# Indian Institute of Technology, Kharagpur

Date...................... FN/AN     Time: 3 Hrs     Full Marks: 50     No. of Students: 50
END (Autumn) Semester 2010-11,     Deptt: MA/EX     Sub. No. MA41021
Subject Name: Programming Languages

**Instruction:** Answer **all** questions in brief. Default context is C programming language.

## Question 1 [2 × 6 marks]

What is the difference between

a) void fun(int $a[\ ]$) and void fun(int $* a$);

b) array and linked list;

c) Stack and Queue;

d) a doubly linked list and a circular linked list;

e) char $b[\ ] = $ "Hello" and char $* b = $ "Hello".

f) float $a[10]$ and struct new $a[5]$, where

         struct new
         {float $b[2]$; };

## Question 2 [5 marks]

If a five-digit number is input through the keyboard

a) write a program to reverse the number, *e.g.* if the input is 69718, the output is 81796.

b) write a program to find the sum of square of the digits, *e.g.* if the input is 69718, the output is the value of $6^2 + 9^2 + 7^2 + 1^2 + 8^2$.

## Question 3 [4 marks]

Write a program which can collect student information (student name, roll number, sex and date of birth) of a class and display the collected information.

————P.T.O————

## Question 4 [6 marks]

Write a program which given two integer input $T$ and $G$, will output the combination of $T$ things into $G$ groups, *e.g.* if $T = 5$ and $G = 3$, the output will be

$$(5, 0, 0)$$
$$(4, 1, 0)$$
$$(3, 2, 0)$$
$$(3, 1, 1)$$
$$(2, 2, 1)$$

## Question 5 [5 marks]

a) How can one dynamically allocate a two dimentional array?

b) Represent a Sparse matrix of order $100 \times 100$ with 9 non-zero elements using linked list.

## Question 6 [5 marks]

Let $P(x) = 1.9x^5 + 2.3x^3 + 1.3x + 7$ and $Q(x) = x + 1$ be two polynomials.

a) Write a program to find $P(x) + Q(x)$ using array;

b) Write a program to find $P(x) \times Q(x)$ using linked list.

## Question 7 [6 marks]

a) Explain with diagram the deletion and addition operations in stack and queue using linked list.

b) Write a program to implement a doubly linked list as a circular linked list.

## Question 8 [6 marks]

What will be the output of the following programs:

a)
```
main( )
    { int x = 1;
        while (x == 1)
            x = x - 1;
        printf("\n%d", x);
    }
```

————P.T.O————

b)
```
main( )
    { int x = 4, y, z;
        y = - - x;
        z = x - -;
        printf("\n%d%d%d", x, y, z);
    }
```

c)
```
main( )
    { int i = 1;
        printf("%d%d%d", i, + + i, i + +);
    }
```

d)
```
main( )
    { int i = 1;
        while (1)
        {printf("%d", i);
            i + +;
        }
    }
```

e)
```
main( )
    { int arr[ ] = {0, 1, 2, 3, 4};
    int i, *Ptr;
    for(Ptr = &arr[0], i = 0; i <= 4; i + +)
        printf("%d", Ptr[i]);
    }
```

f)
```
main( )
    { int b[ ] = {10, 20, 30, 40, 50};
    int i, *k;
    k = &b[4] - 4;
    for(i = 0; i <= 4; i + +)
        {printf("%d", *k);
            k + +;
        }
    }
```

———The End———