

PROGRAMMING IN C

Course Title:	Programming in C	Course Code	CS-105
Year/Semester	I-Year	Course Group	CORE
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture + Tutorials	Total Contact Periods	150
CIE	60 Marks	SEE	40 Marks

Prerequisites

Knowledge of basic mathematics and IT skills.

Course Outcome

Upon completion of the course the students shall be able to:

Course Outcome	
CO1	Develop Algorithms and draw flow charts for given problems
CO2	Use data types and classify operators
CO3	Develop programs using Decision making and looping statements
CO4	Create arrays and know usage of strings
CO5	Analyze and implement Modular Programming using Functions
CO6	Develop programs using Structures, Unions, and Files.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Programming Methodology and Introduction to C Language	20	Q4	Q1	Q9(a)	Q13(a)

II	Understand Constants, Variables and Data types in C and Understand Operators and Expressions in C	20				
III	Decision making and Looping statements	28		Q2	Q10(a)	Q14(a)
IV	Arrays and Strings	28				
V	User Defined functions	26		Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Structures, Unions and File Management	28	Q3	Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	150		8	8	8

COURSE CONTENTS:

1. Programming Methodology and Introduction to C Language

Duration:20 Periods

Steps involved in problem solving - Define algorithm , Program - Characteristics of algorithm - Differentiate between program and algorithm- Steps involved in algorithm development - Differentiate algorithm and flowchart - Algorithms for simple problems -Symbols used in flowcharts -Flowcharts for simple problems - Define High level language and low level language- history of C language - importance of C language – Define & Differentiate Compiler, Assembler - structure of C language - programming style of C language - steps involved in executing the C program

2. Understand Constants, Variables and Data Types in C and Understand Operators and Expressions in C

Duration: 20 Periods

Character set - C Tokens - Keywords and Identifiers- Constants and Variables - data types and classification - declaration of a variable - Assigning values to variables

Define an operator - Define an expression -Classify operators - List and explain various arithmetic operators with examples -Illustrate the concept of relational operators - List logical operators - various assignment operators - Nested assignment - Increment and decrement operators - Conditional operator - List bitwise operators -List various special operators- Arithmetic expressions- precedence and associativity of operators- Evaluation of expressions - Various type conversion techniques and discuss them -Reading and writing characters - formatted input and output - Evaluate a logical expression

3. Decision making and Looping statements and Pre-processor directives

Duration: 28 Periods

Decision making in programming -simple if statement with sample program-Classification of various loop statements- while statement – do-while statement - for loop statement - nesting of loops- Comparisons of different loop statements - break and continue statements - Infinite loop and steps to avoid it - go to statement Need of Preprocessor directives - Various Preprocessor directives

4. Arrays and Strings

Duration: 28 Periods

Arrays -declaration and initialization of One Dimensional -Array -Accessing the elements in the Array - ‘accessing array out of bounds’ problem - Reordering an array in ascending order – average of elements in an array – largest element in an array - Declaration and initialization of two Dimensional Arrays - sample programs on matrix addition and matrix multiplication, transpose- Strings - Declaration and initialization of String variables - Reading of strings from terminal - writing strings to screen - String handling functions with sample programs - Arithmetic operations on Characters

5. User defined functions

Duration: 26 Periods

Function -Need for user defined functions - Advantages of functions - elements of function - Return values and their types - function call - function prototype – Scope, visibility and lifetime of variables in functions- Local and External variables -Global variable-Functions with no arguments and no return values - functions with arguments with no return values - functions with arguments with return values - functions with no arguments with return values - Recursion - sample programs on recursion - passing arrays to functions - passing the global variables as parameters

6. Structures and Unions and File Management

Duration: 28 Periods

Structures and Unions Structure- Creating a structure - Declaring structure variables - Accessing the structure members - Array of structures - Concept of structure assignment - Find size of a structure - Nested structure concept - Structure as function arguments and structures as function values - Structures containing arrays, arrays of structures containing arrays - Self referential structures with examples - Union and illustrate usage of a union – difference between Structures and Union.

Files management File - Declare file pointer to a file - file opening in various modes - Concept of closing of a file - Input / Output operations on a file - Random access to files.

TEXT BOOKS

1. Let Us C -- Yeshwanth Kanetkar BPB Publications
2. Programming in ANSI C -- E. Balaguruswamy Tata McGrawHill
3. Programming with C -- Gottfried Schaum' outline
4. C The complete Reference -- Schildt Tata McGraw Hill

Reference Books

1. The C Programming Language- Brian W. Kernighan, Dennis M. Ritchie - Publication Prentice Hall
2. Programming in C 3rd Edition-Sams Publishing- Steven G. Kochan- Sams Publishing
3. Expert C Programming: Deep Secrets-Peter Van Der Linden- Pearson Publications
4. C Programming: A Modern Approach. K.N. King- Norton Publications
5. Learn to Program with C- Noel Kalicharan- APress Publications

Suggested e-Learning Links

1. https://www.w3schools.com/c/c_intro.php?external_link=true
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <https://www.programiz.com/c-programming>
4. <https://www.javatpoint.com/c-programming-language-tutorial>
5. <https://www.freecodecamp.org/news/the-c-programming-handbook-for-beginners/>
6. <https://www.tutorialspoint.com/cprogramming/index.htm>
7. <https://www.codecademy.com/catalog/language/c>
8. <https://www.codechef.com/learn/course/c>
9. <https://archive.nptel.ac.in/courses/106/104/106104128/>
10. <https://www.youtube.com/watch?v=3QiItmIWmOM>
11. <https://www.digimat.in/nptel/courses/video/106105171/L01.html>
12. <https://www.digimat.in/nptel/courses/video/106105171/L07.html>

Suggested Learning Outcomes

For achieving the Course outcomes, the following learning outcomes must be achieved

CO1: Develop Algorithms and Draw Flowchart for given problems.

- 1.1 State different steps involved in problem solving
- 1.2 Define algorithm and know its characteristics
- 1.3 State the steps involved in algorithm development
- 1.4 Develop algorithms for simple problems.
- 1.5 Define flowchart and know symbols used in drawing flowcharts
- 1.6 Draw flowchart for simple problems.
- 1.7 Differentiate algorithm and flowchart
- 1.8 Define program and differentiate between program and algorithm
- 1.9 Define High level language and low level language
- 1.10 Define Compiler, Assembler, Linker and Loader
- 1.11 Define source code, assembly code, object code, machine code.
- 1.12 State the importance of C language
- 1.13 Explain the structure of C program
- 1.14 List and Explain different stages in converting the C program source code to executable code.
- 1.15 Explain the steps involved in executing the C program.

CO2: Use Data types and classify Operators.

- 2.1 Describe Character set, C Tokens-Keywords, Variables, Identifiers, Constants and Variables.
- 2.2 Define Data type.
- 2.3 Classify Primary data types and explain with examples
- 2.3 Write the syntax to declare and assigning values to variables.
- 2.4 Define operator.
- 2.5 Classify and explain operators with examples.
- 2.6 Describe operator precedence and associativity of operators.
- 2.7 Define expression.
- 2.8 Describe evaluation of Arithmetic, Relational and logical expressions.
- 2.9 Illustrate type conversion (implicit and explicit) techniques.
- 2.10 Define Pre-Processor Directive.
- 2.11 List different types of Pre-Processor directives.
- 2.12 Illustrate conditional and Unconditional preprocessor directives.
- 2.13 Discuss #include and #define Pre-processor directives.
- 2.14 Develop a C program to demonstrate #include and #define directives.

- 2.15 Define Header file and discuss `stdio.h`, `conio.h`, `math.h`, `string.h` Header files.
- 2.16 Illustrate `getchar()`, `putchar()`, `scanf()`, `printf()` functions with syntax and programs.

CO3: Develop Programs Using Decision Making Branching and looping statements.

- 3.1. Discuss decision making in programming.
- 3.2. Illustrate if statement with syntax and example program.
- 3.3. Illustrate if-else statement with syntax and example program.
- 3.4. Illustrate nested if-else statement with syntax and example program.
- 3.5. Illustrate else-if ladder statement with syntax and example program.
- 3.6. Illustrate switch statement with syntax and program.
- 3.7. Define looping.
- 3.8. List various loop statements.
- 3.9. Illustrate While loop with syntax and example program.
- 3.10. Illustrate do-While loop with syntax and example program.
- 3.11. Illustrate for loop with syntax and example program.
- 3.12. Discuss break and continue statements.
- 3.13. Compare and Contrast break and continue statements.
- 3.14. Define Nested loops.
- 3.15. Develop programs using Nested loops.
- 3.16. Compare different loop statements.

CO4: Create Arrays, know the usage of strings.

- 4.1 Define an Array.
- 4.2 List different types of Arrays.
- 4.3 Declare and initialize One Dimensional Array with example program.
- 4.4 Develop a program to read, access and display the elements of a one dimensional array
- 4.5 Develop a program to sort the elements in ascending or descending order using one-dimensional Array.
- 4.6 Develop a c program to count the even and odd numbers for a given array of n elements.
- 4.7 Declare and initialize two Dimensional Arrays with example program.
- 4.8 Illustrate the concept of two dimensional arrays with the following programs
 - a. Matrix addition, subtraction
 - b. Matrix multiplication
 - c. Transpose of a matrix and check whether the given matrix is symmetric or not.
- 4.9 Define String
- 4.10 Declare and initialize a String variable.
- 4.11 Outline the different ways of reading and writing strings using `scanf()`, `getchar()`, `gets()`, `printf()`, `putchar()`, `puts()` functions.
- 4.12 Create a program to concatenate, copy, and finding out the length of a string without using string handling functions.
- 4.13 Discuss various String handling functions `strlen()`, `strcpy()`, `strcat()`, `strcmp()`, `strchr()`, `strstr()`, `strtok()`, `strupr()`, `strlwr()` with their syntax.

- 4.14 Develop C programs using different string handling functions strlen(), strcpy(), strcat(), strcmp(), strchr(), strstr(), strtok(),strupr(), strlwr()

CO5: User defined functions and Applications

- 5.1 Define function,
- 5.2 Discuss the need of functions.
- 5.3 List out the advantages of functions.
- 5.4 Identify the elements of function.
- 5.5 Define and discuss function prototype, function call, and function definition with syntax and program.
- 5.6 Discuss the scope, visibility and lifetime of variables in functions.
- 5.7 Classify different storage classes.
- 5.8 Illustrate functions with no arguments and no return values with syntax and example programs.
- 5.9 Illustrate functions with no arguments and with return values with syntax and example programs.
- 5.10 Illustrate functions with arguments and with no return values with syntax and example programs.
- 5.11 Illustrate functions with arguments and with return values with syntax and example programs.
- 5.12 Illustrate passing arrays to functions as arguments with example programs.
- 5.13 Define recursion.
- 5.14 Develop the following programs using recursion
 - a. Factorial of a number.
 - b. compute x^n (hint : x raised to the power n).
 - c. Fibonacci series.

CO6: Develop programs Using structures, Unions and Files

- 6.1 Define structure
- 6.2 State the uses of structures.
- 6.3 Know declaration and initialization of a structure template and structure variables.
- 6.4 Explain accessing structure members using (.) dot operator.
- 6.5 Illustrate how to get the size of a structure.
- 6.6 Illustrate the nested structure concept.
- 6.7 Know the differences between Structures and Arrays.
- 6.8 Illustrate array of structures, structures containing arrays, array of structures containing arrays.
- 6.9 Illustrate structure as function arguments and returning of structure variables as function values.

- 6.10 Define Union and State the usage of unions.
- 6.11 Know the declaration and initialization of a union.
- 6.12 Explain accessing of union members using (.) dot operator.
- 6.13 Know the differences between Structure and Unions.
- 6.14 Define file and differentiate text files and binary files.
- 6.15 Know how to declare file pointer to a file
- 6.16 Illustrate the concept of file opening in various modes
- 6.17 Illustrate the concept of closing of a file
- 6.18 Illustrate the concept of Input / Output operations on a file
- 6.19 Define random access in files.
- 6.20 Illustrate the concept of positioning file pointer in a Random Access file.
- 6.21 Develop a program to manage student's records using Random Access in files.
- 6.22 Develop a program to manage Inventory records using Random Access in files.

Suggested Student Activities

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 5-10 students.

- Each group should do any one of the following type of activity or any other similar activity related to the course with prior approval from the course coordinator and programme coordinator concerned.

- Each group should conduct different activity and no repetition should occur.

- Explore and analyse topics to improve the level of creativity and analytical skill by taking Quiz/ tests/ assignments. Documents have to be maintained as a record.

- Create a power point presentation on the topic relevant to course or advanced topic as an extension to the course to improve the communication skills. Documents have to be maintained as a record.

- Visit different sites relevant to topics. Listen to the lectures and submit a handwritten report

- Coding competitions

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	

CO1	3	2	1			1	2	1,2,3,6,7
CO2	3	2				1	2	1,2,6,7
CO3	3	2	2	1		2	2	1,2,3,4,6,7
CO4	3	2	2	1		2	2	1,2,3,4,6,7
CO5	3	2	2	1		2	2	1,2,3,4,6,7
CO6	3	2	1			3	2	1,2,3,6,7

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

S.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page, 1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

S.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R		U		A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8		8		8

State Board of Technical Education and Training, Telangana
Model Question paper
CS-105, PROGRAMMING IN C (I-YEAR)
Mid Semester-I Examination

Course Code: CS-105

Duration: 1 hour

Course Name: Programming in C

Max. Marks: 20 Marks

PART-A

Answer **all** questions- Each Question carries **ONE** mark
Marks

4 x 1 = 4

1. List any two differences between algorithm and flow chart?
2. Define Low level language?
3. List various types of constants?
4. Define an expression?

PART-B

Answer **two** questions - Each Question carries **THREE** marks

2 x 3 = 6

- 5.a) List out any 6 symbols used in Flowchart.

(OR)

- 5 b) Write any three differences between high level language and low level language

- 6.a) Write the syntax to declare variable in C? Give examples.

(OR)

- 6 b) Evaluate an expression $(2+5)*(10-4)\%10$.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks

2 x 5 = 10

- 7 a) Draw a flowchart to find factorial of given number N.

(OR)

- 7 b) Explain the stages to execute a C-Program

- 8 a) Explain different data types in C with examples.

(OR)

- 8 b) Elaborate any three categories of operators in C.

State Board of Technical Education and Training, Telangana
Model Question paper
CS-105, PROGRAMMING IN C (I-YEAR)
Mid Semester-II Examination

Course Code: CS-105

Duration: 1 hour

Course Name: PROGRAMMING IN C

Max. Marks: 20 Marks

PART-A

Answer **all** questions- Each Question carries **ONE** mark

4 x 1 = 4

1. Write the syntax of if statement.
2. Give the syntax of while statement in C.
3. Define an array.
4. Give the syntax for declaring and initializing of one dimensional array.

PART-B

Answer **two** questions- Each Question carries **THREE** marks

2 x 3 = 6

5 a) Explain switch statement with syntax.

(OR)

b) Write any three differences between while and do-while statements.

6 a) Write a C program to find largest number in array.

(OR)

b) Explain any three String handling functions.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks

2 x 5 = 10

7 a) Explain do-while statement with syntax and sample program?

(OR)

7 b) Write a C program whether a given number is Armstrong or not using while loop?

8 a) Write a C program to multiply two matrices?

(OR)

b) Write a C program to check whether given string is palindrome or not?

State Board of Technical Education and Training, Telangana
Model Question paper
CS-105, PROGRAMMING IN C (I-YEAR)
End Examination

Course Code: CS-105
Course Name: Programming in C

Duration: 2 hour
Max. Marks: 40 Marks

PART-A

Answer **all** questions- Each Question carries **ONE** mark

8 x 1 = 8

1. List any two differences between algorithm and program.
2. Give the syntax of simple if statement in C.
3. List any two advantages of functions.
4. Give the syntax for declaring and initializing of one dimensional array.
5. Define function.
6. Define recursion.
7. Write any two uses of structures
8. Define Random Access Files?

PART-B

Answer **Four** questions- Each Question carries **THREE** marks

4 x 3 = 12

9. a) Write any three characteristics of algorithm.
(OR)
b) Write any three advantages of functions.
10. a) Write any three differences between break and continue statements.
(OR)
b) Write any three differences between structure and union statements.
11. a) Explain elements of function in C.
(OR)
b) Write any three differences between local variable and global variable statements.
12. a) Explain how to access structure members.
(or)
b. Discuss various File Opening Modes?

PART-C

Answer **Four** questions- Each Question carries **FIVE** marks

4 x 5 = 20

13. a) Explain the structure of a C-Program.
(OR)

- b) Write a C program to compute the transpose of given matrix.
14. a) Write a C program to sort the elements of a one-dimensional array.
(OR)
- b) Write a C program to access the elements of a union.
15. a) Write a C program to illustrate functions with arguments and without return values.
(OR)
- b) Write a C program to find the factorial of a number using recursion.
16. a) Write a C program to implement nested structures.
(OR)
- b) Write a C program to implement Random access in files.