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COURSE DELIVERY MANUAL
(B.TechProgramme)

Name of Course with code	: EST 102, Programming in C
Offering Department	: Computer Science and Engineering
Semester &Programme (Branch)	: 2nd Semester, Common to all Branches
Course Instructor , Department	: Prof. TeenaGeroge, Prof.Rose Mary Varghese Prof.. Joseph George Prof. Shyama R Prof. T Sobha Prof. Prabhu M ,Dept. of CSE
Name & Designation of Stream Coordinator	: Prof. Nikhil Narayan, Prof. Rosemary Varghese Assistant Professor, Dept. of CSE
Academic Year & Batch	: 2023-24, 2023-27 (Even Semester)
Type of the Course Content*	: 1, 5 and 8
Course project linked (Y/N)	: Y

{* 1. Introductory 2. Theoretical 3.Problematic 4.Analytical 5.Programming 6.Simulation 7.Designing 8.Practical/implementation.}

1. Course Overview:

C is a powerful, flexible, portable and elegant structured programming language. Since C combines the features of high-level language with the elements of the assembler, it is suitable for both system and application programming. It is the most widely used general purpose language today for developing operating systems and embedded systems. Its influence is evident in almost all modern programming languages. This course covers the basic structure and elements of C

programs and their execution, Constants, variables and data types, operators and expressions, managing input and output operations, decision making of branching and looping, arrays and strings, user-defined and built-in functions, structures and unions, pointers, and file management. This course prepares the Engineering Graduates capable of writing readable C programs to solve computational problems that they may have to solve in their professional life.

2. **Course Prerequisites:**

Nil

3. **Course Syllabus:**

EST 102	**PROGRAMMING IN C**	**L**	**T**	**P**	**Credit**
		2	**1**	**2**	**4**
Module	**Contents**	**Contact Hours**		**Semester Exam Marks %**	
I	Basics of Computer Hardware and Software Basics of Computer Architecture: processor, Memory, Input& Output devices Application Software & System software: Compilers, interpreters, High level and low-level languages. Introduction to structured approach to programming, Flow chart Algorithms, Pseudo code (bubble sort, linear search - algorithms and pseudocode)	7		20%	
II	Program Basics Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types, Constants, Console IO Operations, printf and scanf Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators. Operators Precedence. Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using goto statement, While Loop, Do While Loop, For Loop, Break and Continue statements. (Simple programs covering control flow)	8		20%	
III	Arrays Declaration and Initialization, 1-Dimensional Array, 2-Dimensional Array String processing: In built String handling functions (strlen, strcpy, strcat, strcmp, puts and gets) Linear search program, bubble sort program, simple programs covering arrays and strings	7		20%	
IV	Introduction to modular programming, writing functions, formal parameters, actual parameters Pass by Value, Recursion, Arrays as Function Parameters structure, union, Storage Classes, Scope and life time of variables, simple programs using functions	7		20%	
V	Basics of Pointer: declaring pointers, accessing data though pointers, NULL pointer, array access using pointers, pass by reference effect File Operations: open, close, read, write, append Sequential access and random access to files: In built file handling functions (rewind(),	6		20%	

	fseek(), ftell(), feof(), fread(), fwrite()), simple programs covering pointers and files.		

Text Books

T1. Schaum Series, Gottfried B.S.,Tata McGraw Hill,Programming with C
T2. E. Balagurusamy, McgrawHill,Programming in ANSI C
T3. Asok N Kamthane, Pearson,Programming in C
T4. Anita Goel, Pearson, Computer Fundamentals

Reference Books

R1. Anita Goel and Ajay Mittal, Pearson, Computer fundamentals and Programming in C
R2. Brian W. Kernighan and Dennis M. Ritchie, Pearson, C Programming Language
R3. Rajaraman V, PHI, Computer Basics and Programming in C
R4. Yashavant P, Kanetkar, BPB Publications, Let us C

4. Course Objectives:

- To develop the skill of writing readable C programs to solve computational problems.
- To compile, debug and run a C program to get the desired output.

5. Course Outcomes:

After the completion of this course, students shall be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Compare various hardware and software components of a computer system.	K2
CO2	Design algorithm/flowchart for a given computational problem.	K2
CO3	Develop C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	K3
CO4	Develop C programs with arrays, structure or union for storing and processing the data.	K3
CO5	Implement multi-function C programs for a given computational problem.	K3
CO6	Build C programs which use pointers for array processing and parameter passing.	K3
CO7	Develop readable C programs with files for reading input and storing output.	K3

6. CO-PO and CO-PSO mapping:

CO\PO&PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2				2		1	2	1		1
CO2	2	1	2	1						1	2	1		1
CO3	3	2	2	1	2					2		2		2
CO4	3	3	2	1	2					2		2		3
CO5	3	3	3	1	2					2	2	2		3
CO6	3	2	2	1	2	2				2		2		1
CO7	3	2	2	1	2					2		2		1

1-Slightly, 2-Moderately, 3-Strongly

7. Gap in the Syllabus (Consolidated list of the gaps mentioned in the Syllabus):

SI No:	Description	Proposed Actions	Relevant COs ,POs
1	Command Line Arguments Array of Pointers	Written Assignment	CO3, CO6,CO7, PO1, PO2, PO3, PO5

8. Content Beyond Syllabus (To meet Research /Industry/Professional Requirements)

SI No:	Description	Proposed Actions	Relevant COs ,POs
1	**Eclipse** It is a modern tool used in the IT Industry for software development.	Practical session/Demonstration	CO1,CO3,PO1, PO2, PO5, PO12,PSO2

9. Schedule for implementation of the course:

Class	Topics and Subtopics	Learning Activities*/ Learning Assessments**	CO's	Reference No:
	Module No:1 & Contact hours required: 7			
1,2	Basics of Computer Architecture:Processor, Memory, Input& Output devices ,Input& Output devices	L-I/II	CO1	T4 Chp2

P1	***Practical (Familiarization of hardware and linux environment)(EXP 1)***	***LA8: IV (Graded)***	***CO1***	***Practical Manual Ex no: 1***
5	Application Software & System software: Compilers, interpreters, High level and low level languages	L-I/II	CO1	T4 Chp2
6	Introduction to structured approach to programming, Flow chart, Algorithms and Pseudo code for linear search ,Bubble sort	L-I/II	CO2	T4 Chp 8
7	**Flowchart (T)**	**T1-I**	***CO1***	**T2 22 – 51**
8	**Algorithms for simple programs (T)**	**T2-I**	***CO2***	**T2 22 – 51**
9	**Module Test- 1**	**LA1:V (Graded)**	**CO1 CO2**	
	Module No:2 & Contact hours required: 8			
10	Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types, Constants	L-I/II	CO3	T2 22 – 51
11	Console IO Operations, printf and scanf	L-I/II	CO2	T2 83 – 110
P2	***Familiarization of Linux environment – How to do Programming in C with Linux(EXP 2)***	***LA8: IV (Graded)***	***CO1, CO2, CO3***	***Practical Manual Ex no: 2***
14	Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size-of operator, Assignment operators and Bitwise Operators, Operators Precedence	L-I/II	CO3	T2 52 - 82
15	**Operators and Expressions (T): Programs**	**T3-I/IV**	CO3	T2 52 - 82
P3	***Exp. 3, 4***	***LA8: IV (Graded)***	***CO3***	***Practical Manual Exp. 3, 4***
18	Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using go-to statement.	L-I/II	CO3	T2 112 - 151
19	**Control Flow statements(T)**	**T4-I/IV**	**CO3**	T2 112 - 151
20	While Loop, Do While Loop, and For Loop,Break and Continue statements	L-I/II	CO3	T2 151 - 191

21	.**Eclipse:**Practical session/Demonstration	LA8:IV(Non-Graded)	CO1, CO3	Practical session/Demonstration
	Assignment: Programs on break and continue statements	**LA2: I (Graded)**	**CO3**	T2 151 - 191
P4	***Ex no: 5, Ex no: 6***	***LA8: IV (Graded)***	***CO3***	***Practical Manual Ex no: 5, Ex no: 6***
24	**Module Test- 2**	**LA3:V (Graded)**	***CO2, CO3***	
	Module No:3 & Contact hours required: 8			
25	Arrays Declaration and Initialization, 1-Dimensional Array	L-I/II	CO4	T2 192 - 196
26	Arrays Declaration and Initialization 2-Dimensional Array	L-I/II	CO4	T2 197 - 216
27	**Linear search program and bubble sort program (T)**	**T5-I/IV**	**CO4**	T2 203
28	**Simple programs covering arrays(T)**	**T6-I/IV**	**CO4**	T2 197 - 216
P5	***Ex no: 7 , 8, 9***	***LA8: IV (Graded)***	***CO4***	***Practical Manual Ex no: 7 , 8, 9***
31	String processing: In built String handling functions (strlen, strcpy, strcat, strcmp, puts, gets)	L-I/II	CO4	T2 237 - 266
32	**Simple programs covering strings (T)**	**T7-I/IV**	**CO4**	T2 237 - 266
P6	***Ex no: 10,11, 12***	***LA8: IV (Graded)***	***CO4***	***Practical Manual Ex no: 10,11, 12***
35	**Module Test-3**	**LA4:V (Graded)**	**CO4**	
	Module No:4 & Contact hours required: 7			
36	Introduction to modular programming writing functions,	L-I/II	CO5	T2 270 - 293
37	formal parameters, actual parameters, Pass by value	L-I/II	CO5	T2 270 - 293
38	Pass by Value, Recursion	L-I/II	CO5	T2 295

39	Arrays as Function Parameters	L-I/II	CO5	T2 296
40	**Simple programs using functions(T)**	**T8-I/IV**	**CO5**	T2 270 - 293
P7	***Ex no: 16, 17,18***	***LA8: IV (Graded)***	***CO5***	***Practical Manual Ex no: 16, 17,18***
43	**Structure and Union**	**T9-I/IV**	**CO5**	**T2 324 - 344**
44	Storage Classes, Scope and lifetime of variables	L-I/II	CO5	T2 324 - 344
P8	***Ex no: 13,14,15***	***LA8: IV (Graded)***	***CO4***	***Practical Manual Ex no: 13,14,15***
	Assignment on Storage classes, scope and lifetime of variables	**LA5:I (Graded)**	**CO5**	T2 324 - 344
47	**Module Test-4**	**LA6:I(Graded)**	**CO5**	
	Module No:5 & Contact hours required: 6			
48	Basics of Pointer: declaring pointers, accessing data through pointers, NULL pointer, Array access using pointers, pass by reference effect.	L-I/II	CO6	T2 357 – 374
49	**Simple programs using pointers(T)**	**T10-I/IV**	CO6	T2 369 - 374
50	File Operations: open, close, read, write, append	L-I/II	CO7	T2 395- 402
P9	***Ex no: 19, 20,21***	***LA8: IV (Graded)***	***CO6***	***Practical Manual Ex no: 19, 20,21***
53	Sequential access and random access to files	L-I/II	CO7	T2 403 – 406
54	In built file handling functions (rewind() ,fseek(), ftell(), feof(), fread(), fwrite())	L-I/II	CO7	T2 407 - 408
55	**Simple programs covering pointers and file (T)**	**T11-I/IV**	**CO6, CO7**	T2 **418**
56	**Module Test**	**LA7:V (Graded)**	**CO6, CO7**	

P10	***Ex no: 22, 23***	***LA8: IV (Graded)***	***CO7***	***Practical Manual Ex no: 22, 23***
	Course Project	**LA9:VI (Graded)**	**CO1, CO2, CO3, CO4, CO5, CO6, CO7**	**T2**

***Learning Activities**

i. Lecture (L)

I. Black board Teaching
II. Smart class Teaching

ii. Tutorial (T)

[A period of tuition or an intensive session given by a tutor or professor for one or several students, usually on a specific topic]

I. Problem solving
II. Presentation
III. Think Pair Share
IV. Practical session
V. Discussion

****Learning Assessment (LA) [Graded (G)/Non Graded(NG)]**

I Assignment
II Quiz
III Student Presentation
IV Practical session
V Test
VI. Others

10. Assessment Activity: (Sample Questions/topics can be given)

Sl No.	LearningActivity ReferenceNo:	Questions/topics
1	**LA1:V (Graded)**	Module Test 1
2	**LA2: I (Graded)**	Assignment: Programs on break and continue statements
3	**LA3:V (Graded)**	Module Test 2
4	**LA4:V (Graded)**	Module Test 3
5	**LA5:I (Graded)**	Assignment on Storage classes, scope and lifetime of variables
6	**LA6:V (Graded)**	Module Test 4
7	**LA7:V (Graded)**	Module Test 5
8	**LA8: IV(Graded)**	Lab experiments 1 to 23
9	**LA9:VI(Graded)**	Course Project

11. CO Assessment Strategy:

COs	Activities Planned	Type of Learning Activity	POs Mapped
CO1	LA1: Module Test	V	PO1, PO2, PO3, PO4
	Internal Assessment Test 1	V	PO1, PO2, PO3, PO4
	LA8:Practical – Exp 1,2 (P1,P2)	IV	PO1
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO6, PO10, PO11, PO12
CO2	LA1: Module Test	V	PO1, PO2, PO3, PO4
	LA3: Module Test	V	PO1, PO2, PO3, PO4
	Internal Assessment Test 1	V	PO1, PO2, PO3, PO4
	LA8:Practical – Exp 2,3,4,5,6(P2,P3,P4)	IV	PO1, PO5, PO10, PO12
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO6, PO10, PO11, PO12
CO3	LA2: Assignment	I	PO1, PO2, PO3, PO4
	LA3: Module Test	V	PO1, PO2, PO3, PO4
	Internal Assessment Test 2	V	PO1, PO2, PO3, PO4
	LA8:Practical – Exp 3,4,5,6 (P3,P4)	IV	PO1, PO5, PO10, PO12
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO6, PO10, PO11, PO12
CO4	LA4: Module Test	V	PO1, PO2, PO3, PO4
	Internal Assessment Test 2	V	PO1, PO2, PO3, PO4
	LA8:Practical – Exp 7,8,9,10,11,12,13,14,15 (P5,P6,P7)	IV	PO1, PO5, PO10, PO12
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO5, PO10, PO11, PO12
CO5	LA5: Assignment	I	PO1, PO2, PO3, PO4
	LA6: Module Test	V	PO1, PO2, PO3, PO4
	LA8:Practical – Exp 16,17,18 (P8)	IV	PO1, PO2, PO3, PO4, PO5,PO10, PO11, PO12
	Internal Assessment Test 2	V	PO1, PO2
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO6, PO10, PO11, PO12
CO6	LA8:Practical – Exp 19,20,21 (P9)	IV	PO1, PO2, PO5, PO10, PO12

	LA7: Module Test	V	PO1, PO2,PO5,PO10,PO12
CO7	LA8:Practical – Exp 22,23 (P10)	IV	PO1, PO2, PO5,PO10,PO12
	LA7: Module Test	V	PO1, PO2,PO5,PO10,PO12
	LA9: Course Project	VI	PO1, PO2, PO3, PO4, PO6, PO10, PO11, PO12

12. Grading Policy: (May be Changed based on Lab, Project, Seminar Scheme)

Internal Assessment Marks(50)	**Test(20 Marks)**	Internal Assessment Test 1(IA1)	Average of IA1 & IA2	10 Marks
		Internal Assessment Test 2(IA2)		
		Module Test 1,2,3,4 (LA1/LA3,LA4,LA6)	Best of 4	5 Marks
		Module Test-5 (LA7)		5 Marks
	Lab Assessment (20 Marks)	LA2,LA5(Assignment) LA8(Regular Lab Assessment) LA9(Course Project)	2 Marks 5 Marks 3 Marks	10 Marks
		Internal Assessment Test for Lab		10 Marks
	Attendance (10 Marks)			10 Marks

13. Course Project and Assessment (if any):

*(CO of the course project may be formulated.)

30%	40%	30%
Design	Simulation and output	Report

Course Project Questions:

Implement the following projects with multi-function multi-file programming for solving a given computational problem

- Library Management
- Student Record System
- Gaming with C programming
- Railway Reservation
- Calendar application
- Customer Billing System
- Admission management system
- Minesweeper Game

- Modern periodic table
- Employee Management System
- Contact Management System.
- Cricket Scorecard Management
- Cyber Management System.
- Departmental Store Management.
- Medical Store Management.
- Personal Diary Management.
- Phonebook Management System.
- Quiz Game Project.
- School Billing System.
- Snake Game Project.
- Student Record System.

CO assessment value(last academic year) (Individual CO values)	
Pass percentage (last academic year)	

Checklist to be filled by Stream Coordinator

	Yes/No
1. CDM Format is followed?	
2. COs are properly formulated?	
3. CO-PO Mapping formulated?	
4. Content beyond Syllabus included?	
5. Gaps Identification process done?	
6. Mapping of Course Project done?	
7. Separate CDM for add-on courses is included	

Name and Signature of the Course Instructor: **Date:**

Comments by the Stream Coordinator

Name and Signature of the Stream Coordinator: **Date:**

Name and Signature of the Academic Head: **Date:**

Name and Signature of the IQAC Coordinator: **Date:**

Name and Signature of the HOD: **Date:**

ANNEXURES

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the

engineering community and with society at large, such as, being able to comprehend an write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

After successful completion of the course, the student will be able to:

1. **PSO-1**
   Design and develop highly efficient and cost effective robotic and automation systems using advanced tools and control strategies.
2. **PSO-2**
   Apply the knowledge of robotics and automation to provide solutions in industrial and societal challenges.

CO-PO/CO-PSO JUSTIFICATION

Mapping	Strongly/Moderately /Slightly	Justification
CO1-PO1	Strongly	The knowledge of various hardware and software can be applied to solve problems.
CO1-PO2	Moderately	Knowledge in hardware and software helps to analyze complex problems.
CO1-PO3	Moderately	Helps to design and develop solutions for each problem.
CO1-PO4	Moderately	Helps in investigations of complex problems of both hardware and software through research.
CO1-PO8	Moderately	Apply ethical principles in engineering practice.
CO1-PO10	Slightly	Communicate effectively and give and receive clear instructions during presentations.
CO1-PO11	Moderately	Course project involving software and hardware provide management skills to the students.
CO1-PO12	Slightly	Recognize the need for engaging in lifelong learning of various hardware and software.
CO2-PO1	Moderately	The knowledge can be enhanced by implementing algorithm and flowchart using C programming.
CO2-PO2	Slightly	Algorithm and flowchart helps to analyze complex problems.
CO2-PO3	Moderately	The implementation of algorithm and flowchart helps to design solutions to complex C programs.
CO2-PO4	Slightly	Algorithms and flowchart can be used to solve complex engineering problems.
CO2-PO10	Slightly	Communicate effectively and give and receive clear instructions during presentations.
CO2-PO11	Moderately	Course project involving flowchart and algorithms provide management skills to the students.
CO2-PO12	Slightly	Recognize the need for engaging in lifelong learning of flowchart and algorithms.
CO3-PO1	Strongly	Knowledge of branching and looping statements can be effectively used to solve various problems.
CO3-PO2	Moderately	Analysis of algorithms based on branching,looping,operations etc. can be carried out.
CO3-PO3	Moderately	Efficient algorithms can be designed using arithmetic and logical operations,branching and looping statements.
CO3-PO4	Slightly	Complex problems can be efficiently solved using branching statements,looping statements etc.
CO3-PO5	Moderately	Implementation of complex problems using branching statements,looping statements etc.
CO3-PO10	Moderately	Communicate effectively and give and receive clear instructions during presentations.
CO3-PO12	Moderately	Recognize the need for engaging in lifelong learning of branching statements,looping statements etc.
CO4-PO1	Strongly	Knowledge of array and structure can be effectively

		used to solve various problems
CO4-PO2	Strongly	Analysis of algorithms based on array and structure can be carried out.
CO4-PO3	Moderately	Efficient algorithms can be designed using array ,structure and union.
CO4-PO4	Slightly	Complex problems can be efficiently solved using array,structure and union.
CO4-PO5	Moderately	Implementation of complex problems using array ,structure and union using C programming.
CO4-PO10	Moderately	Communicate effectively and give and receive clear instructions during presentations.
CO4-PO12	Moderately	Recognize the need for engaging in lifelong learning of array,structure and union.
CO5-PO1	Strongly	Knowledge of multi function can be used to solve engineering problems
CO5-PO2	Strongly	Knowledge of multi function can be applied to analyze problems and reach conclusions.
CO5-PO3	Strongly	Knowledge of multi function can be applied to design solutions
CO5-PO4	Slightly	Multi function methods can be applied to solve complex problems.
CO5-PO5	Moderately	Implementation of different multi-function using C language.
CO5-PO10	Moderately	Communicate effectively and give and receive clear instructions during presentations.
CO5-PO11	Moderately	Course project involving the concept of multi-function provide management skills to the students.
CO5-PO12	Moderately	Recognize the need for engaging in lifelong learning of multi functions methods.
CO6-PO1	Strongly	The knowledge about non linear data structure can be enhanced by implementing that data structure using any programming language.
CO6-PO2	Moderately	Analyze the problems related to pointers,parameter passing etc. can be carried out
CO6-PO3	Moderately	The implementation of pointers,parameter passing methods help to design solutions to engineering problems.
CO6-PO4	Slightly	Pointer concept can be used to solve complex engineering problems.
CO6-PO5	Moderately	Implementation of various applications oriented programs using pointers and parameter passing methods.
CO6-PO6	Moderately	The engineering problem can be beneficial to society.
CO6-PO10	Moderately	Communicate effectively and give and receive clear instructions during presentations.
CO6-PO12	Moderately	Recognize the need for engaging in lifelong learning of pointers,parameter passing methods.
CO7-PO1	Strongly	Fundamental knowledge in the concept of files can be used in research and other areas.
CO7-PO2	Moderately	Concept of files helps to design an efficient solutions to complex problems.

CO7-PO3	Moderately	Knowledge of files helps in suitable representation and there by in interpretation of data can be done efficiently.
CO7-PO4	Slightly	The knowledge of file help to analyze and design solutions
CO7-PO5	Moderately	Implementation of concept of file helps for solving engineering problems.
CO7-PO10	Moderately	Good team work and communication can be the key to a successful project.
CO7-PO12	Moderately	File concepts are being used in course projects related to network security.

CO1-PSO2	Slightly	Course project requires the understanding of various softwares.
CO2-PSO2	Slightly	Course project includes various algorithms and flowcharts.
CO3-PSO2	Moderately	Course project includes the use of concept of branching and looping statements.
CO4-PSO2	Strongly	Course project includes the use of concept of array, union ,structures etc.
CO5-PSO2	Strongly	Course project includes the use of concept of multi-function.
CO6-PSO2	Slightly	Course project includes the use of concept of pointers,parameter passing methods etc.
CO7-PSO2	Slightly	Course project includes the use of concept of files.