

**I YEAR II SEMESTER**  
**COMPUTER SCIENCE**

**3-2-108**

**PROGRAMMING IN C**

**UNIT I**

**Introduction to C:** Introduction – Structure of C Program – Writing the first C Program – File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples – Type Conversion and Type Casting

**UNIT II**

**Decision Control and Looping Statements:** Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement

**Functions:** Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions – Type of recursion – Towers of Hanoi – Recursion vs Iteration

**UNIT III**

**Arrays:** Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – Calculating the length of the Array – Operations that can be performed on Array – one dimensional array for inter-function communication – Two dimensional Arrays –Operations on Two Dimensional Arrays - Two Dimensional Arrays for inter-function communication – Multidimensional Arrays – Sparse Matrices

**Strings:** Introduction –Suppressive Input – String Taxonomy – String Operations – Miscellaneous String and Character functions

**UNIT IV**

**Pointers:** Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Generic Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Passing Array to Function – Difference between Array Name and Pointer – Pointers and Strings – Array of pointers – Pointer and 2D Arrays – Pointer and 3D Arrays – Function Pointers – Array Of Function Pointer – Pointers to Pointers – Memory Allocation in C Programs – Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers.

**Structure, Union, and Enumerated Data Types:** Introduction – Nested Structures – Arrays of Structures – Structures and Functions – Self referential Structures – Union – Arrays of Unions Variables – Unions inside Structures – Enumerated Data Types.

## UNIT V

**Files:** Introduction to Files – Using Files in C – Reading Data from Files – Writing Data from Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly - Remove() – Renaming a File – Creating a Temporary File.

## TEXT BOOK

1. Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS.

## REFERENCE BOOKS

1. E Balagurusamy: –COMPUTING FUNDAMENTALS & C PROGRAMMINGI – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. 2. Henry Mullish & Huubert L.Cooper: The Sprit of C, Jaico Pub. House,1996.

## B.Sc(CS/IT) - I YEAR - II SEMESTER PROGRAMMING in C LAB

Please select 10 programs (compulsory) and rest are optional exercises

OR

Please Choose two from each unit for lab and rest of programs are optional exercises

### UNIT I

**/\* Write a program to demonstrate the use of printf statement to print values of variables of different data types.\*/**

```
#include <stdio.h>
main()
{
// Declare and initialize variables
int num = 7;
float amt = 123.45;
char code = 'A';
double pi = 3.1415926536;
long int population_of_india = 10000000000;
char msg[] = "Hi";
// Print the values of variables
printf("\n NUM = %d \t AMT = %f \t CODE = %c \n PI = %e \t POPULATION OF INDIA = %ld \n MESSAGE = %s",
num, amt, code, pi, population_of_india, msg);
return 0;
}
```

**/\* Write a program to perform addition, subtraction, division, integer division, multiplication, and modulo division on two integer numbers.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int num1, num2;
int add_res=0, sub_res=0, mul_res=0, idiv_res=0, modiv_res=0; float fdiv_res=0.0;
clrscr();
printf("\n Enter the first number : ");
scanf("%d", &num1);
printf("\n Enter the second number : ");
scanf("%d", &num2);
add_res= num1 + num2;
sub_res= num1 - num2;
mul_res = num1 * num2;
idiv_res = num1/num2;
modiv_res = num1%num2;
fdiv_res = (float)num1/num2;
printf("\n %d + %d = %d", num1, num2, add_res);
printf("\n %d - %d = %d", num1, num2, sub_res);
printf("\n %d * %d = %d", num1, num2, mul_res);
printf("\n %d / %d = %d (Integer Division)", num1, num2, idiv_res);
printf("\n %d %% %d = %d (Moduluo Division)", num1, num2, modiv_res);
printf("\n %d / %d = %.2f (Normal Division)", num1, num2, fdiv_res);
return 0;
}

```

**/\* Write a program to show the use of relational operators. \*/**

```

#include <stdio.h>
main()
{
int x=10, y=20;
printf("\n %d < %d = %d", x, y, x<y);
printf("\n %d == %d = %d", x, y, x==y);
printf("\n %d != %d = %d", x, y, x!=y);
printf("\n %d > %d = %d", x, y, x>y);
printf("\n %d >= %d = %d", x, y, x>=y);
printf("\n %d <= %d = %d", x, y, x<=y);
return 0;
}

```

**/\* Write a program to illustrate the use of unary prefix increment and decrement operators. \*/**

```

#include <stdio.h>
main()
{
int num = 3;
// Using unary prefix increment operator
printf("\n The value of num = %d", num);
printf("\n The value of ++num = %d", ++num);
printf("\n The new value of num = %d", num);
// Using unary prefix decrement operator

```

```

printf("\n\n The value of num = %d", num);
printf("\n The value of --num = %d", --num);
printf("\n The new value of num = %d", num);
return 0;
}

```

**/\* Write a program to find the largest of three numbers using ternary operator.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int num1, num2, num3, large;
clrscr();
printf("\n Enter the first number: ");
scanf("%d", &num1);
printf("\n Enter the second number: ");
scanf("%d", &num2);
printf("\n Enter the third number: ");
scanf("%d", &num3);
large = num1>num2?(num1>num3?num1:num3):(num2>num3?num2:num3);
printf("\n The largest number is: %d", large);
return 0;
}

```

**/\* Write a program that displays the size of every data type.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
clrscr();
printf("\n The size of short integer is: %d", sizeof(short int));
printf("\n The size of unsigned integer is: %d", sizeof(unsigned int));
printf("\n The size of signed integer is: %d", sizeof(signed int));
printf("\n The size of integer is: %d", sizeof(int));
printf("\n The size of long integer is: %d", sizeof(long int));
printf("\n The size of character is: %d", sizeof(char));
printf("\n The size of unsigned character is: %d", sizeof(unsigned char));
printf("\n The size of signed character is: %d", sizeof(signed char));
printf("\n The size of floating point number is: %d", sizeof(float));
printf("\n The size of double number is: %d", sizeof(double));
return 0;
}

```

---

## UNIT II

Chapter -3

**/\* Write a program to determine the character entered by the user.\*/**

```

#include <stdio.h>
#include <ctype.h>
#include <conio.h>

```

```

main(){
char ch;
printf("\n Press any key: ");
scanf("%c", &ch);
if(isalpha(ch)>0)
printf("\n The user has entered a character");
if(isdigit(ch)>0)
printf("\n The user has entered a digit");
if(isprint(ch)>0)
printf("\n The user has entered a printable character");
if(ispunct(ch)>0)
printf("\n The user has entered a punctuation mark");
if(isspace(ch)>0)
printf("\n The user has entered a white space character");
getch();
return 0;
}

```

**/\* Write a program to find whether a given year is a leap year or not. \*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int year;
clrscr();
printf("\n Enter any year: ");
scanf("%d",&year);
if((year%4 == 0) && ((year%100 !=0) || (year%400 == 0)))
printf("\n Leap Year");
else
printf("\n Not A Leap Year");
return 0;
}

```

**/\* A company decides to give bonus to all its employees on Diwali. A 5% bonus on salary is given to the male workers and 10% bonus on salary to the female workers. Write a program to enter the salary and sex of the employee. If the salary of the employee is less than Rs 10,000 then the employee gets an extra 2% bonus on salary. Calculate the bonus that has to be given to the employee and display the salary that the employee will get. \*/**

```

#include <stdio.h>
#include <conio.h>
main()
{
char ch;
float sal, bonus, amt_to_be_paid;
printf("\n Enter the sex of the employee (m or f): ");
scanf("%c", &ch);
printf("\n Enter the salary of the employee: ");
scanf("%f", &sal);

```

```

if(ch == 'm')
bonus = 0.05 * sal;
else
bonus = 0.10 * sal;
if (sal < 10000)
bonus += 0.20 * sal;
amt_to_be_paid = sal + bonus;
printf("\n Salary = %f", sal);
printf("\n Bonus = %f", bonus);
printf("\n *****");
printf("\n Amount to be paid: %f", amt_to_be_paid);
getch();
return 0;
}

```

**/\* Write a program to enter a number from 1–7 and display the corresponding day of the week using switch case statement.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int day;
clrscr();
printf("\n Enter any number from 1 to 7: ");
scanf("%d",&day);
switch(day)
{
case 1: printf("\n SUNDAY");
break;
case 2: printf("\n MONDAY");
break;
case 3: printf("\n TUESDAY");
break;
case 4: printf("\n WEDNESDAY");
break;
case 5: printf("\n THURSDAY");
break;
case 6: printf("\n FRIDAY");
break;
case 7: printf("\n SATURDAY");
break;
default: printf("\n Wrong Number");
}
return 0;
}

```

**/\* Write a program to calculate the sum of numbers from m to n.\*/**

```

#include <stdio.h>
#include <conio.h>

```

```

int main()
{
int n, m, sum =0;
clrscr();
printf("\n Enter the value of m: ");
scanf("%d", &m);
printf("\n Enter the value of n: ");
scanf("%d", &n);
while(m<=n)
{
sum = sum + m;
m = m + 1;
}
printf("\n SUM = %d", sum);
return 0;
}

```

**/\* Write a program using do-while loop to display the square and cube of first n natural numbers.\*/**

```

#include <stdio.h>
#include <conio.h>

int main()
{
int i, n;
clrscr();
printf("\n Enter the value of n: ");
scanf("%d", &n);
printf("\n -----");
i=1;
do
{
printf("\n | \t %d \t | \t %d \t | \t %d \t |", i, (i*i), (i*i*i));
i++;
} while(i<n);
printf("\n -----");
return 0;
}

```

**/\* Write a program to print the multiplication table of n, where n is entered by the user.\*/**

```

#include <stdio.h>
int main()
{
int n, i;
printf("\n Enter any number: ");
scanf("%d", &n);
printf("\n Multiplication table of %d", n);
printf("\n *****");
for(i=0;i<=20;i++)
printf("\n %d X %d = %d", n, i, (n * i));
}

```

```
return 0;
}
```

**/\* Write a program using for loop to calculate factorial of a number.\*/**

```
#include <stdio.h>
#include <conio.h>
int main()
{
int fact = 1, num;
clrscr();
printf("\n Enter the number: ");
scanf("%d",&num);
if(num == 0)
fact = 1;
else
{
for(int i=1; i<=num;i++)
fact = fact * i;
}
printf("\n Factorial of %d is: %d ", num, fact);
return 0;
}
```

**/\* Write a program to print the following pattern.**

```
1
121
12321
1234321
123454321
*/
```

```
#include <stdio.h>
#define N 5
main()
{
int i, j, k, l;
for(i=1;i<=N;i++)
{
for(k=N;k>=i;k--)
printf(" ");
for(j=1;j<=i;j++)
printf("%d", j);
for(l=j-2;l>0;l--)
printf("%d", l);
printf("\n");
}
return 0;
}
```

**/\* Write a program to sum the series.. (Please refer to the book for the series)\*/**

```

#include <stdio.h>
#include <conio.h>
#include <math.h>
main()
{
int n, NUM;
float i,sum=0.0;
clrscr();
printf("\n Enter the value of n: ");
scanf("%d", &n);
for(i=1.0;i<=n;i++)
{
NUM = pow(i,i);
sum += (float)NUM/i;
}
printf("\n 1/1 + 4/2 + 27/3 + .... = %f", sum);
return 0;
}

```

---

## UNIT II

Chapter-4

**/\*Write a program to calculate area of a circle using function.\*/**

```

#include <stdio.h>
float cal_area(float r);
int main()
{
float area, radius;
printf("\n Enter the radius of the circle: ");
scanf("%f", &radius);
area = cal_area(radius);
printf("\n Area of the circle with radius %f = %f", radius, area);
return 0;
}
float cal_area(float radius)
{
return (3.14 * radius * radius);
}

```

**/\* Write a program to print the Fibonacci series using recursion.\*/**

```

#include <stdio.h>
int Fibonacci(int);
main()
{
int n;
printf("\n Enter the number of terms in the series: ");
scanf("%d", &n);
for(int i=0;i<n;i++)
printf("\n Fibonacci (%d) = %d", i, Fibonacci(i));
return 0;
}

```

```

int Fibonacci(int num)
{
if(num <= 2)
return 1;
return (Fibonacci (num - 1) + Fibonacci(num - 2));
}

```

---

### UNIT III

**/\* Write a program to read and display n numbers using an array. \*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int i=0, n, arr[20];
clrscr();
printf("\n Enter the number of elements:");
scanf("%d", &n);
for(i=0;i<n;i++)
{
printf("\n Arr[%d] = ", i);
scanf("%d", &arr[i]);
}
printf("\n The array elements are ");
for(i=0;i<n;i++)
printf("Arr[%d] = %d\t", i, arr[i]);
return 0;
}

```

**/\* In a class there are 10 students. Each student is supposed to appear in 3 tests. Write a program using two-dimensional arrays to print**

**(i) the marks obtained by each student in different subjects**

**(ii) total marks and average obtained by each student**

**(iii) store the average of each student in a separate 1D array so that it can be used to calculate the class average.\*/**

```

#include <stdio.h>
#include <conio.h>
main()
{
int marks[10][3], i, j;
int total_marks[10]={0};;
float class_avg=0.0, total_avg = 0.0;
float avg[10];
//INPUT DATA
printf("\n ENTER THE DATA");
printf("\n *****");
for(i=0;i<10;i++)
{
printf("\n Enter the marks of student %d in 3 subjects : ", i);
for(j=0;j<3;j++)
scanf("%d", &marks[i][j]);
}
}

```

```

}
// CALCULATE TOTAL MARKS OF EACH STUDENT
for(i=0;i<10;i++)
{
for(j=0;j<3;j++)
total_marks[i] += marks[i][j];
}
// CALCULATE AVERAGE OF EACH STUDENT
for(i=0;i<10;i++)
{
for(j=0;j<3;j++)
avg[i] = (float)total_marks[i]/3.0;
}
// CALCULATE CLASS AVERAGE
for(i=0;i<10;i++)
total_avg += avg[i];
class_avg = (float)total_avg/10;
// DISPLAY RESULTS
printf("\n\n STUD NO. MARKS OBTAINED IN THREE SUBJECTS TOTAL MARKS \t AVERAGE");
printf("\n*****");
for(i=0;i<10;i++)
{
printf("\n %4d", i);
for(j=0;j<3;j++)
printf(" %d", marks[i][j]);
printf("%4d \t%2.2f", total_marks[i], avg[i]);
}
printf("\n\n CLASS AVERAGE = %f", class_avg);
getch();
return 0;
}

```

**/\* Write a program to input two  $m \times n$  matrices and then calculate the sum of their corresponding elements and store it in a third  $m \times n$  matrix.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
int i, j;
int rows1, cols1, rows2, cols2, rows_sum, cols_sum;
int mat1[5][5], mat2[5][5], sum[5][5];
clrscr();
printf("\n Enter the numbers of rows in the first matrix: ");
scanf("%d",&rows1);
printf("\n Enter the numbers of columns in the first matrix: ");
scanf("%d",&cols1);
printf("\n Enter the numbers of rows in the second matrix: ");
scanf("%d",&rows2);
printf("\n Enter the numbers of columns in the second matrix:");
scanf("%d",&cols2);

```

```

if(rows1 != rows2 || cols1 != cols2)
{
printf("\n The number of rows and columns of both the matrices must be equal");
getch();
}
rows_sum = rows1;
cols_sum = cols1;
printf("\n Enter the elements of the first matrix");
printf("\n *****");
for(i=0;i<rows1;i++)
{
for(j=0;j<cols1;j++)
scanf("%d",&mat1[i][j]);
}
printf("\n Enter the elements of the second matrix");
printf("\n *****");
for(i=0;i<rows2;i++)
{
for(j=0;j<cols2;j++)
scanf("%d",&mat2[i][j]);
}
for(i=0;i<rows_sum;i++)
{
for(j=0;j<cols_sum;j++)
sum[i][j] = mat1[i][j] + mat2[i][j];
}
printf("\n The elements of the resultant matrix are");
printf("\n *****");
for(i=0;i<rows_sum;i++)
{
printf("\n");
for(j=0;j<cols_sum;j++)
printf("\t %d", sum[i][j]);
}
return 0;
}

```

---

### UNIT III

#### Chapter 6

**/\* Write a program to reverse the given string.\*/**

```

#include <stdio.h>
#include <conio.h>
#include <string.h>
int main()
{
char str[100], reverse_str[100], temp;
int i = 0, j = 0;
clrscr();
printf("\n Enter the string: ");
gets(str);

```

```

j=strlen(str)-1;
while(i<j)
{
temp = str[j];
str[j] = str[i];
str[i] = temp;
i++;
j--;
}
printf("\n The reversed string is: ");
puts(str);
getch();
return 0;
}

```

**/\* Write a program to read a sentence. Then count the number of words in the sentence.\*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
char str[1000];
int i=0, count=1;
clrscr();
printf("\n Enter the sentence: ");
gets(str);
while(str[i] != '\0')
{
if(str[i] == ' ' && str[i+1] != ' ')
count++;
i++;
}
printf("\n The total count of words is: %d", count);
return 0;
}

```

**/\* Write a function to swap the value of two variables.\*/**

```

#include <stdio.h>
void swap_call_by_val(int, int);
void swap_call_by_ref(int *, int *);
int main()
{
int a=1, b=2, c=3, d=4;
printf("\n In main(), a = %d and b = %d", a, b);
swap_call_by_val(a, b);
printf("\n In main(), a = %d and b = %d", a, b);
printf("\n\n In main(), c = %d and d = %d", c, d);
swap_call_by_ref(&c, &d);
// address of the variables is passed
printf("\n In main(), c = %d and d = %d", c, d);
}

```

```

return 0;
}
void swap_call_by_val(int a, int b)
{
int temp;
temp = a;
a = b;
b = temp;
printf("\n In function (Call By Value Method) a = %d and b = %d", a, b);
}
void swap_call_by_ref(int *c, int *d)
{
int temp;
temp = *c;
// *operator used to refer to the value
*c = *d;
*d = temp;
printf("\n In function (Call By Reference Method) c = %d and d = %d", *c, *d);
}

```

=====

#### UNIT IV

***/\* Write a program to read and display the information of all the students in the class.\*/***

```

#include <stdio.h>
#include <conio.h>
int main()
{
struct student
{
int roll_no;
char name[80];
int fees;
char DOB[80];
};
struct student stud[50];
int n, i;
clrscr();
printf("\n Enter the number of students: ");
scanf("%d", &n);
for(i = 0; i < n; i++)
{
printf("\n Enter the roll number: ");
scanf("%d", &stud[i].roll_no);
fflush(stdin);
printf("\n Enter the name: ");
gets(stud[i].name);
fflush(stdin);
printf("\n Enter the fees: ");
scanf("%d", &stud[i].fees);
fflush(stdin);
}
}

```

```

printf("\n Enter the DOB: ");
gets(stud[i].DOB);
fflush(stdin);
}
for(i = 0;i < n;i++)
{
printf("\n *****DETAILS OF STUDENT %d *****", i+1);
printf("\n ROLL No. = %d", stud[i].roll_no);
printf("\n NAME = %s", stud[i].name);
printf("\n FEES = %d", stud[i].fees);
printf("\n DOB = %s", stud[i].DOB);
}
getch();
return 0;
}

```

---

### UNIT V

**/\* Write a program to read the details of a student and then print it on the screen as well as write it into a file. \*/**

```

#include <stdio.h>
#include <conio.h>
int main()
{
FILE *fp;
typedef struct student
{
int roll_no;
char name[80];
float fees;
char DOB[80];
}
STUDENT;
STUDENT stud1;
clrscr();
fp = fopen("student_details.dat", "w");
if(fp == NULL)
{
printf("\n File Opening Error");
return 0;
}
printf("\n Enter the roll number: ");
scanf("%d", &stud1.roll_no);
printf("\n Enter the name: ");
scanf("%s", &stud1.name);
printf("\n Enter the fees: ");
scanf("%f", &stud1.fees);
printf("\n Enter the DOB: ");
scanf("%s", &stud1.DOB);

```

```

// PRINT ON SCREEN
printf("\n *** STUDENT'S DETAILS ***");
printf("\n ROLL No. = %d", stud1.roll_no);
printf("\n NAME = %s", stud1.name);
printf("\n FEES = %f", stud1.fees);
printf("\n DOB = %s", stud1.DOB);
// WRITE TO FILE
fprintf(fp, "%d %s %f %s", stud1.roll_no, stud1.name, stud1.fees, stud1.DOB);
fclose(fp);
getch();
return 0;
}

```

---

## UNIT V

***/\*Write a program to read a file character by character, and display it simultaneously on the screen.\*/***

```

#include <stdio.h>
#include <string.h>
main()
{
FILE *fp;
int ch;
char filename[20];
printf("\n Enter the filename: ");
fp = fopen(filename, "r");
if(fp==NULL)
{
printf("\n Error Opening the File");
exit(1);
}
ch= fgetc(fp);
while(ch!=EOF)
{
putchar(ch);
ch = fgetc(fp);
}
fclose(fp);
}

```

Code No:

**SRI VENKATESWARA UNIVERSITY: TIRUPATI**  
**BSc(CS/IT) /BCA BSc(CA) (CBCS)**  
**II Semester Examinations - Model Question Paper**  
**PROGRAMMING IN C**

**Time: 3 Hours**

**Max. Marks: 75**

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer any five of the following questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks

**PART - A**

**5 × 5 marks = 25**

1. Define Type Conversion and Type Casting?
2. What are the basic data types used in C?
3. Describe the Function Declaration with example?
4. Differentiate Break and Continue statements?
5. How to Declare an Array? Give an example.
6. Briefly describe few String Functions?
7. What are the drawbacks of Pointers?
8. Define Command Line arguments?

**PART - B**

**5 × 10 marks = 50**

9. i) Discuss about the Structure of C Program with neat diagram?  
ii) What are the rules followed in declaring a C Variable? Give an example.

**OR**

10. Write a Sample program in C which explains the usage of I/O Statements in C?

11. i) List and explain all Storage Classes available in C?  
ii) Explain the Usage of Functions in C?

**OR**

12. Distinguish the Decision Control and Looping Statements with an example Program?

13. i) Write a Program to find the Maximum of an array?  
ii) Describe and Differentiate String and Character functions?

**OR**

14. Write a Program for performing Matrix multiplication using two-dimensional arrays?

15. i) How to declare a Pointer Variable? Explain its usage with sample program?  
ii) Explain the Merits and Demerits of Enumerated Data Types?

**OR**

16. What are the key roles played by Structures and Unions in C programming? Justify.

17. i) How to Read and Write data into Files? Explain it with sample program?  
ii) Explain the role of Command Line Arguments in C?

**OR**

18. i) Explain the Error Handling mechanisms during File Operations in C?  
ii) Write a sample Program which creates a Temporary File?