Indian Association for the Cultivation of Science

(Deemed to be University under *de novo* Category)

Integrated Bachelor's-Master's Program

End-Semester Examination-2019 (Semester- I)

Subject: Introduction to Computing with Python ***Subject Code(s): MCS1101B***

Full Marks: 50 ***Time Allotted: 3 hrs***

Answer a total of five questions, with at least one from each section.
Each question carries 10 marks

Section – A

1. a) Draw a flowchart diagram to check whether a number is prime or not. **(3)**
b) Convert from one number system to the other, **(2+2)**
i) $(29.65)_{10} = (?)_2$
ii) $(364364364)_8 = (?)_{16}$
c) Perform the following operation in BCD (binary coded decimal), 1247 – 759. **(3)**

2. a) Write an iterative program/function in C/Python (without using any library function other than scanf/input and printf/print) to check whether a number is a palindrome or not, without using array. You can use only one loop, without any nesting. **(4)**
b) Write a recursive program/function in C/Python, which performs the same task as stated in 2. a). **(4)**
c) State and explain the output of the following code snippet. **(2)**

```
#include<stdio.h>
#define SQUARE(X) X * X
int main(void)
{
      printf("\n Square = %d", SQUARE(10+2));
      return 0;
}
```

Section – B

3. a) Answer the following questions – **(2+2)**

i) Explain the value of degC at the end of the following lines?

```
double degC, degF = 96;
degC = 5 / 9 * (degF - 32);
```

ii) Explain the output of the following code,

```
const int  num;
num = 20;
num += num;
printf("%d",num);
```

b) Write a C/Python program/function to find $S(x,n) = x - x^3/3! + x^5/5! - ..$ up to n terms. Provide x and n as inputs. Using library functions, except for receiving input and displaying the output, is not permitted. **(5)**

c) How is a local static variable different from other local variables? **(1)**

4. a) Explain the output of the following code snippet – **(5)**

```
item = input("Letter: ")
ip = input("Input: ").lower()
r = ip.count(item)
print (r)
ip = ip.split()
for word in ip:
    if item in word:
        print((word), end = ' ')
```

First input: e
Second input: The quick brown fox jumps over the lazy dog.

b) Write a Python program to input two sentences and print the words they have in common. Assume that the sentences end with full-stop (".") and may have comma (",") as the only other punctuation mark. **(5)**

Section – C

5. a) Describe how strcmp( ) works in C. Write a C program to exactly simulate it, without using any library function from string.h. **(1+4)**

b) Explain the output of the following C program. **(5)**

```
#include<stdio.h>
int main(void)
{
    int x[5] = {10, 20, 30, 40, 50};
    int i, *j;
    j = x;
    printf("\n");
    for(i=0; i<=4; i++)
    {
        printf("%u %u %u %u %d %d\n", \
            j, &j, j[i], &j[i], *j, x[i]);
        j++;
    }
    return 0;
}
```

6. a) What are the differences between lists and tuples in Python. **(2)**

b) Write a program in C to multiply two matrices (size of the input matrices should be accepted at the time of execution). The initial input matrices should be freed after the multiplication is done and the result is stored in a matrix of suitable size. **(6)**

c) Write a C function to generate a random integer within the range of two positive integers x and y. **(2)**

Section – D

7. a) Write a C program to store name, roll and GPA of n students in an n length array of structure. Input should be n and the student details. The input should be provided during the time of execution. Print the list of student names in order of merit (non-ascending GPA). **(3+ 4)**

b) What will be the output of the following Python code, **(3)**

```
a = {}
a[1] = 1
a['1'] = 2
a[1]= a[1]+1
count = 0
for i in a:
    count += a[i]
print(count)
```

8. a) Write a Python program to store name, roll and GPA of n students in an n length list of tuples. Print the list of student details in sorted order of merit (non-ascending GPA).**(5)**

b) Write a C/Python program for the following,
Given a string S and a pattern string P, report the index of the first and second occurrence of P in S. For example, S = "xxxxHAMxxxxHAMxxxxHAMxxxx".
If P = "HAM", the output should be 4 and 11.
If P = "HAMxxxxHAMxxxxHAM", the output will be 4 and -1.
If it occurs less than twice, it'll print -1 in place of the corresponding missing index.
Given, another string R, write a C/Python program to replace the first two instances of P by R. You can use any library function you want from C/Python libraries. **(5)**