

INDIAN STATISTICAL INSTITUTE

Laboratory Test I (Part I)
M. Tech (CS) - I Year, 2013-2014 (Semester - I)
Data and File Structures Laboratory

Date: 17.08.2013

Total Marks: 24 [= 8 x 3]

Answer all questions on the question sheet. For the multiple choice questions, circle the correct alternative. For the rest, answer in the space provided. Do your rough work on this sheet only.

Name: _____ Roll Number: _____

1. How many times is the body of the following loop executed?

```
int i;  
for (i=0; i<100; i=i+3) printf("i = %d\n", i);
```

(A) 100 (B) 97 (C) 34 (D) 33 **Answer: (C)**

2. What value is assigned to the variable a?

```
#define N 10+10  
a = N * N;
```

(A) 400 (B) 210 (C) 200 (D) 120 **Answer: (D)**

3. Assume that the integer variables a, b and c store the values 5, 6 and 7 respectively. At that instance the following statement is executed:

```
a = a * b % c + a;
```

What value is assigned to the variable a?

(A) 5 (B) 6 (C) 7 (D) 30 **Answer: (C)**

4. Describe, in terms of the scanned integers m and n, what integer values are printed at the end of the program below:

```
#include <stdio.h>  
int main ()  
{  
    int m, n;  
    printf("Supply two integers: ");  
    scanf("%d%d",&m,&n);  
  
    m = m - n;  
    n = m + n;  
    m = n - m;  
  
    printf("%d %d\n", m,n);  
}
```

Answer: _____ **Swaps m and n** _____

5. The following is the skeleton of a C program that computes the number of each numeral in a string. Fill in the blanks with appropriate C constructs.

```
#include <stdio.h>

#define base 10
int main () /* This program outputs the numbers of 0's,1's, ..., 9's in an input string ending in $ */
{
    char b;
    int i, a[base];

    /* Initialize array elements to zero */
    for ( __i=0__ ; __i<=9__ ; __i++__ )
        a[i] = 0;

    printf("Input numeric characters ending with $\n" );
    scanf("%c", &b); /* Scan next character */

    /* Execute the loop as long as $ is not scanned */
    while ( __b!='$'__ ) {
        printf("Processing the digit %c\n", b);

        /* Increment the count for the new digit */
        a[ __b - '0'__ ] = __a[ b - '0' ] + 1__ ;

        scanf("%c", &b); /* Scan next character */
    }
    for ( i=0 ; i<=9 ; i=i+1 )
        printf("There are %d %d's\n", a[i], i);
}
```

Note: You don't have to know the exact ASCII values for the characters 0, 1, 2,..... It is sufficient to know only that the ASCII representations of 0, 1, 2... are consecutive.

6. Consider the following function that expects a non-negative integer argument:

```
unsigned int doit ( unsigned int n )
{
    unsigned int m;
    m = 0;
    while ( n > 0 ) {
        m = (m*10) + (n%10);
        n = n/10;
    }
    return m;
}
```

What does `doit(92429)` return? Describe the return value of `doit` as a function of the input argument `n`.

92429 – returns the integer whose (decimal) digits are in the reverse order as they are in the input argument n.

7. What is the output of the below program?

```
#include<stdio.h>

int func()
{
    static int i = 3;
    i++;
    return i;
}

int main()
{
    int i;
    for (i = 0; i < 4; i++)
    {
        printf(" %d", func());
    }
}
```

Answer: _____ **4 5 6 7** _____

8. Suppose that we have got a two-dimensional array $A = a[i][j]$ with m rows and n columns. Let the one-dimensional row-major representation of A be stored in the array $B = b[i]$ of size $m*n$. Assume that indexing in the arrays is zero-based.

(a) Given a pair of indices i, j for the matrix A , the element $a[i][j]$ is stored as $b[k]$, where $k =$ _____ **$n * i + j$** _____ (in terms of i, j, m, n)

(b) Given an index k in the array B , the element $b[k]$ corresponds to the element $a[i][j]$ in A , where

$i =$ _____ **k / n** _____ (in terms of k, m, n)

$j =$ _____ **$k \% n$** _____ (in terms of k, m, n)