ANSWER ALL QUESTIONS

1a. What are the different data types in C Programming? Explain. Also give the details of the different control strings used for each data type.

1b. Write a program to compute all the prime numbers between two user given numbers. [Hint: Prime numbers between 5 to 25]

1c. Explain the different parameter passing techniques with necessary example. (8+6+6)

2a. What is an array data type? Explain. Discuss the different ways to initialize & read the two dimensional arrays with necessary example.

2b. Write a program to check whether the given string is a palindrome or not. Use user defined function. [Hint don't use built in string handling functions]

2c. Explain the general structure of the following control Structures:

i. Uni-directional Control Statement
ii. Bi-directional Control Statement
iii. Multi-directional Control Statement. (7+6+7)

3a. Write a program to sum the cosine series upto the term accuracy is 0.0001. Use while loop do the necessary computation.

[Hint: $\text{Cos}(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \text{-} \ldots\ldots]$

3b. How union data type is different from structure data type? Explain with necessary general form. Also explain how to initialize the members of each data type.

3c. Write a program to convert given decimal number into its equivalent octal number. Use switch statement. (6+7+7)

4a. What is recursive function? Give the general form of recurve function. Also, write a program segment to compute the factorial of a number using recursive program construct.

4b. Consider a situation that a class of n students takes an annual examination in m subjects. Write a program to read the marks obtained by each student in various subjects and compute and print the total marks obtained by each of them.

4c. Explain the ternary operator with necessary general syntax. Also write a program to compute whether a given number is odd or even. (7+8+5)

5a. Write the output for the following program segments:

```
main ( )
{
 char string[ ] = "WEL COME"
 int m;
 for (m = 0; string [m] != '\0'; m++)
 if (m%2 = = 0)
 printf ("%c", string[m]);
}
```

Fig 5a-i


```
#include <stdio.h>
int main ( ) {
int i;
for (i = 0; i<= 4; i++);
printf ( "%d", i)
return 0;
}
```

Fig 5a-ii

```
void test();
main ()
{ test( );
  test( );
  test( ); }
void test( )
{  static int a = 0;
   a = a+1;
   printf("% d\t",a); }
```

Fig 5a-iii

```
main( )
{ int *px, *py;
static  int a[6] = {1, 2, 3, 4, 5, 6};
px = &a[0];
py =  &a[5];
printf("px  = % x   py = % x", px,  py);
printf("\n  py – px  = % x", py-px);
}
```

Fig 5a-iv

5b. Explain the different looping statements with necessary general syntax. **(12+8)**

----------ALL THE BEST----------

Roll no

NATIONAL INSTITUTE OF TECHNOLOGY GOA

Farmagudi, Ponda, Goa 403 401

Programme Name: B.Tech

End Semester Examination, November-2014

Course Name: Computer Programming and Problem Solving **Course Code: CS100**

Date: 24/11/2014 **Time: 10:00 AM – 01:00 PM**

Duration: 3 hours **Max. Marks: 100**

ANSWER ALL QUESTIONS

Q. 1) a) Which symbols are used in hexadecimal system? Find the hexadecimal equivalent of following binary numbers: i) 1011 ii) 11101011111 iii) 10110101. (3 marks)

b) Find the decimal equivalents of the following hexadecimal numbers: i) AE.6FC ii) D123.AB iii) EFF.3DA. (3 marks)

c) What are the different types of data? Give an example of each of these data types. (3 marks)

Q. 2) a) Define the terms: algorithm, programming language and computer program. (3 marks)

b) What is a compiler? What is the difference between an interpreter and a compiler? (3 marks)

c) Briefly explain following types of programming languages: i) Assembly language, ii) high level language. Which type of language is C language? (3 marks)

Q. 3) a) A company manufactures three products: engines, pumps and fans. It gives a discount of 10% on orders for engines if the order is for Rs. 5000 or more. The same discount of 10% is given on pump orders of value Rs. 2000 or more and on fan orders for Rs. 1000 or more. On all other orders they do not give any discount. Obtain a decision table corresponding to this word statement. (6 marks)

b) Fifteen pairs of coordinates of points in a plane are given. Write an algorithm to find the number of points in each of the 4 quadrants in a plane (For example, the pair <-3, 6> is in the second quadrant. (6 marks)

Q. 4) a) Read the following program and explain what it does. Trace it with n = 10. (4 marks)

```
#include<stdio.h>
int main()
{
        int n, first = 0, second = 1, next, c;
        scanf("%d",&n);
        for ( c = 0 ; c < n ; c++ )
        {
                if ( c <= 1 ) next = c;
                else
                {
                        next = first + second;
                        first = second;
                        second = next;
                }
        printf("%d\n", next);
        }
```

}

b) Pick the incorrect type declarations from the following list. Explain why they are incorrect. (2 marks)

i) float, servo, mass, iota;
ii) int servo, digit, count;
iii) int rs.ps, unsigned;
iv) float real, root, big;

c) Classify the following constants as decimal, octal or hexadecimal. (3 marks)

i) 0234 ii) -0456 iii) 0xAB56 iv) -468734689 v) -0x38 vi) 22

Q. 5) a) Find the value of a in each of the following statements: (4 marks)

int i = 5, j = 5, k = 7;
float a = 3.5, b = 5.5, c = 2.5;
i) a = b – i/j + c/j
ii) a = (b – 1)/(j + c) / j
iii) a = b + 1 % 1 + c
iv) a = (b + 1) % (1 + c)

b) Write printf statements to print the following: (4 marks)

i) int a, b, c
ii) float x, y, z
iii) unsigned it a, b, c
iv) float p, q, r in exponent format.

c) Write scanf statement to read two negative integers and three floating point numbers. (3 marks)

Q. 6) a) Given the base and height of a right angled triangle write a program to find its area. (4 marks)

b) Given a point (x, y) write a program to find out whether it lies inside, outside or on a circle with radius z and center at (0, 0). (6 marks)

Q. 7) a) Compare while, do-while and for loops in C. Give an example of each. (4 marks)

b) Given a set of integers, write a program to find those which are palindromes. E.g. the number 123321 is a palindrome as it reads the same from left to right and from right to left. (6 marks)

Q. 8) a) Write a program to find the sum of squares of elements on the diagonal of a square matrix. (5 marks)

b) Write a program to find if a square matrix is symmetric. (5 marks)

Q. 9) a) Given the date an employee joined a job in the firm: Day/Month/Year and given today's date, write a program to find out whether the given joining date of an employee is a legal date. E.g. a date such as 10/14/81 is illegal as the month cannot exceed 12. (6 marks)

b) Write a C program using function that given x, calculates the value of function f(x) defined below:

$f(x) = 2x^2 + 3x + 4$ for $x < 2$
$f(x) = 0$ for $x = 2$
$f(x) = -2x^2 + 3x - 4$ for $x > 2$.

Q. 10) a) Explain the difference in 'passing by value' and 'passing by reference' with example. (6 marks)

b) Write a C program that uses a function called interchange to swap values of two numbers using po approach. (4 marks)

Roll no | | | | | | | | | |

National Institute Of Technology Goa

End Semester Examinations November 2015
Programme Name: B.Tech

Course Name: Computer Programming and Problem Solving | **Course Code: CS100**
Date: 17/11/2015 | **Time: 2.00pm-5.00pm**
Duration: 3 Hours | **Max. Marks: 100**

ANSWER ALL QUESTIONS

Q1. Roman numerals, the numeric system used in ancient Rome, employ combinations of letters from the. Latin alphabet to signify values. In this system, valid digits are:

I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1,000

For e.g. the numbers 1 to 10 can be expressed in Roman numerals as follows:

I, II, III, IV, V, VI, VII, VIII, IX, X.

Write a C program to convert any input decimal number between 1 and 20 to its equivalent Roman representation. [10 marks]

Q2. Write your own atoi() function. The atoi() function takes a string (which represents an integer) as an input argument and returns its value.

The main function looks as follows:

```
int main()
{
   char str[] = "435213";
   int val = atoi(str);
   printf ("%d ", val);
   return 0;
}
```

[8 marks]

Q3. Write a program using loops(for/while/do-while) to print the following sequences:

a) -10 -20 -30 -40 -50
b) 1 2 4 7 11 16
c) 1 2 4 8 16 32

[9 marks]

Q4. Explain the difference between structure, union and bit-fields. [4 marks]

Q5. Explain the C Standard Library functions below and which header files do they belong to?

a) void *memcpy(void *str1, const void *str2, size_t n)
b) void *malloc(size_t size)

[4 marks]

Q6. How to dynamically allocate a 2D array in C?

a) Using a single pointer
b) Using a pointer to a pointer or Using an array of pointers

[10 marks]

Q7. What does the following function do? Write the iterative version of the program.

```
#include<stdio.h>
#include<stdlib.h>

void f(int n)
{
  if(n<=1){
        printf("%d", n);
  } else {
        f(n/2);
    printf("%d",n%2);
  }
}

int main(int argc, char*argv[])
{
  f(173);
}
```

[10 marks]

Q8. I. Write the complete C program using structures and arrays
a) Accept information of 82 students in an array of structures with fields: name, roll_no and marks.
b) Print a report of all roll numbers and the corresponding grade
c) Print name of the student getting highest marks. [10 marks]

II. I wish to replace your structure definition with a union. Rewrite your structure definition to make it a union. What would be the consequences of this change to your program in Q8 I.? [5 marks]

Q9. As part of the "Rashtriya Avishkar Abhiyaan " NIT Goa plans to adopt 10 schools in Goa.
The Department of Computer Science and Engineering at NIT Goa proposes to teach C programming to school students under this scheme. We need your assistance to prepare "The C Cheat-Sheet" to be distributed amongst our future programmers.
The cheat-sheet should cover all topics in C that will be needed by any C programmer for reference in his/her programming assignments. For each topic included in your cheat-sheet please accompany it with an example.

[15 marks]

Q10. Write your own implementation of printf() function.

int printf(const char *format, ...);

Let's restrict your function to print only integers. In all other ways, your printf() function must behave exactly like the one provided by in stdio.h. It should be able to input any number of integers, write them to stdout (standard output) and return the total number of bytes.

Except for the printf() function, you may use any other function from the C Standard Library; make sure to include the header files as needed.

*** Good Luck ***

[15 marks]