Total No. of Questions—**12**] [Total No. of Printed Pages—**4+2**

Seat No.	

[4757]-194

S.E. (Information Technology) (First Semester)

EXAMINATION, 2015

FUNDAMENTAL OF 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*) Answer any *three* questions from each Section.

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

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

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

SECTION I

1. (*a*) What is structure in C ? Give its applications. [4]

(*b*) Compare macro and function. [4]

(*c*) Write C program to swap two nos. using call by reference. [8]

Or

2. (*a*) Write a C program to print binary equivalent of a decimal number. [6]

(*b*) Explain various operators in 'C'. [4]

P.T.O.

(*c*) Select the choice for the correct answer and write that choice : [3×2=6]

(*i*)
```
#include<stdio.h>
#define x 20
main( )
{
    int x=50;
    printf("%d\n", x);
}
```

The above code snippet will print :

(1) 20

(2) 50

(3) Compile error

(4) None of the above

(*ii*)
```
int main(void)
{
    int x=10;
    if (! x)
        printf("Hello\n");
    else
    {
        x=0
        printf("Bye\n")
    }
    return 0;
    }
```

The above code snippet will print :

(1) Bye

(2) Hello

(3) Hello (infinitely .....)

(4) Bye (infinitely .....)

3. (*a*) Write a C program to find transpose of a matrix. [6]

(*b*) Write a C program to perform multiplication of two 4 by 4 matrices using function. [6]

(*c*) Describe the following declarations : [4]

(*i*) int *p[10];

(*ii*) float (*p) (int no);

(*iii*) int (*q) [5];

(*iv*) char s[10][20][50];

Or

4. (*a*) Write a C program to find HCF and LCM of two nos. [8]

(*b*) What is recursion ? Explain with example. [4]

(*c*) Write a C program to find length of a string without using library functions. [4]

5. (*a*) What is an abstract data type ? Explain with an example. [4]

(*b*) Determine the frequency counts for all the statements in the following program segment : [6]

```
add(a, b, c, m, n)
{
    for i:=1 to m do
    for j:=1 to n do
    c[i][j]:=a[i][j]+b[i][j];
}
```

(*c*) What do you mean by frequency count of a statement ? Explain its importance in analysis of algorithm with suitable examples. [8]

Or

6. (*a*) Explain Big Oh, Omega and Theta notations used to analyze time complexity. [6]

(*b*) Write a non-recursive C function to generate Fibonacci series. [4]

(*c*) Write an algorithm to find smallest element in an array of integers and analyze is time complexity. [8]

SECTION II

7. (*a*) Explain similarities and differences between bubble and selection sort. Justify why selection sort is more efficient. [8]

(*b*) Write C program for selection sort. Analyze its time complexity. Show output after each pass for the following list : [10]

50, 15, 70, 18, 14, 30, 13, 10, 21, –15.

Or

8. (*a*) Write a C program for Merge sort and explain it using example. [8]

(*b*) Consider the following numbers. Sort them using "bubble sort". Comment on time and space complexity in best, average and worst cases. Show output after each pass : [10]

45, 33, 6, 55, 3, 0, –4, 30.

9. (*a*) Write a C program for Fast and Simple Transpose. [10]

(*b*) Represent the following polynomials using arrays : [6]

(*i*) $x^5 - 5x^3y^2 + 2y - x$

(*ii*) $2x^5 + 21x^4y^2 - 30x^2y^2 + 10x$

(*iii*) $-3x^5y^7 + 7y^3 - 2$.

Or

10. (*a*) Write a C program for performing the following string operations without using library functions : [8]

(*i*) Reverse of a string

(*ii*) Palindrome of two strings.

(*b*) Write a C program for addition of two polynomials where polynomials are represented using array. [8]

11. (*a*) Write recursive functions for the following operations on SLL : [8]

(*i*) Display reverse

(*ii*) Count no. of nodes.

(*b*) Write a C program to create doubly link list. [6]

(*c*) Write applications of linked lists. [2]

Or

12. (*a*) Write a C program to add two decreasing ordered polynomials with positive exponents, represented using circular SLL with header node exponent field is set to –1. [8]

(*b*) Compare sequential data organization with linked organization. [6]

(*c*) Why linked organization is preferred over sequential organization in list manipulation ? [2]