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Name _____

Roll No. _____ Year 20____ 20____

Exam Seat No. _____

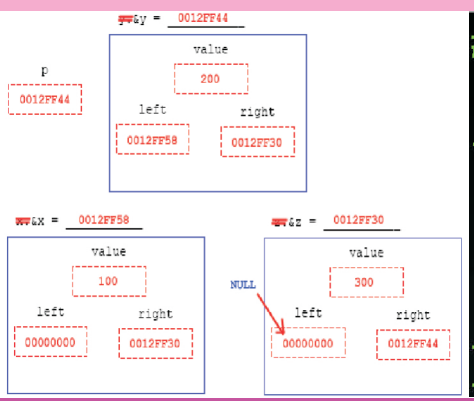
COMPUTER GROUP | SEMESTER - II | DIPLOMA IN ENGINEERING AND TECHNOLOGY

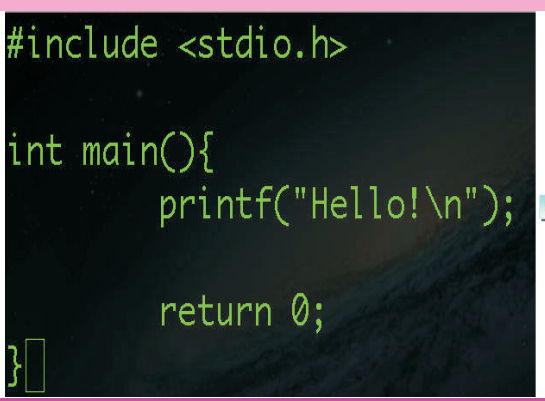
A LABORATORY MANUAL

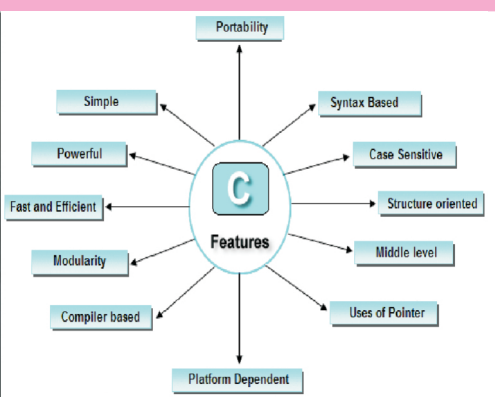
FOR

PROGRMMING IN "C"

(22226)







MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

(Autonomous) (ISO 9001 : 2015) (ISO / IEC 27001 : 2013)

VISION

To ensure that the Diploma level Technical Education constantly matches the latest requirements of technology and industry and includes the all-round personal development of students including social concerns and to become globally competitive, technology led organization.

MISSION

To provide high quality technical and managerial manpower, information and consultancy services to the industry and community to enable the industry and community to face the changing technological and environmental challenges.

QUALITY POLICY

We, at MSBTE are committed to offer the best in class academic services to the students and institutes to enhance the delight of industry and society. This will be achieved through continual improvement in management practices adopted in the process of curriculum design, development, implementation, evaluation and monitoring system along with adequate faculty development programmes.

CORE VALUES

MSBTE believes in the followings:

- Education industry produces live products.
- Market requirements do not wait for curriculum changes.
- Question paper is the reflector of academic standards of educational organization.
- Well designed curriculum needs effective implementation too.
- Competency based curriculum is the backbone of need based program.
- Technical skills do need support of life skills.
- Best teachers are the national assets.
- Effective teaching learning process is impossible without learning resources.

A Laboratory Manual for

Programming in 'C'

(22226)

Semester-II

(CO/CM/CW/IF)

Maharashtra State
Board of Technical Education, Mumbai
(Autonomous) (ISO 9001:2015) (ISO/IEC 27001:2013)

Maharashtra State Board of Technical Education,
(Autonomous) (ISO 9001 : 2015) (ISO/IEC 27001 : 2013)
4th Floor, Government Polytechnic Building, 49, Kherwadi,
Bandra (East), Mumbai - 400051.
(Printed on December, 2017)

MAHARASHTRA STATE

BOARD OF TECHNICAL EDUCATION

Certificate

This is to certify that Mr. / Ms. …… Roll No. ……., of First Semester of Diploma in…….. …… of Institute,…….……. …… (Code: ……...) has completed the term work satisfactorily in Subject **Programming in 'C' (22226)** for the academic year 20…….. to 20…….. as prescribed in the curriculum.

Place: …… Enrollment No:……

Date: …… Exam. Seat No: ……

Subject Teacher **Head of the Department** **Principal**

Seal of Institution

Preface

The primary focus of any engineering laboratory/field work in the technical education system is to develop the much needed industry relevant competencies and skills. With this in view, MSBTE embarked on this innovative 'I' Scheme curricula for engineering diploma programmes with outcome-base education as the focus and accordingly, relatively large amount of time is allotted for the practical work. Thisdisplays the great importance of laboratory work making each teacher; instructor and student to realize that every minute of the laboratory time need to be effectively utilized to develop these outcomes, rather than doing other mundane activities.Therefore, for the successful implementation of this outcome-based curriculum, every practical has been designed to serve as a ***'vehicle'*** to develop this industry identified competency in every student. The practical skills are difficult to develop through 'chalk and duster' activity in the classroom situation. Accordingly, the 'I' scheme laboratory manual development team designed practicals to ***focus*** on the***outcomes***, rather than the traditional age old practice of conducting practicals to 'verify the theory' (which may become a byproduct along the way).

This laboratory manual is designed to help all stakeholders, especially the students, teachers and instructors to develop in the student the pre-determined outcomes. It is expected from each student that at least a day in advance, they have to thoroughly read through the concerned practical procedure that they will do the next day and understand the minimum theoretical background associated with the practical. Every practical in this manual begins by identifying the competency, industry relevant skills, course outcomes and practical outcomes which serve as a key focal point for doing thepractical.The students will then become aware about the skills they will achieve through procedure shown there and necessary precautions to be taken,which will help them to apply in solving real-world problems in their professional life.

This manual also provides guidelines to teachers and instructors to effectively facilitate student-centered lab activities through each practical exercise by arranging and managing necessary resources in order that the students follow the procedures and precautions systematically ensuring the achievement of outcomes in the students.

Diploma engineers (also called technologists) have to write programs to cater with various IT solutions. In order to develop a program to solve a given problem, they have to build logic, develop algorithms and flow charts. This course is designed keeping in view developing these skills. Besides its use to write codes for low level programming such as developing operating systems, drivers, and compilers; 'C' has been widely used as a general-purpose language to develop basic applications. This course deals with fundamental syntactic information about 'C' that will help the students to apply the basic concepts, program structure and principles of 'C' programming paradigm to build given application. The course is basically designed to create a base to develop foundation skills of programming language.

Although best possible care has been taken to check for errors (if any) in this laboratory manual, perfection may elude us as this is the first edition of this manual. Any errors and suggestions for improvement are solicited and highly welcome.

Programme Outcomes (POs) to be achieved through Practicals of this Course

Following programme outcomes are expected to be achieved along withprogramme specific outcomes through the practicals of the course:

PO 1. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.

PO 2. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

PO 3. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve discipline related problems.

PO 4. Engineering tools: Apply appropriate Computer Technology related techniques/ tools with an understanding of the limitations.

PO 7. Ethics: Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.

PO 8. Individual and team work: Function effectively as a leader and team member in diverse/ multidisciplinary teams.

PO 9. Communication: Communicate effectively in oral and written form.

PO 10. Life-long learning: Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

PSO 1.Modern Information Technology: Use latest technologies for operation and application of information.

PSO 2.Information Technology Process: Maintain the information processes using modern information and communication technologies.

Practical- Course Outcome matrix

Course Outcomes (COs)

a. Develop flowchart and algorithm to solve problems logically.
b. Write simple 'C' programs using arithmetic expressions.
c. Develop 'C' programs using control structure.
d. Develop 'C' programs using arrays and structures.
e. Develop/Use functions in C programs for modular programming approach.
f. Develop 'C' programs using pointers.

S. No.	Title of the Practical	CO a.	CO b.	CO c.	CO d.	CO e.	CO f.
1.	**Write/compile/execute simple 'C' program:** Develop minimum 2 programs using Constants, Variables, arithmetic expression.	√	√	-	-	-	-
2.	**Write/compile/execute simple 'C' program:** Develop minimum 2 programs increment/ decrement operators, exhibiting data type conversion degrees.	√	√	-	-	-	-
3.	Write simple programs to convert temperature in Fahrenheit degrees to Centigrade	√	√	-	-	-	-
4.	Write simple programs to calculate the area and perimeter of the rectangle, and the area & circumference of the circle.	√	√	-	-	-	-
5.	**Decision Making and branching using if, if-else structure** Write program to: (i) Determine whether a given year is a leap year or not. (ii) Determine whether a string is palindrome.	√	-	√	-	-	-
6.	Write program to: (i) Find the greatest of the three numbers using conditional operators (ii) Find if a given character is vowel.	√	-	√	-	-	-
7.	**Using switch statement:** Write programs to: (i) Print day of week by taking number from 1 to 7. (ii) Print a student's grade by accepting percent marks.	√	-	√	-	-	-
8.	**Using switch statement:**Write programs to check whether the triangle is isosceles, equilateral, scalene or right angled triangle.	√	√	-	-	-	-
9.	**Looping:** Write a program to : (i) Find sum of digits of a given number. (ii) Generate multiplication table up to 10 for numbers 1 to 5.	√	-	√	-	-	-

10.	**Write a program to:** (iii) Find Fibonacci series for given number. (iv) Write a program to produce the following output: 1 2 3 4 5 6 7 8 9 10	√	-	√	-	-	-
11.	**Array:** Develop a Program to: (i) Sort list of 10 numbers. (ii) Perform addition of 3x3 matrix.	√	-	-	√	-	-
12.	**Structure:** Develop a Program to: (i) Create a structure called library to hold details of a book viz. accession number, title of the book, author name, price of the book, and flag indicating whether book is issued or not. Fetch some sample data and display the same. (ii) Develop and execute C Program to Add Two Distances given in kilometer-meter Using Structures.	√	-	-	√	-	-
13.	**Library Functions:** Develop Program to demonstrate: (i) Use of all String handling functions. (ii) Use of few Mathematical functions. (iii) Use of few other miscellaneous functions.	√	-	-	-	√	-
14.	**User Defined Functions:** Develop a Program to: (i) Create a function to find GCD of given number. Call this function in a program. (ii) Find Factorial of given number using recursion.	√	-	-	-	√	-
15.	**Pointers:** Develop a Program to Print values of variables and their addresses.	√	-	-	-	-	√
16.	Develop a Program to Find sum of all elements stored in given array using pointers.	√	-	-	-	-	√

List of Industry Relevant Skills

The following industry relevant skills of the competency '**Develop 'C' programs to solve broad-based computer related problem'** are expected to be developed in you by undertaking the practicals of this laboratory manual.

1. Develop a 'C' program.
2. Logical ability to solve given problems.

Guidelines to Teachers

1. Teacher should ask students to develop flow chart and algorithm before writing code of the given problem.
2. For difficult practicals if required, teacher could provide the logical solution of the problem, emphasizing on skills which the student should achieve.
3. Teachers should give more problem practice to students for hands-on along with manual problems.
4. Assess the skill achievement of the students and COs of each unit.

Instructions for Students

1. Students should develop flow chart and algorithm before writing code of the given problem.
2. Student should complete journal within given date along with assignments and micro-project.
3. Students should solve more problems with the help of teacher other than manual problems.
4. Attach/Paste separate papers wherever necessary.

Content Page

List of Practicals and Progressive Assessment Sheet

S. No.	Title of the practical	Page No.	Date of performance	Date of submission	Assessment marks(25)	Dated sign. of teacher	Remarks (if any)
	(iv) Write a program to produce the following output: 1 2 3 4 5 6 7 8 9 10						
11.	**Array:** Develop a Program to: (i) Sort list of 10 numbers. (ii) Perform addition of 3x3 matrix.	74					
12.	**Structure:** Develop a Program to: (i) Create a structure called library to hold details of a book viz. accession number, title of the book, author name, price of the book, and flag indicating whether book is issued or not. Fetch some sample data and display the same. (ii) Develop and execute C Program to Add Two Distances given in kilometer-meter Using Structures.	82					
13.	**LibraryFunctions:**Develop Program to demonstrate: (i) Use of all String handling functions. (ii) Use of few Mathematical functions. (iii) Use of few other miscellaneous functions.	90					
14.	**User Defined Functions:** Develop a Program to: (i) Create a function to find GCD of given number. Call this function in a program. (ii) Find Factorial of given number using recursion.	97					
15.	**Pointers:** Develop a Program to Print values of variables and their addresses.	105					
16.	Develop a Program to Find sum of all elements stored in given array using pointers.	112					
Total							

* To be transferred to proforma of CIAAN 2017.

Practical No. 1: Cprograms using constants, variables, arithmetic expression

Note:*Teachers are advised to prepare programming problems on similar guidelines as given below. Each student should develop and execute minimum two programs.*

1. Write a program to add two integer numbers.
2. Write a program to find area and volume of a sphere.
3. Write a program to interchange contents of C and D variables. Input values for these variables through keyboard.
4. Write a program to calculate sum of a five-digit number. (Hint: Use the modulus operator '%')

I Practical Significance

This practical is useful for students to understand procedure for writing, compiling and executing simple C programs. After the completion of this practical student will be able to write C programs using constants, variables and arithmetic expressions.The student will understand steps for compilation and execution of C Program.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency'***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Write simple 'C' programs using arithmetic expressions.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' /gcc compiler.
2. Write simple 'C' program using the given arithmetic expressions.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Practice optimal way to solve problem.

VII Minimum Theoretical Background

Concept of flowcharts and algorithms, symbols of flowchart, guidelines for preparing flowchart and algorithms, concept of variables and constants, knowledge of arithmetic operators.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

Sr.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.

XIII Resources used

Sr. No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV **Conclusion**(Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questionsso as to ensure the achievement of identified CO.

1. Write error message given by C Compiler during program compilation, if variable is used without declaration.
2. Write error message given by C Compiler during program compilation, if you use %d to print float variable.
3. Write error message given by C Compiler during program compilation, if you don't use '&' sign in scanf statement.
4. Write output, if '&' sign with variable name is given while printing the output.

Space for Answer

XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/operators/
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total (25)**	

Practical No. 2: C programs using increment/decrement operators and data type conversion.

Note: Teachers are advised to prepare programming problems on similar guidelines as given below. Each student should develop and execute minimum two programs.

1. Write a program to take one integer number as input, assign its value to another variable with pre and post increment operator and display its value.
2. Write a program for pre and post decrement operator.
3. Write a program for Implicit and Explicit data type conversion.

I Practical Significance

This practical is useful for student to understand the use of increment/decrement operators. After the completion of this practical student will be able to use increment/decrement operators and convert data from one type to another.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency'***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Write simple 'C' programs using arithmetic expressions.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' /gcc compiler.
2. Write simple 'C' program to exhibit increment/decrement operators and data type conversion.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.

2. Follow ethical practices.

VII Minimum Theoretical Background

Concept of increment and decrement operators, hierarchy of operators, different data types and type conversion.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write the output of following C Program.

```
#include<stdio.h>
int main()
{
   int i=1;
   i=2+2*i++;
   printf("%d",i);
   return 0;
```

```
}
```

2. Write the output of following C Program

```
#include <stdio.h>
int main()
{
 inti = 2;
  int j = ++i + i;
  printf("%d\n", j);
}
```

3. If x=7 and y=-3, write values of z for following C Statement.

```
z = ++x + y-- - ++y - x-- - x-- - ++y – x--;
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Space for Answer

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/operators/
2. http://spoken-tutorial.org/tutorial search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 3: Write simple C program to convert temperature in Fahrenheit degrees to Centigrade degrees.

I Practical Significance

This practical is useful for students to understand the conversion of temperature from Fahrenheit degrees to Centigrade degrees. After the completion of this practical student will be able to use arithmetic formulas for writing programs.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Write simple 'C' programs using arithmetic expressions.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' / gcc compiler.
2. An ability to use and convert mathematical expressions into C statements.

VI Relevant Affective domain related Outcome(s)

1. Maintain tools and equipment.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept of various arithmetic expressions and use of formulas for conversion and hierarchy of operators.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Convert the following mathematical formula into appropriate C statements.
   $X = \frac{-b\ (b * b)\ 24ac}{2a}$
2. Point out the error in following statement.
   k = (a * b) (c + (2.5a + b) (d + e) ;
3. Evaluate the following expressions and show its hierarchy.
   g = big / 2 + big * 4 / big - big + abc / 3;

(abc = 2.5, big = 2, assume g to be a float)

4. Write a C program to convert Kilometer into Miles and Meters.
5. Write a C program to convert temperature in Centigrade degrees to Kelvin degrees.

Space for Answer

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XVII References / Suggestions for further Reading

1. https://www.tutorialspoint.com/cprogramming/c_arithmetic_operators.htm
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 4: Write simple programs to calculate the area and perimeter of the rectangle, and the area & circumference of the circle.

I Practical Significance

Student will be able to use constants, different data types, modulus operator and arithmetic function to find area and circumference of different geometric figures.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Write simple 'C' programs using arithmetic expressions.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' / gcc compiler.
2. To generate an ability to use constants and default values in the program.

VI Relevant Affective domain related Outcome(s)

1. Practice optimal way to solve problem.
2. Demonstrate working as a leader/a team member.

VII Minimum Theoretical Background

Concept of constants and their default values, concept of modulus operator and mathematical functions.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write mathematical function to find square of a number.
2. Write comments in above C program.
3. Write a program to interchange the values of two variables.
4. Write a program to reverse the given number.

Space for Answer

XVII References / Suggestions for further Reading

http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 5: Write C programs for decision making and branching using if and if-else structure.

1. Write a C program to determine whether a given year is a leap year or not.
2. Write a C program to determine whether a string is palindrome.

I Practical Significance

The ability to control the normal flow of a program to make decisions on what code to be executed is valuable to the programmer. One of the important functions of the *if* statement is that it allows you to control if a program enters a section of code or not based on whether a given condition is true or false. After the completion of this practical student will be able to use decision making conditional and branching statements to solve the given problem.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using control structure.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ /gcc compiler.
2. Decision Making and branching using if and if-else structure.

VI Relevant Affective domain related Outcome(s)

1. Maintain tools and equipment.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept variable, constant, keywords and data types. Concept of relational and logical operators, if statement, if else statement, nested if-else, if-else ladder.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following program.

```
main( )
 {
int a = 500, b, c ;
if ( a >= 400 )
    b = 300 ;
```

```
    c = 200 ;
printf ( "\n%d %d", b, c ) ;
 }
```

2. Point out the errors, if any, in the following program.

```
main( )
{
int x = 30 , y = 40 ;
if ( x == y )
printf( "x is equal to y" ) ;
elseif ( x > y )
printf( "x is greater than y" ) ;
elseif ( x < y )
printf( "x is less than y" ) ;
 }
```

3. Write output of following program.

```
main( )
{
int k = 35 ;
printf ( "\n%d %d %d", k == 35, k = 50, k > 40 ) ;
 }
```

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/operators/
2. https://www.programiz.com/c-programming/c-decision-making-loops-examples
3. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 6: Write program to:

1) **Find the greatest of the three numbers using conditional operators**.
2) **Find if a given character is vowel.**

I Practical Significance

Students will be able to write programs using conditional operators to solve the given problem.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency ***'Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using control structure.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' /gcc compiler.
2. Decision Making and branching using if and if-else structure.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Maintain tools and equipment.

VII Minimum Theoretical Background

Basic program logic using different operators and expressions.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Syntax for conditional operator should be given properly.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of the following program

```
#include <stdio.h>
int main()
   {
     int x = 2, y = 0;
```

```
    int z = (y++) ? y == 1 && x : 0;
    printf("%d\n", z);
    return 0;
  }
```

2. Write output of following program

```
#include <stdio.h>
void main()
  {
    int k = 8;
    int m = 7;
    int z = k < m ? k++ : m++;
    printf("%d", z);
  }
```

3. Point out the error in the following program.

```
main( )
{
    int tag = 0, code = 1 ;
    if ( tag == 0 )
    ( code > 1 ? printf ( "\nHello" ) ? printf ( "\nHi" ) ) ;
    else
    printf ( "\nHello Hi !!" ) ;
 }
```

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/decision-making/
2. http://www.lessons2all.com/c_decision_making_branching.php
3. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 7: Using switch statement

Write programs to:

1. Print day of week by taking number from 1 to 7.
2. Print a student's grade by accepting percent marks.

I Practical Significance

Student will be able to understand use of switch case over if-else statement and will solve given problem using switch statement.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using control structure.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' and gcc compiler.
2. Use switch statements in the program.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Follow ethical practices.

VII Minimum Theoretical Background

Basic program logic using different decision making and branching statements.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Syntax for switch cases should be given properly.
5. The case conditions must be constant, or some value that may be evaluated at compile time.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following program

```
main( )
{
        intch = 'a' + 'b' ;
        switch ( ch )
          {
```

```
                    case 'a' :
                    case 'b' :
                    printf ( "\nYou entered b" ) ;
                    case 'A' :
                    printf ( "\na as in ashar" ) ;
                    case 'b' + 'a' :
                    printf ( "\nYou entered a and b" ) ;
                }
        }
```

2. Write output of following program.

```
#include<stdio.h>
void main()
{
    int check=2;
    switch(check)
    {
       case 1:  printf("D.W.Steyn");
       case 2:  printf(" M.G.Johnson");
       case 3:  printf(" Mohammad Asif");
       default: printf(" M.Muralidaran");
    }
}
```

3. Point out the error in the following program.

```
main( )
{
float a = 3.5 ;
switch ( a )
     {
        case 0.5 :
        printf ( "\nThe art of C" ) ;
        break ;
        case 1.5 :
        printf ( "\nThe spirit of C" ) ;
        break ;
        case 2.5 :
        printf ( "\nSee through C" ) ;
        break ;
        case 3.5 :
        printf ( "\nSimply C" ) ;
     }
}
```

Space for Answer

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/decision-making/switch/
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English
3. https://www.programiz.com/c-programming/c-switch-case-statement

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 8:Using switch statement

Write programs to:

1. Check whether the triangle is isosceles, equilateral, scalene or right angled triangle.
2. Display the season- Summer, Winter, Rain for given month of year [Jan,. Feb, …….,Dec.]

I Practical Significance

Student will be able to solve geometric& logical problems using switch statements and will develop an ability to understand how multiple if-else statements can be replaced by simple switch case.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency***'Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Write simple 'C' programs using arithmetic expressions.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ and gcc compiler.
2. Use switch statements in the program.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Demonstrate working as a leader/a team member.

VII Minimum Theoretical Background

Basic program logic using different decision making and branching statements.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S. No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Syntax for switch cases should be given properly.
5. The case conditions must be constant, or some value that may be evaluated at compile time.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Identify valid and invalid expressions from following switch statements.
   a. switch(1+2+23)
   b. switch(a+b+c)

c. switch(1*2+3%4)
d. switch(ab+cd)

2. Write the output of following C program, when input value 1 is entered through key board.

```
#include <stdio.h>
void main()
   {
    intch;
    printf("enter a value btw 1 to 2:");
    scanf("%d", &ch);
    switch (ch, ch + 1)
          {
               case 1:
               printf("1\n");
               break;
               case 2:
               printf("2");
               break;
          }
   }
```

3. Write output of following program after execution.

```
#include<stdio.h>
void main()
{
    static int i;
    int j;
    for(j=0;j<=5;j+=2)
    switch(j)
         {
              case 1: i++;break;
              case 2: i+=2;
              case 4: i%=2;j=-1;continue;
              default: --i;continue;
           }
   printf("%d",i);
}
```

Space for Answer

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/decision-making/switch/
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 9: Looping

Write a program to:

1. Find sum of digits of a given number.
2. Generate multiplication table up to 10 for numbers 1 to 5.

I Practical Significance

Loops are used in programming to repeat a specific block of code. Student will be able to write programs using different loop statements.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency**'*Develop 'C' programs to solve broad-based computer related problem*'**:

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' Programs using control structure.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' and gcc compiler.
2. Ability to use For loops in the program.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Practice optimal way to solve problem..

VII Minimum Theoretical Background

Concept of decision control statements and iterative statement. Selection of appropriate control or looping statements for given problem.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Syntax of 'for loop' should be given properly.
5. Avoid infinite loop execution.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following C program.

```
main( )
{
inti = 0 ;
```

```
                    for ( ; i ; )
printf ( "\nHere is some mail for you" ) ;

                }
```

2. Write output of following C program after execution.

```
#include<stdio.h>
int main()
{
   int x=011,i;
   for(i=0;i<x;i+=3)
   {
         printf("Start ");
         continue;
         printf("End");
   }
   return 0;
}
```

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/loops/
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

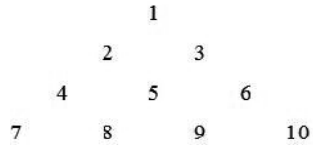
XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 10 Write a program to:

1. **Find Fibonacci series for given number.**
2. **Produce the following output:**



I Practical Significance

Students will be able to write programs using different loop statements. This loop is generally used for performing a same task, a fixed number of times. Student can use nested loops using while, for, or do-while loop.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using control structure.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ and gcc compiler.
2. Use loops and nested loops in the program.

VI Relevant Affective domain related Outcome(s)

1. Demonstrate working as a leader/a team member.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept of decision control statements and iterative statement. Selection of appropriate nested loop statements for given problem.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Syntax of loops should be followed properly.
5. Avoid infinite loop execution.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output for following C Program.

```
void main()
{
   int i;
   clrscr();
```

```
    for(i=0;i<=4;i++)
     {
          printf("%d",i);
          break;
          printf("Hello");
     }
    printf("Programming in C");
    getch();
}
```

2. Write output for following C program.

```
main( )
{
        int x = 4, y = 0, z ;
        while ( x >= 0 )
        {
                x-- ;
                y++ ;
                if ( x == y )
                continue ;
                else
                printf ( "\n%d %d", x, y ) ;
        }
    }
```

3. Write output of following C program.

```
#include <stdio.h>
void main()
   {
inti = 4;
do
      {
printf("Welcome");
      } while (i<4)
   }
```

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XVII References / Suggestions for further Reading

1. https://www.tutorialspoint.com/cprogramming/c_nested_loops.htm
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 11: Array

Develop a Program to:

1. Sort list of 10 numbers.
2. Perform addition of 3x3 matrix.

I Practical Significance

Students will be able to write programs using arrays and store multiple variable values under one variable name with subscript and understand contiguous storage locations used in memory for storing these variables.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency'***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using arrays and structures.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' and gcc compiler.
2. Use single and multi-dimensional arrays in the program.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept of array variables and their declaration.Concept of single and multi-dimensional array.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Array should be declared and used properly.
5. Array size should be given properly.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Point out the error in the following C program.

```
main( )
{
        int size ;
        scanf ( "%d", &size ) ;
        intarr[size] ;
```

```
        for ( i = 1 ; i<= size ; i++ )
        {
                scanf ( "%d", arr[i] ) ;
               printf ( "%d", arr[i] ) ;
        }
}
```

2. Check if the following array declarations are correct.

```
inta (25) ;
int size = 10, b[size] ;
int c = {0,1,2} ;
```

3. Givedifference between these two expressions.

```
intnum[5] ;
num[5] = 11 ;
```

4. Point out the error in the following C program.

```
main( )
{
        int three[3][ ] = {
        2, 4, 3,
        6, 8, 2,
        2, 3 ,1
} ;
printf ( "\n%d", three[1][1] ) ;
}
```

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XVII References / Suggestions for further Reading

1. https://www.programiz.com/c-programming/c-arrays
2. http://www.w3resource.com/c-programming-exercises/array/index.php
3. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 12: Structure

Develop a program to:

1. Create a structure called library to hold details of a book viz.accession number, title of the book, author name, price ofthe book, and flag indicating whether book is issued or not.Fetch some sample data and display the same.
2. Develop and execute C Program to Add Two Distances given in kilometer-meter Using Structures.

I Practical Significance

Student will be able to write programs using structures and use sizeof operator, typedef, Enumerated Data Type in C.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency***'Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using arrays and structures.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ and gcc compiler.
2. Use structures in the program.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Maintain tools and equipment.

VII Minimum Theoretical Background

Concept of structures, declaration and use.Concept of Type def and Enumerated Data Type.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Don't forget the semicolon }; in the ending line.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following C Program.

```
main( )
{
        struct sample
        {
                intnum ;
```

```
                    char m1[50] ;
                    char m2[50] ;
                } m ;
                m.num = 1 ;
                strcpy ( m.m1, "You are in the College " ) ;
                strcpy ( m.m2, "Computer Engineering" ) ;
                /* assume that the strucure is located at address 1004 */
                printf ( "\n%u %u %u", &m.num, m.m1, m.m2 ) ;
        }
```

2. Point out the error in the following C code.

```
        main( )
        {
                struct
                {
                        char name[25] ;
                        chardept[10] ;
                } ;
                struct employee e = { "John", "HR" } ;
                printf ( "\n%s %d", e.name, e.dept ) ;
        }
```

3. Write output of following C Program.

```
#include<stdio.h>

enum year{Jan, Feb, Mar, Apr, May, Jun, Jul,
        Aug, Sep, Oct, Nov, Dec};

int main()
{
    inti;
    for (i=Jan; i<=Dec; i++)
    printf("%d ", i);
    return 0;
}
```

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XVII References / Suggestions for further Reading

1. https://www.w3schools.in/c-tutorial/structures/
2. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related(17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No. 13: Library Functions

Develop Program to demonstrate:

1. Use of all String handling functions.
2. Use of few Mathematical functions.
3. Use of few other miscellaneous functions.

I Practical Significance

Student will be able to define and declare user defined functions and library functions and use different string handling functions, mathematical functions as well as miscellaneous function.Student will develop an ability to compare strings, copy strings, generate random numbers, sine, cosine and log values.

II Relevant Program Outcomes

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency***'Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop/Use functions in C programs for modular programming approach.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ and gcc compiler.
2. Use Library and user defined functions in the program.

VI Relevant Affective domain related Outcome(s)

1. Maintain tools and equipment.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept and need of functions. Concept of Library functions like Math functions, String handling functions and other miscellaneous functions. Declaration and use of User defined functions.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Don't forget to include header file related to particular function.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following C Program.

```
#include <stdio.h>
#include <math.h>
int main()
    {
```

```
        inti = 10;
        printf("%f\n", log10(i));
        return 0;
    }
```

2. Find the errors in the following C program:

```
main ( )
{
    charstr[] = “Good Morning”;
    if (strstr(str, “ Welcome”)==0)
    printf(“\n substring Found”);
}
```

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XVII References / Suggestions for further Reading

1. https://www.programiz.com/c-programming/library-function
2. http://fresh2refresh.com/c-programming/c-function/c-library-functions/

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No.14: User Defined Functions

Develop a Program to:

1. Create a function to find GCD of given number. Call this function in a program.
2. Find Factorial of given number using recursion.

I Practical Significance

Student will be able to define and declare user define functions and can understand the scope of variables. Student will be able to use parameters using call by value and call by reference in C program and use recursive functions.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop/Use functions in C programs for modular programming approach.

V Practical Outcome

1. Write/compile/execute simple ‘C’ program using Turbo ‘C’ and gcc compiler.
2. Write programs using User Defined Functions.

VI Relevant Affective domain related Outcome(s)

1. Demonstrate working as a leader/a team member.
2. Follow ethical practices.

VII Minimum Theoretical Background

Concept of function declaration, function definition and function call.
Understanding of user defined functions and recursive functions.

VIII Algorithm

IX Flow Chart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Function name should start with alphabet and may consist of alphanumeric characters.
5. If there are two words in function name it should be attached with _or -. Example: emp_salary( ) , stud-data( ).
6. User define function name should not be same as any built-in function.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following C program.

```
main( )
```

```
{
        inti = 45, c ;
        c = check ( i ) ;
        printf ( "\n%d", c ) ;
}
check ( intch )
{
        if ( ch>= 45 )
        return ( 100 ) ;
        else
        return ( 10 * 10 ) ;
}
```

2. Find error in following function, if any.

```
sqr ( a ) ;
int a ;
{
        return ( a * a ) ;
 }
```

3. Write output of following C program.

```
#include<stdio.h>
int fun(int count)
{
   printf("%d\n", count);
   if(count < 3)
   {
     fun(fun(fun(++count)));
   }
   return count;
}
 int main()
{
   fun(1);
   return 0;
}
```

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XVII References / Suggestions for further Reading

1. https://www.tutorialspoint.com/cprogramming/c_functions.htm
2. http://www.c4learn.com/c-programming/c-function-definition/
3. www.cs.wisc.edu/~calvin/cs110/RECURSION.html

XVIII Assessment Scheme

Performance indicators		Weightage
Process related (7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related (17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No.15: Pointers

Develop a Program to Print values of variables and their addresses.

I Practical Significance

Student will be able to understand concept of pointer variables and how to access their addresses. He/she will be able to declare, initialize and access pointers. After completion of this practical student will be able to use pointers to get the memory address of variable.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using pointers.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' and gcc compiler.
2. Write programs using pointers.

VI Relevant Affective domain related Outcome(s)

1. Follow safety practices.
2. Demonstrate working as a leader/a team member.

VII Minimum Theoretical Background

Concept of control structures.Understanding of variable storage and type.Declaration of pointers and assigning values to pointer variables.

VIII Algorithm

IX Flowchart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Should take care to define and declare pointers.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Assume that float takes 4 bytes, predict the output of following program.

```
#include <stdio.h>

int main()
{
   floatarr[5] = {12.5, 10.0, 13.5, 90.5, 0.5};
```

```
    float *ptr1 = &arr[0];
    float *ptr2 = ptr1 + 3;

    printf("%f ", *ptr2);
    printf("%d", ptr2 - ptr1);

   return 0;
}
```

2. Write output of following C program.

```
#include <stdio.h>
void main()
    {
 char a[10][5] = {"hi", "hello", "fellows"};
 printf("%d", sizeof(a[1]));
    }
```

Space for Answer

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XVII References / Suggestions for further Reading

1. http://www.c4learn.com/c-programming/c-pointer-address-operator/
2. https://www.programiz.com/c-programming/c-pointers
3. http://www.studytonight.com/c/pointers-in-c.php

XVIII Assessment Scheme

Performance indicators		Weightage
Process related(7.5 Marks)		**30%**
1.	Debugging ability	20%
2.	Following ethical practices	10%
Product related(17.5 Marks)		**70%**
1.	Correctness of algorithm	15%
2.	Correctness of Flow chart	15%
3.	Correctness of Program codes	20%
4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

Practical No.16: Develop a Program to find sum of all elements stored in given array using pointers.

I Practical Significance

Student will be able to understand concept of pointers. He/she will be able to declare, initialize and access pointers and perform various arithmetic operations on pointers, handling arrays using pointers. After the completion of this practical student will be able to handle functions and structures using pointers.

II Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:**Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.
- **Individual and team work:**Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:**Communicate effectively in oral and written form.
- **Life-long learning:**Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III Competency and Practical skills

This practical is expected to develop the following skills for the industry identified competency '***Develop 'C' programs to solve broad-based computer related problem***':

1. Write Algorithm for given program.
2. Draw Flow Chart for given Algorithm.
3. Develop a 'C' program using variables, constants and arithmetic expressions.
4. Debug the program.
5. Execute a simple C program using Turbo C/ gcc compiler.

IV Relevant Course Outcome(s)

1. Develop flowchart and algorithm to solve problems logically.
2. Develop 'C' programs using pointers.

V Practical Outcome

1. Write/compile/execute simple 'C' program using Turbo 'C' and gcc compiler.
2. Write programs using array of pointers.

VI Relevant Affective domain related Outcome(s)

1. Demonstrate working as a leader/a team member.
2. Maintain tools and equipment.

VII Minimum Theoretical Background

Concept of control structures.Understanding of variable storage and type.Declaration of pointers and assigning values to pointer variables.accessing arrays using pointers. Pointer Arithmetic.

VIII Algorithm

IX Flowchart

X ‘C’ Program Code

XI Resources required

S.No.	Name of Resource	Major Specification	Qty.	Remarks
1.	Computer System	Any desktop or laptop computer with basic configuration	One computer system for each student	
2.	'C' Compiler	Turbo C/gcc	One for each computer system	

XII Precautions to be followed

1. Handle computer system with care.
2. Strictly follow the instruction for writing, compiling and executing the program.
3. Start and Shutdown system with proper procedure.
4. Array name should start with alphabet. Array name may consist of alphanumeric characters.
5. If there are two words in Array name it should be attached with _or -. Example: Array_one[ ], Array-two[ ].
6. Array name should not be keyword same as any built-in function name.

XIII Resources used

S.No.	Name of Resource	Specifications		Remarks (If any)
		Make	Details	
1.	Computer System with broad specifications			
2.	Software			
3.	Any other resource used			

XIV Results

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XV Conclusion (Actions/decisions to be taken based on the interpretation of results).

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XVI Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following program.

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

```
void example( int[] );
int main()
   {
intary[4] = {1, 2, 3, 4};
example(ary);
printf("%d ", ary[0]);
   }
void example(int p[4])
   {
inti = 10;
      p = &i;
printf("%d ", p[0]);
  }
```

2. Write output of following program.

```
#include <stdio.h>
int main()
   {
        intary[4] = {1, 2, 3, 4};
        int *p = ary + 3;
        printf("%d %d\n", p[-2], ary[*p]);
  }
```

Space for Answer

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XVII References / Suggestions for further Reading

1. https://www.programiz.com/c-programming/c-pointers-arrays
2. https://www.tutorialspoint.com/cprogramming/c_array_of_pointers.htm

XVIII Assessment Scheme

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4.	Quality of input messaging and output formatting	5%
5.	Completion and submission of Practical in time	5%
6.	Answer to sample questions	10%
	Total (25 Marks)	**100%**

Marks obtained			Dated Sign of Teacher
Process Related(7.5)	**Product Related(17.5)**	**Total(25)**	

List Of Laboratory Manuals Developed by MSBTE

First Semester:

1	Fundamentals of ICT	22001
2	English	22101
3	English Work Book	22101W
4	Basic Science (Chemistry)	22102
5	Basic Science (Physics)	22102

Second Semester:

1	Bussiness Communication Using Computers	22009
2	Computer Peripherals & Hardware Maintenace	22013
3	Web Page Design with HTML	22014
4	Applied Science (Chemistry)	22202
5	Applied Science (Physics)	22202
6	Applied Machines	22203
7	Basic Surveying	22205
8	Applied Science (Chemistry)	22211
9	Applied Science (Physics)	22211
10	Fundamental of Electrical Engineering	22212
11	Elements of Electronics	22213
12	Elements of Electrical Engineering	22215
13	Basic Electronics	22216
14	'C' programming Language	22218
15	Basic Electronics	22225
16	Programming in "C"	22226
17	Fundamentals of Chemical Engineering	22231

Third Semester:

1	Applied Multimedia Techniques	22024
2	Advanced Serveying	22301
3	Highway Engineering	22302
4	Mechanics of Structures	22303
5	Building Construction	22304
6	Concrete Technology	22305
7	Strength Of Materials	22306
8	Automobile Engines	22308
9	Automobile Transmission System	22309
10	Mechanical Operations	22313
11	Technology Of Inorganic Chemicals	22314
12	Object Oriented Programming Using C++	22316
13	Data Structure Using 'C'	22317
14	Computer Graphics	22318
15	Database Management System	22319
16	Digital Techniques	22320
17	Principles Of Database	22321
18	Digital Techniques & Microprocessor	22323
19	Electrical Circuits	22324
20	Electrical & Electronic Measurment	22325
21	Fundamental Of Power Electronics	22326
22	Electrical Materials & Wiring Practice	22328
23	Applied Electronics	22329
24	Electrical Circuits & Networks	22330
25	Electronic Measurments & Instrumentation	22333
26	Principles Of Electronics Communication	22334
27	Thermal Engineering	22337
28	Engineering Matrology	22342
29	Mechanical Engineering Materials	22343
30	Theory Of Machines	22344

Fourth Semester:

1	Hydraulics	22401
2	Geo Technical Engineering	22404
3	Chemical Process Instrumentation & Control	22407
4	Fluid Flow Operation	22409
5	Technology Of Organic Chemicals	22410
6	Java Programming	22412
7	GUI Application Development Using VB.net	22034
8	Microprocessor	22415
9	Database Managment	22416
10	Electric Motors And Transformers	22418
11	Industrial Measurements	22420
12	Digital Electronics And Microcontroller Applications	22421
13	Linear Integrated Circuits	22423
14	Microcontroller & Applications	22426
15	Basic Power Electronics	22427
16	Digital Communication Systems	22428
17	Mechanical Engineering Measurments	22443
18	Fluid Mechanics and Machinery	22445
19	Fundamentals Of Mechatronics	22048
20	Guidelines & Assessment Manual for Micro Projects & Industrial Training	22049

Fifth Semester:

1	Network Management & Administration	17061
2	Solid Modeling	17063
3	CNC Machines	17064
4	Behavioral Science(Hand Book)	17075
5	Behavioral Science (Assignment Book)	17075
6	Windows Programming using VC++	17076
7	Estimation and Costing	17501
8	Public Health Engineering	17503
9	Concrete Technology	17504
10	Design of Steel Structures	17505
11	Switchgear and Protection	17508
12	Microprocessor & Application	17509
13	A.C. Machines	17511
14	Operating System	17512
15	Java Programming	17515
16	System Programming	17517
17	Communication Technology	17519
18	Hydraulic & Pneumatics	17522
19	Advanced Automobile Engines	17523
20	Basic Electrical & Electronics	17524
21	Measurement and Control	17528
22	Power Engineering	17529
23	Metrology & Quality Control	17530
24	Computer Hardware & Networking	17533
25	Microcontroller	17534
26	Digital Communication	17535
27	Control System & PLC	17536
28	Audio Video Engineering	17537
29	Control System	17538
30	Industrial Electronics and applications	17541
31	Heat Transfer Operations	17560
32	Chemical Process Instrumentation & control	17561

Sixth Semester:

1	Solid Modeling	17063
2	Highway Engineering	17602
3	Contracts & Accounts	17603
4	Design of R.C.C. Structures	17604
5	Industrial Fluid Power	17608
6	Design of Machine Elements	17610
7	Automotive Electrical and Electronic Systems	17617
8	Vehicle Systems Maintenance	17618
9	Software Testing	17624
10	Advanced Java Programming	17625
11	Mobile Computing	17632
12	System Programing	17634
13	Testing & Maintenance of Electrical Equipments	17637
14	Power Electronics	17638
15	Illumination Engineering	17639
16	Power System Operation & Control	17643
17	Environmental Technology	17646
18	Mass Transfer Operation	17648
19	Advanced Communication System	17656
20	Mobile Communication	17657
21	Embedded System	17658
22	Process Control System	17663
23	Industrial Automation	17664
24	Industrial Drives	17667
25	Video Engineering	17668
26	Optical Fiber & Mobile Communication	17669
27	Therapeutic Equipment	17671
28	Intensive Care Equipment	17672
29	Medical Imaging Equipment	17673

Pharmacy Lab Manual

First Year:

1	Pharmaceutics - I	0805
2	Pharmaceutical Chemistry - I	0806
3	Pharmacognosy	0807
4	Biochemistry and Clinical Pathology	0808
5	Human Anatomy and Physiology	0809

Second Year:

1	Pharmaceutics - II	0811
2	Pharmaceutical Chemistry - II	0812
3	Pharmacology & Toxicology	0813
4	Hospital and Clinical Pharmacy	0816

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