Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY, BENGALURU

LABORATORY PLAN

Academic Year 2018-19

Program:	B E – Basic Science
Semester :	2
Course Code:	18CPL27
Course Title:	C Programming Laboratory
Credit / L-T-P:	1/ 0-0-2
Total Contact Hours:	42
Course Plan Author:	Iranna S A

Academic Evaluation and Monitoring Cell

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INSTRUCTIONS TO TEACHERS

- Classroom / Lab activity shall be started after taking attendance.
- Attendance shall only be signed in the classroom by students.
- Three hours attendance should be given to each Lab.
- Use only Blue or Black Pen to fill the attendance.
- Attendance shall be updated on-line & status discussed in DUGC.
- No attendance should be added to late comers.
- Modification of any attendance, over writings, etc is strictly prohibited.
- Updated register is to be brought to every academic review meeting as per the COE.

Table of Contents

Note : Remove "Table of Content" before including in CP Book
Each Laboratory Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. LABORATORY INFORMATION

1. Laboratory Overview

Degree:	B E	*Program:*	BS
Year / Semester :	I/ II	*Academic Year:*	2018-19
Course Title:	C Programming Laboratory	*Course Code:*	18CPL27
Credit / L-T-P:	1 / 0-0-2	*SEE Duration:*	180 Minutes
Total Contact Hours:	40 Hrs	*SEE Marks:*	60 Marks
CIA Marks:	40	*Assignment*	-
Lab. Plan Author:	Iranna S A	*Sign*	Dt :
Checked By:		*Sign*	Dt :

2. Laboratory Content

Expt	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	L4 Analyze
7	Implement using functions to check whether the given number is prime and display appropriate messages. (No built-in math function)	2	Modular representation	L4 Analyze
	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	L4 Analyze
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	L4 Analyze
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	L4 Analyze
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	L4 Analyze
15	Implement Recursive functions for Binary to Decimal Conversion	2	Self- invoking functions	L3 Apply

3. Laboratory Material

Books & other material as recommended by university (A, B) and additional resources used by Laboratory teacher (C).

Expt.	Details	Expt. in	Availability

		book	
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
	Programming in ANSI C ,E. Balaguruswamy, 7th Edition,Tata McGraw-Hill		In Library
	The C Programming Language ,Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India.		In Library
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
	Sumitabha Das, Computer Fundamentals & C Programming, Mc Graw Hill Education.		In Library
	Gary J Bronson, ANSI C Programming, 4 th Edition, Ceneage Learning		
	Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.		
	R S Bichkar, Programming with C, University Press, 2012		
	V Rajaraman: Computer Programming in C, PHI, 2013.		
	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.		
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	https://www.youtube.com/watch?v=OeZm1jHQMgs		
C2	https://www.youtube.com/watch?v=qj_X9UwHXac https://www.youtube.com/watch?v=eytkPcvxb7o		
C3	https://www.youtube.com/watch?v=kT9vxEtV130		
C4	https://www.youtube.com/watch?v=xB3OnNnhDrU		
C5	https://www.youtube.com/watch?v=LEgitOGtgkM		
C6	https://www.youtube.com/watch?v=u93_v49rEx0		
C7	https://www.youtube.com/watch?v=j1-68rf0wsg		
C8	https://www.youtube.com/watch?v=Ranc3VvjI88		
C9	https://www.edureka.co/blog/pointers-in-c/		
D	**Software Tools for Design**	**-**	**-**
E	**Recent Developments for Research**	**-**	**-**
		?	In lib
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1			

4. Laboratory Prerequisites:

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

Students must have learnt the following Courses / Topics with described Content . . .

Expt.	Lab. Code	Lab. Name	Topic / Description	Sem	Remarks	Blooms Level

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Expt.	Topic / Description	Area	Remarks	Blooms Level

B. Laboratory Instructions

1. 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.	
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, should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.	
9	Any damage of the equipment or burn-out components 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, program code along with comments and output for various inputs given	

2. Laboratory 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	

C. OBE PARAMETERS

1. Laboratory Outcomes

Expt.	Lab Code #	COs / Experiment Outcome	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
-	-	**At the end of the experiment, the**	-	-	-	-	-

		student should be able to . . .					
1	18CPL27.1	Develop execution of C code using Turbo C compiler	02	Execution of simple C Code	Demonstrate	Viva & presentation	L3 Apply
2	18CPL27.2	Develop a C code using Conditional branching statements	08	Decision-making statements	Demonstrate	Viva & presentation	L3 Apply
3	18CPL27.3	Develop a C code using Looping statements	03	Looping statements	Demonstrate	Viva & presentation	L3 Apply
4	18CPL27.4	Develop a C code using Arrays	08	Linear representation	Demonstrate	Viva & presentation	L4 Analyze
5	18CPL27.5	Develop a C code using user defined functions.	09	Modular representation	Demonstrate	Viva & presentation	L4 Analyze
6	18CPL27.6	Develop a C code using String manipulation functions parameters	03	String operations	Demonstrate	Viva & presentation	L4 Analyze
7	18CPL27.7	Develop a C code using structures	03	Derived datatype	Demonstrate	Viva & presentation	L4 Analyze
8	18CPL27.8	Develop a C code using pointers	03	Address of memory location	Demonstrate	Viva & presentation	L4 Analyze
9	18CPL27.9	Develop a C code using recursion	03	Self-invoking functions	Demonstrate	Viva & presentation	L3 Apply
-		**Total**	**42**	-	-	-	-

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

2. Laboratory Applications

Expt.	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. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Expt.	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	-	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	-
1	CO1	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of Klystron Oscillator is essential to accomplish solutions to complex engineering problems in Electronics Engineering.	L2
1	CO1	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of microwave oscillators and working of Klystron Oscillators to accomplish solutions to complex engineering problems in Electronics engineering.	L3
1	CO1	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of microwave oscillators and working of Klystron Oscillators to accomplish solutions to complex engineering problems in Electronics engineering.	L6

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Experiment Outcomes	Program Outcomes														-
Expt.	CO.#	**At the end of the experiment student should be able to . . .**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	Level
1	18CPL27.1	Develop execution of C code using Turbo C compiler	2.5	2.5	2.5		2.5											L3
2,3,5	18CPL27.2	Develop a C code using Conditional branching statements	2.5	2.5	2.5		2.5											L3
4	18CPL27.3	Develop a C code using Looping statements	2.5	2.5	2.5		2.5											L3
6.8,11	18CPL27.4	Develop a C code using Arrays	2.5	2.5	2.5		2.5											L4
7.9,12	18CPL27.5	Develop a C code using user defined functions.	2.5	2.5	2.5		2.5											L4
10	18CPL27.6	Develop a C code using String manipulation functions parameters	2.5	2.5	2.5		2.5											L4
13	18CPL27.7	Develop a C code using structures	2.5	2.5	2.5		2.5											L4
14	18CPL27.8	Develop a C code using pointers	2.5	2.5	2.5		2.5											L4
15	18CPL27.9	Develop a C code using recursion	2.5	2.5	2.5		2.5											L3
-	**18CPL27**	**Average attainment (1, 2, or 3)**	**2.5**	**2.5**	**2.5**	-	**2.5**											-
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*															

5. Curricular Gap and Experiments

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Expt	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. Experiments Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

D. COURSE ASSESSMENT

1. Laboratory Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

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 C Program	02	1	-	-	-	-	-	1	CO1	L3
	PART-A										
2	Commercial calculator	02	1	-	-	-	-	-	1	CO2	L3
3	Quadratic equation	03	1	-	-	-	-	-	1	CO2	L3
4	palindrome or not.	02	1	-	-	-	-	-	1	CO3	L3
5	Electricity Bill	03	1	-	-	-	-	-	1	CO2	L3
6	Binary search	03	-	1	-	-	-	-	1	CO4	L4
7	Prime number or not	03	-	1	-	-	-	-	1	CO5	L4
	PART-B										
8	Matrix multiplication .	03	-	1	-	-	-	-	1	CO4	L4
9	Sin(x) using Taylor series	03	-	1	-	-	-	-	1	CO5	L4
10	string operations such as compare, concatenate, string length. .	03	-	1	-	-	-	-	1	CO6	L4
11	Bubble Sort	03	-	-	1	-	-	-	1	CO4	L4
12	square root of a given number N	03	-	-	1	-	-	-	1	CO3	L4
13	structures to read, write, compute average- marks	03	-	-	1	-	-	-	1	CO7	L4
14	the sum, mean and standard deviation	03	-	-	1	-	-	-	1	CO8	L4
15	Binary to Decimal Conversion	03	-	-	1	-	-	-	1	CO5	L3
-	**Total**	**42**	**5**	**5**	**5**	**-**	**-**	**-**	**15**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

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	CO6,CO7, CO8,CO9	L3,L4
Assignment - 1			
Assignment - 2			
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**

E. 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,	• welcome to SKIT college • this is the first program in ccp lab						

	Output	
9	Sample Calculations	-
10	Graphs, Outputs	-
11	Results & Analysis	-
12	Application Areas	Computer Science
13	Remarks	-
14	Faculty Signature with Date	-

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	Step 1: [start]
		Step 2: [accept the input]
		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);
		}
		
		Step 4: [print the result]
		print a,op,b,res
		Step 5: [finished]
		step 6: stop						

7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output	Enter the expression 5+6=11 Enter the expression						

		6-5=1 Enter the expression 5*6=30 Enter the expression 6/2=3 Enter the expression 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 appy Decision-making statements in quadratic equation						

6	Procedure, Program, Activity, Algorithm, Pseudo Code	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						

7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							

8	Observation Table, Look-up Table, Output	case 1 : enter the non-zero coefficient: 1 0 1 Invalid Input case 2: enter the non-zero coefficient: 1 2 3 complex roots root1=-1.000000+i1.414214 root2=-1.000000-i1.414214 case 3: enter the non-zero coefficient: 5 5 1 real roots root1=-0.276393 root2=-0.723607 case 4: enter the non-zero coefficient: 1 2 1 equal roots root1=-1.000000 root2=-1.000000
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	Step1: [start]
		Step2: [read no]
		Read n
		Step3: [assign reverse 0 and n to m]
		reverse=0,m=n
		Step4: [reverse the number]
		while(n≠0)
		digit=n%10
		n=n/10
		reverse=reverse*10+digit
		end while
		Step5: [Check whether reversed and original numbers are same]
		if(m==reverse)
		print "number is a palindrome"
		else
		print "number is not a palindrome"
		end if
		Step6: [finished]						

		Stop
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	case 1 : enter the number: 1221 number is palindrome case 2 : enter the number: 1234 number is not palindrome
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	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;
		Rs=Rs+100;
		}
		else if(unit>300)
		{
		Rs=unit*1.00;						

		Rs=Rs+100;
		}
		if(Rs>400)
		{
		Rs=Rs+(0.15*Rs);
		}
		Step 4: [print the result]
		print name,unit,Rs
		Step 5: [finished]
		step 6: [stop]

7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	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 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 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
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						
6	Procedure, Program, Activity, Algorithm, Pseudo Code	Step 1: [start] Step 2: [read the input] read n Step 3: [read the array elements] for(i=0;i<n;i++) read (arr[i]) Step 4:[enter the number to be searched] Read num 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);
		Step 6: [finished]
		stop

7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	enter the number of elements in the array in ascending order: 5 enter the elements: 12 23 34 45 56 enter the number that has to be searched: 34 34 is present in the array at position= 3
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	

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	Step 1: [start]
		Step 2: [read the input]
		read n
		
		Step 3:[to check whether the number is prime or not]
		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)
		Step 4: [print the prime number]
		if(p==1) print(n is prime)
		else
		print(n is not prime)
		
		Step 6: [finished]
		stop

7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	Case 1: enter 1 for genarating prime numbers till N enter 0 to check whether the given number is prime or not 1 enter the minimum value and the maximum value 10 20 the list of prime no's are : 11 13 17 19 Case 2: enter 1 for generating prime numbers till N enter 0 to check whether the given number is prime or not 0 enter the number 5 it is a prime number Case 3: enter 1 for generating prime numbers till N enter 0 to check whether the given number is prime or not 0 enter the number 6

		it is not a prime number
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	Step 1: [start] Step 2: read the size of Matrix A and B Step 3: [validate] if matrix A column not equal to matrix B row print matrix multiplication is not possible Step 4: read the elements for Matrix A Step 5: read the elements for Matrix B Step 6: compute matrix multiplication step 7: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output	1. enter the size of matrix a 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
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, Circuit, Model Diagram, 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	
14	Faculty Signature with Date	

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 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, Expected Graph	-						
8	Observation Table, Look-up Table, Output	enter the number of students: 2 enter the roll number: 32 enter the name: sandya enter the marks in 2 subjects: 100 99 roll no. name sub1 sub2 total average 32 sandya 100 99 100 Above Average enter the roll number: 33 enter the name: vanitha enter the marks in 2 subjects: 100 99 roll no. name sub1 sub2 total average 32 vanitha 100 99 100 Above Average						
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	Step 1: start Step 2: read array elements Step 3: compute sum, mean and standard deviation Step 4: print the sum, mean and standard deviation step 5: stop						
7	Block, Circuit, Model Diagram, Reaction Equation, 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	Step 1: start Step 2: read binary number Step 3: convert binary to decimal using recursive function						

	Code	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	

F. Content to Experiment Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Expt-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction Methods for Learning	Assessment Methods to Measure Learning
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
1	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code.	3	- L2 - L3	L3	- Illustrate -	- Demonstrate - -	- Viva & presentation
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)	3	- L2 - L3	L3	- Implement -	- Demonstrate - -	- Viva & presentation
3	Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.	3	- L2 - L3	L3	- Demonstrate -	- Demonstrate -	- Viva & presentation
4	Develop a program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages.	3	- L2 - L3	L3	-Illustrate -	- Demonstrate -	- Viva & presentation
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.	3	- L2 - L3	L3	-Illustrate -	- Demonstrate -	- Viva & presentation -

6	Introduce 1D Array manipulation and implement Binary search.	3	- L3 - L4	L4	- Demonstrate	- Demonstrate	- Viva & presentation
7	Implement using functions to check whether the given number is prime and display appropriate messages. (No built-in math function)	3	- L3 - L4	L4	- Implement -	- Demonstrate - -	- Viva & presentation - -
8	Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.	3	- L3 - L4	L4	- Demonstrate -	- Demonstrate	- Viva & presentation
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.	3	- L3 - L4	L4	-Illustrate -	- Demonstrate	- Viva & presentation
	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.	3	- L3 - L4	L4	- Demonstrate -	- Demonstrate	- Viva & presentation
	Develop a program to sort the given set of N numbers using Bubble sort.	3	- L3 - L4	L4	- Demonstrate	- Demonstrate	-Viva & presentation
	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).	3	- L3 - L4	L4	- Implement	- Demonstrate	-Viva & presentation
	Implement structures to read, write, compute average- marks and the students scoring above and below the average marks for a class of N students.	3	- L3 - L4	L4	- Implement	- Demonstrate	-Viva & presentation
	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.	3	- L3 - L4	L4	- Implement	- Demonstrate	-Viva & presentation
	Implement Recursive functions for Binary to Decimal Conversion.	3	- L2 - L3	L3	- Implement	- Demonstrate	-Viva & presentation

2. Concepts and Outcomes:

Table 2: Concept to Outcome – Example Course

Expt - #	Learning or Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome **Student Should be able to ...**
A	*I*	*J*	*K*	*L*	*M*	*N*
1	- Study of simple C program	- Compilation - execution - debugging	Execution of simple C Code	Illustrate the execution of basic C programs	- Develop - Turbo C compiler - C code	Develop execution of C code using Turbo C compiler

2	-Study of arithmetic operators, quadratic equation	- Conditional statements	Decision-making statements	Implement the different arithmetic operators in C, quadratic equation using decision making statements	- Develop - Conditional branching - C code	Develop a C code using Conditional branching statements
3	-Study of Palindrome	- Repetition statements	Looping statements	Illustrate positive integers to check palindrome using looping statements	-Develop - Looping statements - C code	Develop a C code using Looping statements
4	-Study of Binary Search Bubble sort, Matrix multiplication	-Arrays	Linear representation	Demonstrate 1-D,2-D in binary searching technique,bubble sort,matrix multiplication	- Develop - Arrays - C code	Develop a C code using Arrays
5	-Study of prime number, Taylor series, square root of number	-User Defined functions -	Modular representation	Implementing functions to check prime or not, Taylor series, square root of number	- Develop - User defined functions - C code	Develop a C code using user defined functions.
6	-Study of compare, concatenate, length	-String Manipulation functions	String operations	Demonstrate different types of string operations	- Develop - String manipulation functions - C code	Develop a C code using String manipulation functions parameters
7	-Study of read, write, compute average marks of student	- Structures -	Derived datatype	Implement structures in student database	- Develop - Structures - C code	Develop a C code using structures
8	-Study of sum, mean, standard deviation	-Pointers	Address of memory location	Implement pointers in sum, mean and deviation	- Develop - pointers - C code	Develop a C code using pointers
9	-Study of binary to decimal conversion	- Recursion	Self- invoking functions	Implement recursion for binary to Decimal conversion	- Develop - Recursive function - C code	Develop a C code using recursion