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Note : Remove "Table of Content" before including in CP Book

18CPL27: COMPUTER PROGRAMMING LABORATORY

A. LABORATORY INFORMATION

1. Lab Overview

<i>Degree:</i>	BE	<i>Program:</i>	IS
<i>Year / Semester :</i>	1/ 2	<i>Academic Year:</i>	2018-19
<i>Course Title:</i>	Computer Programming Laboratory	<i>Course Code:</i>	18CPL17
<i>Credit / L-T-P:</i>	4 / 0-0-2	<i>SEE Duration:</i>	180 Minutes
<i>Total Contact Hours:</i>	30 Hrs	<i>SEE Marks:</i>	60 Marks
<i>CIA Marks:</i>	40	<i>Assignment</i>	1 / Experiment

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Course Plan Author: LOKESH H D	Sign	Dt :
Checked By:	Sign	Dt :

2. Lab Content

Unit	Title of the Experiments	Lab Hours	Concept	Blooms Level
1	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code	2	Execution of simple C Code	L3 Apply
PART-A				
2	Develop a program to solve simple computational problems using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. (No built-in math function)	2	Arithmetic Operators	L3 Apply
3	Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.	2	Decision-making statements	L3 Apply
4	Develop a program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages	2	Looping statements	L3 Apply
5	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit; for the next 100 units 90 paise per unit; beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges	2	Decision-making statements	L3 Apply
6	Introduce 1D Array manipulation and implement Binary search	2	Linear representation of 1-D arrays	L3 Apply
7	Implement using functions to check whether the given number is prime and display appropriate messages. (No built-in math function)	2	Modular representation	L3 Apply
PART-B				
8	Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.	2	Linear representation of 2-D arrays	L4 Analyze
9	Develop a Program to compute Sin(x) using Taylor series approximation. Compare your result with the built- in Library function. Print both the results with appropriate messages.	2	Modular Representation	L4 Analyze
10	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.	2	String operations	L4 Analyze
11	Develop a program to sort the given set of N numbers using Bubble sort.	2	Data arrangement	L3 Apply
12	Develop a program to find the square root of a given number N and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n)	2	Modular programming	L3 Apply
13	Implement structures to read, write, compute average- marks and the students scoring above and below the average marks for a class of N students.	2	Derived datatype	L3 Apply

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14	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers	2	Address of memory location	L3 Apply
15	Implement Recursive functions for Binary to Decimal Conversion	2	Self-invoking functions	L3 Apply

3. Lab Material

Unit	Details	Available
1	Text books	
	1. E.Balaguruswamy, Programming in ANSI C, 7 th Edition, Tata McGraw-Hill	Not Available (requirement given)
	2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.	Available
2	Reference books	
	1. Sumitabha Das, Computer Fundamentals & C Programming, Mc Graw Hill Education.	Not Available (requirement given)
	2. Gary J Bronson, ANSI C Programming, 4 th Edition, Cengage Learning.	
	3. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.	
	4. R S Bichkar, Programming with C, University Press, 2012.	
	5. V Rajaraman: Computer Programming in C, PHI, 2013.	
	6. Basavaraj S. Anami, Shanmukhappa A Angadi, Sunilkumar S. Manvi, Computer Concepts and C Programming: A Holistic Approach to Learning C, Second edition, PHI India, 2010.	
3	Others (Web, Video, Simulation, Notes etc.)	Available
	https://www.tutorialspoint.com/PPS	
	https://vtuplanet.com/notes	
	https://www.khanacademy.com	

4. Lab Prerequisites:

SNo	Course Code	Base Course: Course Name	Topic / Description	Sem	Remarks
1	18CPL17	Computer Programming Laboratory	Familiarize with fundamentals of computer concepts	1	Required for Experiment 1

Note: If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

5. General Instructions

SNo	Instructions	Remarks
1	Observation book and Lab record are compulsory.	
2	Students should report to the concerned lab as per the time table.	
3	After completion of the program, certification of the concerned staff in-charge in the observation book is necessary.	
4	Student should bring a notebook of 100 pages and should enter the readings / observations into the notebook while performing the experiment.	
5	The record of observations along with the detailed experimental procedure of the experiment in the Immediate last session should be submitted and certified staff member in-charge.	
6	Should attempt all problems / assignments given in the list session wise.	

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7	It is responsibility to create a separate directory to store all the programs, so that nobody else can read or copy.	
8	When the experiment is completed, student should save the experiment with relevant filenames and exit from the Turbo C IDE compiler.	
9	Any damage of the equipment of the computer system will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year	
10	Completed lab assignments should be submitted in the form of a Lab Record in which you have to write the algorithm, Flowchart, program code along with comments and output for various inputs given	

6. Lab Specific Instructions

SNo	Specific Instructions	Remarks
1	Start windows Operating system	
2	Open the Turbo C text editor screen in Windows	
3	Select new file	
4	Write the program	
5	Save the program with ".c" extension	
6	Compile the program using Alt + F9	
7	Press Ctrl + F9 to Run to execute the Program	
8	Press Alt+F5 to view the output of the program at the output screen	

B. OBE PARAMETERS

1. Lab / Course Outcomes

#	COs	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	Develop execution of C code using Turbo C compiler	02	Execution of simple C Code	Demonstrate	Viva & presentation	L3 Apply
PART-A						
2	Develop a C code using Conditional branching statements	02	Decision-making statements	Demonstrate	Viva & presentation	L3 Apply
3	Develop a C code using Conditional branching statements	02	Decision-making statements	Demonstrate	Viva & presentation	L3 Apply
4	Develop a C code using Repetitive statements	02	Looping statements	Simulation	Viva & presentation	L3 Apply
5	Develop a C code using Conditional branching statements	02	Decision-making statements	Tutorial	Viva & presentation	L3 Apply
6	Develop a C code using Arrays	02	Linear representation of 1-D arrays	Tutorial	Viva & presentation	L3 Apply
7	Develop a C code using Repetitive statements	02	Modular representation	Demonstrate	Viva & presentation	L3 Apply
PART-B						
8	Develop a C code using Arrays	02	Linear representation of 2-D	Demonstrate	Viva & presentation	L4 Analyze

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			arrays			
9	Develop a C code using Repetitive statements	02	Modular Representation	Demonstrate	Viva & presentation	L4 Analyze
10	Develop a C code using String manipulation functions	02	String operations	Demonstrate	Viva & presentation	L4 Analyze
11	Develop a C code using Arrays	02	Data arrangement	Demonstrate	Viva & presentation	L3 Apply
12	Develop a C code using Repetitive statements	02	Modular programming	Demonstrate	Viva & presentation	L3 Apply
13	Develop a C code using structures	02	Derived datatype	Demonstrate	Viva & presentation	L3 Apply
14	Develop a C code using pointers	02	Address of memory location	Demonstrate	Viva & presentation	L3 Apply
15	Develop a C code using recursion	02	Self- invoking functions	Demonstrate	Viva & presentation	L3 Apply
-	Total	30	-	-	-	-

Note: Identify a max of 2 Concepts per unit. Write 1 CO per concept.

2. Lab Applications

SNo	Application Area	CO	Level
1	Computer Science	CO1	L3
2	banking sectors	CO2	L3
3	Theory of Algebra	CO2	L3
4	In Number theory ,DNA sequences	CO3	L3
5	Electricity department	CO2	L3
6	Applications of the binary search algorithm include sets,, trees dictionaries, bags, bag trees, bag dictionaries, hash sets, hash tables, maps	CO4	L3
7	Theory of Algebra	CO3	L3
8	Computer Graphics	CO4	L4
9	Power flow analysis of electrical power systems	CO3	L4
10	Database Management system	CO5	L4
11	Bubble sort is used in programming TV remote to sort channels on the basis of longer viewing time	CO4	L3
12	Mathematical statistics	CO3	L3
13	Computer Architecture	CO6	L3
14	Memory allocation	CO7	L3
15	Computer Technology for encoding and decoding	CO8	L3

Note: Write 1 or 2 applications per CO.

3. Articulation Matrix

(CO – PO MAPPING)

#	Course Outcomes COs	Program Outcomes												Level	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
18CPL27.1	Develop execution of C code using Turbo C compiler	1	3	3		3									L3
18CPL27.2	Develop a C code using	1	3	3		3									L3

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	Conditional branching statements																	
18CPL27.3	Develop a C code using Conditional branching statements	1	3	3		3												L3
18CPL27.4	Develop a C code using Repetitive statements	1	3	3		3												L3
18CPL27.5	Develop a C code using Conditional branching statements	1	3	3		3												L3
18CPL27.6	Develop a C code using Arrays	1	3	3		3												L3
18CPL27.7	Develop a C code using Repetitive statements	1	3	3		3												L3
18CPL27.8	Develop a C code using Arrays	1	3	3		3												L4
18CPL27.9	Develop a C code using Repetitive statements	1	3	3		3												L4
18CPL27.10	Develop a C code using String manipulation functions	1	3	3		3												L4
18CPL27.11	Develop a C code using Arrays	1	3	3		3												L3
18CPL27.12	Develop a C code using Repetitive statements	1	3	3		3												L3
18CPL27.13	Develop a C code using structures	1	3	3		3												L3
18CPL27.14	Develop a C code using pointers	1	3	3		3												L3
18CPL27.15	Develop a C code using recursion	1	3	3		3												L3
18CPL27																		

Note: Mention the mapping strength as 1, 2, or 3

4. Mapping Justification

Mapping		Justification	Mapping Level
CO	PO	-	-
CO1	PO1	Knowledge of C compiler is required for execution by executing a sample program	1
	PO2	analyzing the problem requires the knowledge of basic concepts of C program	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO2	PO1	Knowledge of arithmetic operations is required	1
	PO2	analyzing the problem requires the knowledge of basic concepts of C program	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution.	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-

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	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO3	PO1	Knowledge of Conditional branching statements is required.	1
	PO2	analyzing the problem requires the knowledge of Conditional branching statements	3
	PO3	Design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO4	PO1	Knowledge of arrays is required for execution.	1
	PO2	analyzing the problem requires the knowledge of arrays concepts	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO5	PO1	Knowledge of string concepts is required	1
	PO2	analyzing the problem requires the knowledge of string handling concepts	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO6	PO1	Knowledge of structures is required.	1
	PO2	analyzing the problem requires the knowledge of structure concepts	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-

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	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO7	PO1	Knowledge of pointers is required.	1
	PO2	Analyzing the problem requires the knowledge of pointers	3
	PO3	Design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	Requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-
CO8	PO1	Knowledge of recursive function is required.	1
	PO2	analyzing the problem requires the knowledge of recursion concepts	3
	PO3	design and develop a solution for a problem	3
	PO4	No investigation & interpretation content. No mapping. Learning is at the basic level. Attainment will be Zero, if mapping done.	-
	PO5	requires the knowledge of C compiler for program execution	3
	PO6	No social, cultural issues. No mapping	-
	PO7	No impact on Environment and sustainability. No mapping	-
	PO8	No team work or lead for the ethical work. No mapping	-
	PO9	No team work or lead for the ethical work. No mapping	-
	PO10	No usage for communication. No mapping.	-
	PO11	No project management and finance. No mapping.	-
	PO12	No mapping as there is only understanding	-

Note: Write justification for each CO-PO mapping.

5. Curricular Gap and Content

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Content Beyond Syllabus

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					

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10					
11					
12					
13					
14					
15					

Note: Anything not covered above is included here.

C. COURSE ASSESSMENT

1. Course Coverage

Unit	Title	Teaching Hours	No. of question in Exam							CO	Levels	
			CIA-1	CIA-2	CIA-3	Asg-1	Asg-2	Asg-3	SEE			
1	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C-code	02	1	-	-	-	-	-	-	1	CO1	L3
PART-A												
2	Develop a program to solve simple computational problems using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. (No built-in math function)	02	1	-	-	-	-	-	-	1	CO2	L3
3	Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.	02	1	-	-	-	-	-	-	1	CO2	L3
4	Develop a program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages	02	1	-	-	-	-	-	-	1	CO3	L3
5	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit; for the next 100 units 90 paise per unit; beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges	02	1	-	-	-	-	-	-	1	CO2	L3
6	Introduce 1D Array manipulation and implement Binary search	02	-	1	-	-	-	-	-	1	CO4	L3
7	Implement using functions to check whether the given number	02	-	1	-	-	-	-	-	1	CO3	L3

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	is prime and display appropriate messages. (No built-in math function)											
PART-B												
8	Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.	02	-	1	-	-	-	-	1	CO4	L4	
9	Develop a Program to compute Sin(x) using Taylor series approximation. Compare your result with the built- in Library function. Print both the results with appropriate messages.	02	-	1	-	-	-	-	1	CO3	L4	
10	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.	02	-	1	-	-	-	-	1	CO5	L4	
11	Develop a program to sort the given set of N numbers using Bubble sort.	02	-	-	1	-	-	-	1	CO4	L3	
12	Develop a program to find the square root of a given number N and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n)	02	-	-	1	-	-	-	1	CO3	L3	
13	Implement structures to read, write, compute average- marks and the students scoring above and below the average marks for a class of N students.	02	-	-	1	-	-	-	1	CO6	L3	
14	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers	02	-	-	1	-	-	-	1	CO7	L3	
15	Implement Recursive functions for Binary to Decimal Conversion	02	-	-	1	-	-	-	1	CO8	L3	
-	Total	30	5	5	5	-	-	-	15	-	-	

Note: Write CO based on the theory course.

2. Continuous Internal Assessment (CIA)

Evaluation	Weightage in Marks	CO	Levels
CIA Exam - 1	40	CO1, CO2, CO3	L3
CIA Exam - 2	40	CO3, CO4, CO5,	L3,L4
CIA Exam - 3	40	CO3.CO4.CO6.CO7, CO8	L3
Assignment - 1			
Assignment - 2			

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Assignment - 3			
Seminar - 1			
Seminar - 2			
Seminar - 3			
Other Activities – define – Slip test			
Final CIA Marks	40	-	-

SNo	Description	Marks
1	Observation and Weekly Laboratory Activities	05 Marks
2	Record Writing	20 Marks for each Expt
3	Internal Exam Assessment	15 Marks
4	Internal Assessment	40 Marks
5	SEE	60Marks
-	Total	100 Marks

D. EXPERIMENTS

Experiment 01: Familiarization with programming environment by taking any simple C- code.

-	Experiment No.:	1	Marks	Date Planned	Date Conducted
1	Title	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code			
2	Course Outcomes	Develop execution of C code using Turbo C compiler			
3	Aim	Exercise on simple C program using Turbo C compiler			
4	Material / Equipment Required	Lab Manual			
5	Theory, Formula, Principle, Concept	Theory- Basic structure of C program, Concept-writing & Execution of Simple C program			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	step 1: start step 2: write program step 3: save the program step 4: compile step 5:if error then correct the errors step 6:run step 7:View the output step 7:stop			
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph				
8	Observation Table, Look-up Table, Output	<ul style="list-style-type: none"> welcome to SKIT college this is the first program in ccp lab 			
9	Sample Calculations	-			
10	Graphs, Outputs	-			
11	Results & Analysis	-			
12	Application Areas	Computer Science			
13	Remarks	-			
14	Faculty Signature with Date	-			

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Experiment 02 : Develop a program to simulate commercial calculator

-	Experiment No.:	2	Marks	Date Planned	Date Conducted	
1	Title	Develop a program to solve simple computational problems using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. (No built-in math function)				
2	Course Outcomes	Develop a C code using Conditional branching statements				
3	Aim	To solve simple arithmetic operations using operators without built-in functions				
4	Material Equipment Required	/ Lab Manual				
5	Theory, Formula, Principle, Concept	To apply Decision-making statements without using built-in function				
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step 1: [start]</p> <p>Step 2: [accept the input]</p> <pre> read a,b ,op Step 3: [perform the arithmetic operation on variables a,b] if(op=='+') res=a+b; else if(op=='-') res=a-b; else if(op=='*') res=a*b; else if(op=='/') { if(b!=0) res=a/b; else { printf("divide by zero\n"); exit(0); } } else { printf("illegal operator\n"); exit(0); } </pre> <p>Step 4: [print the result]</p> <pre> print a,op,b,res </pre> <p>Step 5: [finished]</p> <p>step 6: stop</p>				
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph					
8	Observation Table, Look-up Table, Output	<p>Enter the expression</p> <pre> 5+6=11 6-5=1 5*6=30 6/2=3 </pre> <p>Enter the expression</p>				

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		6@2 Illegal operator
	Sample Calculations	-
10	Graphs, Outputs	-
11	Results & Analysis	-
12	Application Areas	banking sectors
13	Remarks	
14	Faculty Signature with Date	

Experiment 03 : Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.

-	Experiment No.:	3	Marks	Date Planned	Date Conducted
1	Title	Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.			
2	Course Outcomes	Develop a C code using Conditional branching statements			
3	Aim	To compute quadratic equation through coefficients			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	To apply Decision-making statements in quadratic equation			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<pre> Step1: [start] Step2: [take input] Accept a,b,c for non zero values Step3: [Find discriminate] D=b*b-4*a*c Step4: [Check the nature] If (D==0) print' roots are real & equal' r1=(-b)/(2*a) r2=(-b)/(2*a) print r1,r2 end if Else if(d>0) print'roots are real & distinct' r1=(-b+sqrt(d))/(2*a) r2 =(-b-sqrt(d))/(2*a) print r1,r2 end if else print'roots are imaginary' Step5: [finished] Stop </pre>			
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph				
8	Observation Table, Look-up Table,	case 1 : enter the non-zero coefficient: 1 0 1			

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	Output	<p>Invalid Input</p> <p>case 2: enter the non-zero coefficient: 1 2 3 complex roots root1=-1.000000+i1.414214 root2=-1.000000-i1.414214</p> <p>case 3: enter the non-zero coefficient: 5 5 1 real roots root1=-0.276393 root2=-0.723607</p> <p>case 4: enter the non-zero coefficient: 1 2 1 equal roots root1=-1.000000 root2=-1.000000</p>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Theory of Algebra
13	Remarks	
14	Faculty Signature with Date	

Experiment 04 : Develop a program to check for palindrome.

-	Experiment No.:	4	Marks	Date Planned	Date Conducted
1	Title	Develop a program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages			
2	Course Outcomes	Develop a C code using Repetitive statements			
3	Aim	To reverse a positive integer and check whether a given number is palindrome or not			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	To apply Looping constructs			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step1: [start]</p> <p>Step2: [read no] Read n</p> <p>Step3: [assign reverse 0 and n to m] reverse=0,m=n</p> <p>Step4: [reverse the number] while(n≠0) digit=n%10 n=n/10 reverse=reverse*10+digit end while</p> <p>Step5: [Check whether reversed and original numbers are same] if(m==reverse) print "number is a palindrome" else</p>			

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		<pre> print "number is not a palindrome" end if Step6: [finished] Stop </pre>
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	<pre> case 1 : enter the number: 1221 number is palindrome case 2 : enter the number: 1234 number is not palindrome </pre>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	In Number theory ,DNA sequences
13	Remarks	
14	Faculty Signature with Date	

Experiment 05 : Write a program to read the name of the user, number of units consumed and print out the charges.

-	Experiment No.:	5	Marks	Date Planned	Date Conducted
1	Title	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges			
2	Course Outcomes	Develop a C code using Conditional branching statements			
3	Aim	To read the name of the user, number of units consumed and print the units consumed using If-else statements			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	To Compute the electricity units consumption using If-else statements			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<pre> Step 1: [start] Step 2: [read the input] read name,unit Step 3: [perform the operation on unit consumed] if(unit>=0 && unit<=200) { Rs=unit*0.80; Rs=Rs+100; } else if(unit<=300 && unit>200) { Rs=unit*0.90; </pre>			

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		<pre> Rs=Rs+100; } else if(unit>300) { Rs=unit*1.00; Rs=Rs+100; } if(Rs>400) { Rs=Rs+(0.15*Rs); } </pre> <p>Step 4: [print the result] print name,unit,Rs</p> <p>Step 5: [finished] step 6: [stop]</p>
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	<p>1. enter the customer name: Sandhya enter the number of units consumed:260 the customer name is:divya number of units consumed is 260 total cost(Rs) is 334.000000</p> <p>2. enter the customer name: sowmya enter the number of units consumed:180 the customer name is: sowmya number of units consumed is 180 total cost(Rs) is 244.000000</p> <p>3. enter the customer name: Divya enter the number of units consumed:380 the customer name is: sandhya number of units consumed is 380 total cost(Rs) is 552.000000</p>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Electricity department
13	Remarks	
14	Faculty Signature with Date	

Experiment 06 : Introduce 1-D Array manipulation and implement Binary search.

-	Experiment No.:	6	Marks	Date Planned	Date Conducted
1	Title	Introduce 1D Array manipulation and implement Binary search			
2	Course Outcomes	Develop a C code using Arrays			
3	Aim	To apply 1-Dimensional array manipulation and implement Binary search			
4	Material Equipment Required	/Lab Manual			
5	Theory, Formula, Principle, Concept	Linear representation of 1-D arrays			

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6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step 1: [start]</p> <p>Step 2: [read the input] read n</p> <p>Step 3: [read the array elements] for(i=0;i<n;i++) read (arr[i])</p> <p>Step 4:[enter the number to be searched] Read num</p> <p>Step 5: [search for key element through array] low=0; high=n-1; while(low<=high) { mid=(low+high)/2; if(arr[mid]==num) { print(num is present in the array at position mid+1); getch(); exit(0); } else if(arr[mid]>num) high=mid-1; else low=mid+1; } print(num does not exist in the array);</p> <p>Step 6: [finished] stop</p>
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	<p>enter the number of elements in the array in ascending order: 5</p> <p>enter the elements: 12 23 34 45 56</p> <p>enter the number that has to be searched: 34 34 is present in the array at position= 3</p>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Applications of the binary search algorithm include sets,, trees dictionaries, bags, bag trees, bag dictionaries, hash sets, hash tables, maps
13	Remarks	
14	Faculty Signature with Date	

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Experiment 07 : Implement using functions to check whether the given number is prime .

-	Experiment No.:	7	Marks		Date Planned		Date Conducted
1	Title	Implement using functions to check whether the given number is prime and display appropriate messages. (No built-in math function)					
2	Course Outcomes	Develop a C code using Repetitive statements					
3	Aim	To check whether the given number is prime without using built-in math function					
4	Material Equipment Required	/ Lab Manual					
5	Theory, Formula, Principle, Concept	Linear representation of 1-D arrays					
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step 1: [start]</p> <p>Step 2: [read the input] read n</p> <p>Step 3:[to check whether the number is prime or not]</p> <pre> int isprime(int m) { int x,i,min,max,j; if(m==0) { printf("enter x\n"); scanf("%d",&x); for(i=2;i<=x-1;i++) { if(x%i==0) { return(0); } } return(1); } p= isprime(n) </pre> <p>Step 4: [print the prime number] if(p==1) print(n is prime) else print(n is not prime)</p> <p>Step 6: [finished] stop</p>					
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph						
8	Observation Table, Look-up Table, Output	<p>Case 1:</p> <p>enter 1 for generating prime numbers till N enter 0 to check whether the given number is prime or not</p> <p>1 enter the minimum value and the maximum value 10 20</p>					

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		<p>the list of prime no's are :</p> <p>11 13 17 19</p> <p>Case 2:</p> <p>enter 1 for generating prime numbers till N</p> <p>enter 0 to check whether the given number is prime or not</p> <p>0</p> <p>enter the number</p> <p>5</p> <p>it is a prime number</p> <p>Case 3:</p> <p>enter 1 for generating prime numbers till N</p> <p>enter 0 to check whether the given number is prime or not</p> <p>0</p> <p>enter the number</p> <p>6</p> <p>it is not a prime number</p>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Theory of Algebra
13	Remarks	
14	Faculty Signature with Date	

Experiment 08 : Develop a program to implement Matrix multiplication.

-	Experiment No.:	8	Marks	Date Planned	Date Conducted
1	Title	Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.			
2	Course Outcomes	Develop a C code using Arrays			
3	Aim	To implement matrix multiplication			
4	Material Equipment Required	/Lab Manual			
5	Theory, Formula, Principle, Concept	Linear representation of 2-D arrays			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step 1: [start]</p> <p>Step 2: read the size of Matrix A and B</p> <p>Step 3: [validate]</p> <p>if matrix A column not equal to matrix B row</p> <p>print matrix multiplication is not possible</p> <p>Step 4: read the elements for Matrix A</p> <p>Step 5: read the elements for Matrix B</p> <p>Step 6: compute matrix multiplication</p> <p>step 7: stop</p>			
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph				
8	Observation Table,	1. enter the size of matrix a			

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	Look-up Table, Output	<pre> 2 2 enter the size of matrix b 2 2 enter the elements of matrix a 1 2 3 4 the matrix a is 1 2 3 4 enter the elements of matrix b 4 3 2 1 the matrix b is 4 3 2 1 The resultant matrix c is 8 5 20 13 2. enter the size of matrix a 1 2 enter the size of matrix b 1 2 Multiplication is not possible </pre>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Computer Graphics
13	Remarks	
14	Faculty Signature with Date	

Experiment 09 : Develop a Program to compute Sin(x) using Taylor series approximation.

-	Experiment No.:	9	Marks	Date Planned	Date Conducted
1	Title	Develop a Program to compute Sin(x) using Taylor series approximation. Compare your result with the built- in Library function. Print both the results with appropriate messages.			
2	Course Outcomes	Develop a C code using Repetitive statements			
3	Aim	To compute sin(x) using Taylor series and compare with built- in Library function			
4	Material Equipment Required	/Lab Manual			
5	Theory, Formula, Principle, Concept	Modular Representation			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: [start] Step 2: read the value of x in degrees Step 3: read the number of terms more than three Step 4: compute sin(x) value Step 5: compare using built-in function step 6: stop			
7	Block, Model, Circuit, Diagram,	-			

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	Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	enter x in degrees, eg: 45, 60, 90...etc 30 enter the no. of terms greater than three 4 sin value is 0.500059 sin value using built-in function is 0.500059
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Power flow analysis of electrical power systems
13	Remarks	
14	Faculty Signature with Date	

Experiment 10 : Write functions to implement string operations.

-	Experiment No.:	10	Marks	Date Planned	Date Conducted
1	Title	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.			
2	Course Outcomes	Develop a C code using String manipulation functions			
3	Aim	To implement string operations			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	String operations			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: [start] Step 2: read the two strings Step 3: compare two strings and print the result Step 4: concatenate two strings and print the concatenated string Step 5: compute string length step 6: stop			
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph				
8	Observation Table, Look-up Table, Output	enter the first string: sandhya enter the second string: divya strings are not equal length of the string is 7 concatenated string is sandhyadivya			
9	Sample Calculations				
10	Graphs, Outputs				
11	Results & Analysis				
12	Application Areas	Database Management system			
13	Remarks				

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14	Faculty Signature with Date	
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Experiment 11 :Develop a program to sort the given set of N numbers using Bubble sort.

-	Experiment No.:	11	Marks		Date Planned		Date Conducted	
1	Title	Develop a program to sort the given set of N numbers using Bubble sort.						
2	Course Outcomes	Develop a C code using Arrays						
3	Aim	To arrange the numbers in ascending order using bubble sort technique						
4	Material Equipment Required	/Lab Manual						
5	Theory, Formula, Principle, Concept	Data arrangement						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: [start] Step 2: read size of array Step 3: read the array elements Step 4: sort the array elements Step 5: print the sorted array elements step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output	enter the maximum no. of elements in the array: 5 Enter the elements in to the array 10 45 2 6 80 the sorted array is: 2 6 10 45 80						
9	Sample Calculations							
10	Graphs, Outputs							
11	Results & Analysis							
12	Application Areas	Bubble sort is used in programming TV remote to sort channels on the basis of longer viewing time						
13	Remarks							
14	Faculty Signature with Date							

Experiment 12 : Develop a program to find the square root of a given number N

-	Experiment No.:	12	Marks		Date Planned		Date Conducted	
1	Title	Develop a program to find the square root of a given number N and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n)						
2	Course Outcomes	Develop a C code using Repetitive statements						
3	Aim	To find the square root of a given number N without using library function						

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		sqrt(n)
4	Material Equipment Required	/Lab Manual
5	Theory, Formula, Principle, Concept	Derived datatype
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read n Step 3: compute square root using user defined function Step 4: print the square root of a number step 5: stop
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	Case 1: enter the no 64 the sqrt is 8.000 Case 2 : enter the no 12 the sqrt is 3.464
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Mathematical statistics
13	Remarks	
14	Faculty Signature with Date	

Experiment 13 : Implement structures to compute average- marks and the students scoring above and below the average marks for a class of N students.

-	Experiment No.:	13	Marks		Date Planned		Date Conducted	
1	Title	Implement structures to read, write, compute average- marks and the students scoring above and below the average marks for a class of N students.						
2	Course Outcomes	Develop a C code using structures						
3	Aim	To implement structure to compute student average marks for N students						
4	Material Equipment Required	/Lab Manual						
5	Theory, Formula, Principle, Concept	Derived datatype						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read number of students Step 3: read the student marks Step 4: compute average marks Step 5: print marks above and below average marks step 6: stop						
7	Block, Circuit, Model Diagram, Reaction Equation,	-						

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	Expected Graph	
8	Observation Table, Look-up Table, Output	<p>enter the number of students: 2</p> <p>enter the roll number: 32</p> <p>enter the name: sandya</p> <p>enter the marks in 2 subjects: 100 99</p> <p>roll no. name sub1 sub2 total average 32 sandya 100 99 100 Above Average</p> <p>enter the roll number: 33</p> <p>enter the name: vanitha</p> <p>enter the marks in 2 subjects: 100 99</p> <p>roll no. name sub1 sub2 total average 32 vanitha 100 99 100 Above Average</p>
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Computer Architecture
13	Remarks	
14	Faculty Signature with Date	

Experiment 14 :Develop a program using pointers to compute the sum, mean and standard deviation.

-	Experiment No.:	14	Marks	Date Planned	Date Conducted
1	Title	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers			
2	Course Outcomes	Develop a C code using pointers			
3	Aim	To compute sum, mean and standard deviation of all elements stored in an array of n real numbers using pointers			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	Address of memory location			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	<p>Step 1: start</p> <p>Step 2: read array elements</p> <p>Step 3: compute sum, mean and standard deviation</p> <p>Step 4: print the sum, mean and standard deviation</p> <p>step 5: stop</p>			
7	Block, Model, Reaction Equation, Circuit, Diagram,				

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	Expected Graph	
8	Observation Table, Look-up Table, Output	enter the max no. of elements an array 5 Enter the floating point(like:3.5...etc) elements into array 2.5 5.5 6.4 8.8 10.5 the value of sum=33.700001 and mean=6.740000 standard deviation is 3.082694
9	Sample Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Memory allocation
13	Remarks	
14	Faculty Signature with Date	

Experiment 15: Implement Recursive functions for Binary to Decimal Conversion

-	Experiment No.:	15	Marks	Date Planned	Date Conducted
1	Title	Implement Recursive functions for Binary to Decimal Conversion			
2	Course Outcomes	Develop a C code using recursion			
3	Aim	To convert Binary to Decimal number using recursion			
4	Material Equipment Required	/ Lab Manual			
5	Theory, Formula, Principle, Concept	Self- invoking functions			
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: start Step 2: read binary number Step 3: convert binary to decimal using recursive function Step 4: print the decimal number step 5: stop			
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph				
8	Observation Table, Look-up Table, Output				
9	Sample Calculations				
10	Graphs, Outputs				
11	Results & Analysis				
12	Application Areas	Computer Technology for encoding and decoding.			
13	Remarks				
14	Faculty Signature with Date				

Add required experiments

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