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Total No. of Questions—**12**] [Total No. of Printed Pages—**7**

Seat No.	

[4757]-149

S.E. (E & TC) (Second Semester) EXAMINATION, 2015

DATA STRUCTURES

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. **:—** (*i*) Answers to the two sections should be written in separate answer-books.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of non-programmable electronic pocket calculator is allowed.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) List the different phases of creating a program. Explain any *two*. [4]

(*b*) Write an algorithm to sort the following data using bubble sort and insertion sort. Give time complexity for the bubble sort and insertion sort. [6]

42 37 4 22 17

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(*c*) What will be the output of the following code ? Justify your answer : [6]

```
for(i=o;i<4;i++)
{
        for(j=0;j<4;j++)
        {
                a[i][j]=20*(i+j);
                printf("%d\t",a[i][j]);
        }
printf("\n");
}
printf('%d%d",i,j);
```

Or

2. (*a*) Write a function in 'C' to implement selection sort. [4]

(*b*) What will be the output of the following code ? Justify your answer : [6]

```
void Fun(intx, int * p)
{
        x=x + 20;
        *p= * p+x;
}
void main()
{
int a=20,b=30;
        Fun(a, &b);
printf("%d%d",a,b);
}
```


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(*c*) Define Recursive Function in 'C' and explain with example in detail. [6]

3. (*a*) Explain parameter passing to functions for swapping of two variables : [8]

(*i*) By value

(*ii*) By reference.

(*b*) Differentiate between static and dynamic memory allocation. List the functions used for dynamic memory allocation. [4]

(*c*) What is a string ? How do you declare a string variable in C ? Write and explain the function in C to find length of a string. [4]

Or

4. (*a*) Write a function "Add_poly" in 'C' for addition of two polynomials. [8]

(*b*) What are union ? Explain its advantages. Define a union having one integer, one float and an array of characters of size 2. [4]

(*c*) Write a short note on pointer to array and array of pointers. [4]

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5. (*a*) Define GLL with node declaration and represent the following polynomial using GLL : [8]

$$20X^2Y^2Z + 10XY^2Z^2 + 8XYZ + 7XYZ^2.$$

(*b*) Write a C function to delete node in a linked list. [6]

(*c*) Explain node structure of a Doubly linked list and explain its advantages. [4]

Or

6. (*a*) Write a C function for the following operations in DLL : [8]

(*i*) Display the complete list

(*ii*) Search an element in the list.

(*b*) Write functions in C to create a node and display all nodes in SLL. [6]

(*c*) Define Circular linked list and compare with SLL. [4]

SECTION II

7. (*a*) Write a program for stack using array. [6]

(*b*) Explain the examples in general and applications of queue in computer science. [6]

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(*c*) Convert the following expression to postfix from using stack. Show content of stack step by step. [6]

A + (B * C) ^ D.

Or

8. (*a*) Give algorithm for evaluation of postfix expression. [6]

(*b*) Write a program to create a queue using linked list. [6]

(*c*) What are types of expressions ? Explain with *one* example, how to convert infix expression to prefix and postfix form. [6]

9. (*a*) Construct the binary search tree from the following elements :

10, 8, 15, 12, 9, 6, 18.

Also show representation of this tree using array. [6]

(*b*) What are advantages of threaded binary trees ? [4]

(*c*) Describe the algorithm for non-recursive in order traversal in BST. [6]

Or

10. (*a*) Construct the expression tree for : [8]

B – C ^ D * E + 20.

(*b*) Explain the cases related to delete an element from binary search tree. [8]

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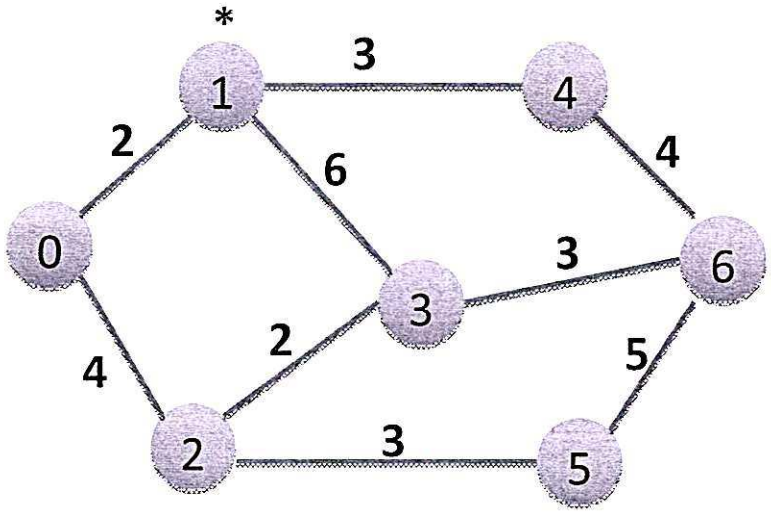
11. (*a*) How to represent a graph ? Represent the graph consisting of minimum 6 nodes. [4]

(*b*) Explain, how stack can be used for non-recursive depth first traversal related to graph traversal ? [6]

(*c*) Describe Kruskal's algorithm to find minimum spanning tree from graph. Consider graph mentioned in Q.12 (*b*). [6]

Or

12. (*a*) Find the minimum cost spanning tree from the following graph using Prim's algorithm. [8]



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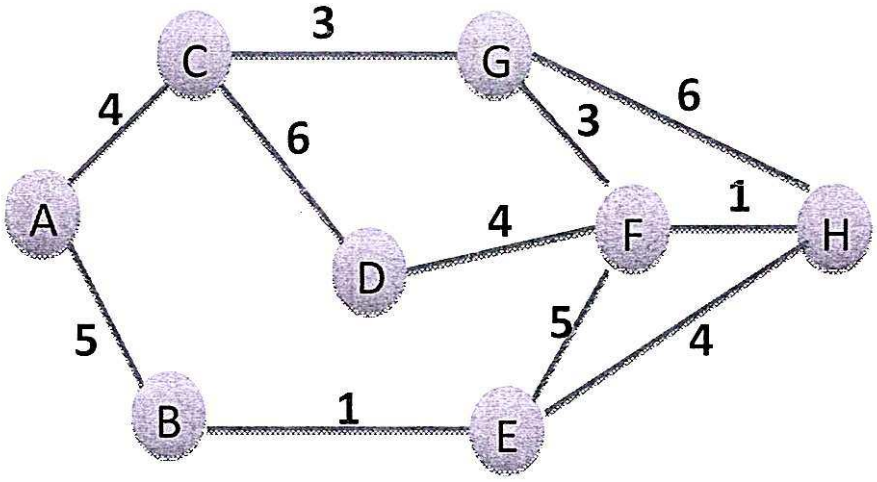
(*b*) Find shortest path from node A to all nodes in the following graph using Dijkstra's algorithm. [8]



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