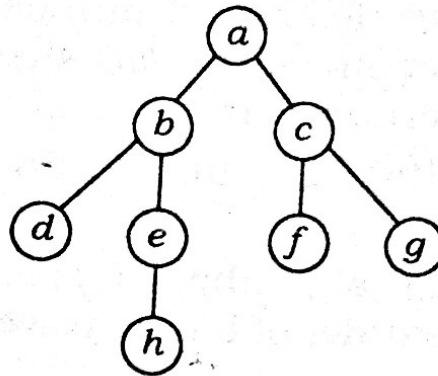
7. (a) What is minimal spanning tree? For the following graph, calculate the minimal spanning tree by using Kruskal's algorithm :

7



Or

(b) What is DFS? Consider the following graph to find the DFS :



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**2 0 1 4**

**( 3rd Semester )**

**BACHELOR OF COMPUTER APPLICATION**

Paper No. : BCA-301

**( Data Structures using C )**

**( PART : A—OBJECTIVE )**

**( Marks : 25 )**

*The figures in the margin indicate full marks for the questions*

**SECTION—I**

**( Marks : 15 )**

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

**(a) The proper choice of data structure allows major improvement in program**

**(i) efficiency ( )**

**(ii) coding style ( )**

**(iii) understanding ( )**

**(iv) All of the above ( )**

(b) `int` refers to which one of the following statements as true regarding the expression `((char*)p)++`?

(i) It gives the first byte of the value pointed by `p` and increments `p` by 1 ( )

(ii) It increases `p` by 1 ( )

(iii) This expression is not portable ( )

(iv) It increments the first byte of the value pointed by `p` by 1 ( )

(c) The following sequence of operations performed on a stack `push(1)`, `push(2)`, `pop`, `push(1)`, `push(2)`, `pop`, `pop`, `pop`, `push(2)`, `pop`. The sequence of popped out values is

(i) 2, 2, 1, 1, 2 ( )

(ii) 2, 2, 1, 2, 2 ( )

(iii) 2, 1, 2, 2, 1 ( )

(iv) 2, 1, 2, 2, 2 ( )

(d) The initial configuration is `a, b, c, d` (`a` is at the front). To get the configuration `d, c, b, a`, one needs a minimum of

(i) 2 deletions and 3 additions ( )

(ii) 3 deletions and 2 additions ( )

(iii) 3 deletions and 3 additions ( )

(iv) 3 deletions and 4 additions ( )



( 3 )

(e) Linear order in linked list is provided through

- (i) index number ( )
- (ii) the implied position of the node ( )
- (iii) pointer ( )
- (iv) All of the above ( )

(f) Inserting a node in a doubly linked list after a given node requires

- (i) one-pointer change ( )
- (ii) four-pointer change ( )
- (iii) two-pointer change ( )
- (iv) three-pointer change ( )

(g) Which of the following sorting methods works in  $O(n \log n)$  time in the average case?

- (i) Bubble sort ( )
- (ii) Quick sort ( )
- (iii) Selection sort ( )
- (iv) Insertion sort ( )

(h) Which of the following sorts inserts each elements  $A(k)$  into its proper position in the previously sorted subarray  $A(1), \dots, A(k-1)$ ?

(i) Radix sort ( )

(ii) Insertion sort ( )

(iii) Merge sort ( )

(iv) Bubble sort ( )

(i) Breadth first search

(i) scans all incident edges before moving to other vertex ( )

(ii) scans adjacent unvisited vertex as soon as possible ( )

(iii) is same as backtracking ( )

(iv) All of the above ( )

(j) An adjacency matrix representation of a graph cannot contain information of

(i) nodes ( )

(ii) edges ( )

(iii) direction of edges ( )

(iv) parallel edges ( )



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

(a) Dynamically allocated memory can only be accessed using pointers.

( T / F )

(b) A priority queue is implemented using an array of stacks.

( T / F )

(c) In circular header list, successive elements need not occupy adjacent space in memory.

( T / F )

(d) A radix sort requires each phase to be stable.

( T / F )

(e) The in-degree of a vertex is the number of edges leaving it.

( T / F )

( 6 )

SECTION—II

( Marks : 10 )

3. Answer the following questions :

2×5=10

(a) How do you declare and initialize pointer?

(b) What is priority queue?

(c) How is linked list efficient than array?

(d) Write a note on bubble sort.

(e) What is treaded binary tree?

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