| | | |
|---|---|---|
| **Course Title** | : | Problem Solving & Computer Programming |
| **Course Code** | : | 19SC1101 |
| **L-T-P-S Structure** | : | 3-0-2-0 |
| **Credits** | : | 4 |
| **Pre-requisite** | : | Problem Solving Ability, Logical Thinking |
| **Course Coordinator** | : | Mr.N.SreeRam |

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**Course Objective:** The objective of the course is to equip the student with problem solving skills using C Language and associated Data Structures to provide the student details about algorithms used in typically familiar problems, and a few details about the essential ingredients of the programming language C and fundamental Data Structures.

**Course Rationale:** The course takes an imperative view of problem solving through programming using C programming language. This necessitates data abstraction, basics of data structures, and an introduction to the GNU/Linux operating system and programming the medium level language C. Student is professionally trained in algorithms, flowcharts, analysis of a problem and translating the same into a C program. The students are made to write C programs on their own for sets of both mathematical and other engineering problems after exposing them to the different constructs of C language namely Input/output, assignments, iteration and control structures. Finally the student is acquainted with basic data structures like stacks, queues, lists etc.

## COURSE OUTCOMES (COs):

| CO# | Course Outcome Description | PO/PSO | BTL |
|-----|---------------------------|--------|-----|
| CO1 | Illustrate how problems are solved using computers and programming. | PO1, PO2 | 3 |
| CO2 | Illustrate use of Control Flow Statements in C. | PO1, PO2 | 3 |
| CO3 | Interpret & Illustrate user defined functions and different operations on list of data. | PO1, PO2 | 3 |
| CO4 | Implement Linear Data Structures and compare them. | PO4 | 3 |
| CO5 | Apply the knowledge obtained by the course to solve real world problems in laboratory. | PO1, PO2, PO4 | 3 |

## COURSE OUTCOME INDICATORS (COIs):

| CO No. | COI-1 (BTL-3) | COI-2 (BTL-3) | COI-3 (BTL-3) | COI-4 (BTL-3) |
|--------|---------------|---------------|---------------|---------------|
| CO-1 | Describe problem solving techniques and how to translate a flowchart to a C program. | Understanding various Data types in C language including pointers. | Illustrate different types of C – Operators. | Implement the operator precedence rules, Files |
| CO-2 | Interpret & Solve Decision making problems. | Solve problems by using while and for loop | Illustrate Looping by (do-while) | Solve the problems using Control Structures |
| CO-3 | Experiment with various library functions and storage classes | Apply recursive functions to solve real world problems | Make use of searching and sorting | Implement the modular programming in |

| | | | techniques to solve real world problems | solving real world problems |
|---|---|---|---|---|
| **CO-4** | Interpret user-defined data types & Illustrate different operations on strings. | Implement Linear Data Structures and stacks and queues (with structure pointers) | Implement linear data structures using linked list | Building trees for list of items |

## PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES (POs/PSOs)

### Program Objectives

**PO1** An ability to apply knowledge of mathematics, science and engineering

**PO2** An ability to identify, formulate, and solve engineering problems

**PO3** an ability to design a system, component, or process to meet desired needs within realistic Constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

**PO4** An ability to design and conduct experiments, as well as to analyze and interpret data

### Program Specific Objectives

**PSO1** An ability to design and develop software projects, as well as to analyze and test user requirements.

**PSO2** Working knowledge on emerging software tools and technologies.

### SYLLABUS (As approved by BoS):

Problem Solving Approach, **Algorithms and Algorithm Analysis**, Program Development Steps, Structure of C Program, Pre-Processor Directives, **Formatted I/O**,**C Tokens, Data Types**: Primitive, Extended and Derived Including Pointers, Operators, Precedence, Associativity , **Redirecting I/O** : Files and File Operations , **Control Flow Statements, Functions, Recursion**, Scope of Variables and Storage classes, **Arrays,** 2-D Arrays, Dynamic Memory Allocation, **Searching:** Linear Search and Binary Search, **Sorting:** Bubble Sort, **Strings**, **Structures and Unions**, Introduction to **Stacks**-Implementation using array, Introduction to Queues – Linear **Queue**-Implementation using array, Introduction to **Lists:** Single Linked List-Insertion, Deletion, Display, Introduction to **Trees**- Binary tree, Definition, Terminology.

### TEXT BOOKS:-

1. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language: ANSI C Version", 2/e, Prentice-Hall/Pearson Education-2005.

2. E. Balagurusamy, **"**Programming in ANSI C" 4th ed., Tata McGraw-Hill Education, 2008.

3. R. F. Gilberg, B. A. Forouzan, "Data Structures", 2nd Edition, Thomson India Edition-2005.

### REFERENCE BOOKS:-

1. Mark Allen weiss, Data Structures and Algorithm Analysis in C, 2008, Third Edition, Pearson Education.

2. Horowitz, Sahni, Anderson Freed, "Fundamentals of Data structures in C", 2nd Edition-2007.

3. Robert Kruse, C. L. Tondo, Bruce Leung, Shashi Mogalla, "Data structures and Program Design in C", 4th Edition-2007.

4. C for Engineers and Scientists – An Interpretive Approach by Harry H. Cheng, Mc Graw Hill International Edition-2010.

5. Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", 7/e, Pearson Education-2004.

6. Jean Paul Trembly Paul G.Sorenson, "An Introduction to Data Structures with applications", 2nd Edition.

**OTHER BOOKS, REFERENCES: (As recommended for reference by the course team, if any): Nill**

**Deviations (if any) from BoS approved syllabus and the topics planned: Nill**
*(Clearly state each deviation and give brief explanation on justifying the deviation)*

**WEB REFERNCES/MOOCs:**
1. www.hackerrank.com
2. www.codechef.com
3. www.spoj.com

## COURSE DELIVERY PLAN:

| Session. No. | CO | COI | Topic (s) | Book No [CH No] [Page No] | Teaching-Learning Methods | Evaluation Components |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Introduction, Algorithms and flowcharts. | [R5-PP.1-25] | Lecturing, Discussion | SIE-1/SEE |
| 2 | | 1 | Algorithms and flowcharts, Algorithm Analysis | [R5-PP.1-25] | Lecturing, Discussion | SIE-1/SEE |
| 3 | | 2 | Introduction to C programming language-structure of C & formatted I/O. | [T1-PP.1-46] | Lecturing, Discussion | SIE-1/SEE |
| 4 | | 2 | Basics of C Language - Tokens. | [T1- PP.1-46] | Lecturing, Discussion | SIE-1/SEE |
| 5 | | 2 | Data Types | [T1- PP.1-46] | Lecturing, Discussion | SIE-1/SEE |
| 6 | | 2 | Redirecting I/O – Files & File Operations. | [T1- PP. 370-384] | Lecturing, Discussion | SIE-1/SEE |
| 7 | | 3 | Arithmetic, relational, and logical operators. | [T1- PP. 52-59] | Lecturing, Discussion | SIE-1/SEE |
| 8 | | 3 | Increment and decrement operators, conditional, assignment and special operators. | [T1- PP. 61-63] | Lecturing, Discussion | SIE-1/SEE |
| 9 | | 3 | Special Operators, Operators precedence, operators associativity, Expression evaluation rules | [T1- PP. 64-72] | Lecturing, Discussion | SIE-1/SEE |
| 10 | | 3 | Bit- wise operators. | [T1- PP. 52-59] | Lecturing, Discussion | SIE-1/SEE |
| 11 | 2 | 1 | Simple-if and if-else statement | [T1- PP. 114-119] | Lecturing, Discussion | SIE-1/SEE |
| 12 | | 1 | Else-if ladder statement | [T1- PP. 126-128] | Lecturing, Discussion | SIE-1/SEE |
| 13 | | 1 | Nested – If and Switch case statement | [T1- PP. 129-132] | Lecturing, Discussion | SIE-1/SEE |

| 14 | | 2 | *While loop statement* | [T1- PP. 154-156] | Lecturing, Discussion | SIE-1/SEE |
|---|---|---|---|---|---|---|
| 15 | | 2 | For loop statement | [T1- PP. 159-170] | Lecturing, Discussion | SIE-1/SEE |
| 16 | | 2 | For loop statement | [T1- PP. 159-170] | Lecturing, Discussion | SIE-1/SEE |
| 17 | | 2 | Do-while loop statement | [T1- PP. 157-158] | Lecturing, Discussion | SIE-1/SEE |
| | | | Revision - 1 | | | |
| 18 | 3 | 1 | Functions –Basic concepts, Types, Categories of functions | [T1- PP. 262-287] | Lecturing, Discussion | SIE-2/SEE |
| 19 | | 1 | Functions – function pointer, call by value and call by reference. | [T1- PP. 262-287] | Lecturing, Discussion | SIE-2/SEE |
| 20 | | 1 | Recursive Function – Introduction, Examples | [T1- PP 288-289] [Web Ref – 1] | Lecturing, Discussion, visualization | SIE-2/SEE |
| 21 | | 1 | Recursive Function – practice | [T1- PP 288-289] | Lecturing, Discussion, visualization | SIE-2/SEE |
| 22 | | 1 | Storage Classes – Introduction, Types, Examples | [T1- PP. 295-303] | Lecturing, Discussion | SIE-2/SEE |
| 23 | | 2 | Arrays – 1 Dimensional array | [T1- PP. 192-198, T3- PP.597-600] | Lecturing, Discussion | SIE-2/SEE |
| 24 | | 2 | Arrays – pointer to an array, array of pointers | [T1- PP. 192-198, T3- PP.597-600] | Lecturing, Discussion | SIE-2/SEE |
| 25 | | 2 | Arrays – 2 Dimensional array | [T1- PP. 199-208] | Lecturing, Discussion | SIE-2/SEE |
| 26 | | 2 | Linear search | [T1- PP. 192-198, T3- PP.597-600] | Lecturing, Discussion | SIE-2/SEE |
| 27 | | 2 | Binary search | [T1- 603-607] [Web Ref – 1] | Lecturing, Discussion | SIE-2/SEE |
| 28 | | 2 | Sorting on numeric data– Bubble sort | [T3- PP. 558-560] | Lecturing, Discussion | SIE-2/SEE |
| 29 | 4 | 1 | Operations on Strings | [T1- PP. 229-241] | Lecturing, Discussion | SIE-2/SEE |
| 30 | | 1 | Operations on Strings & string pointers | [T1- PP. 242-250] | Lecturing, Discussion | SIE-2/SEE |
| 31 | | 1 | Introduction to structures | [T1- PP. 317-326] | Lecturing, Discussion | SIE-2/SEE |
| 32 | | 1 | Structures and structure pointers and unions. | [T1- PP. 317-326] | Lecturing, Discussion | SIE-2/SEE |
| 33 | | 2 | Implementation of stacks using arrays. | [T3-PP.79-82] [Web Ref – 2] | Lecturing, Discussion | SIE-2/SEE |
| 34 | | 2 | Implementation of queues using arrays. | [T3-PP. 148-151] | Lecturing, Discussion | SIE-2/SEE |
| 35 | | 2 | Definition and Implementation of single linked list | [T3- PP.197-202,216-219] [Web Ref -3] | Lecturing, Discussion | SIE-2/SEE |
| 36 | | 2 | Introduction to Trees | [T3- PP.197-202,216-219] | Lecturing, Discussion | SIE-2/SEE |

| | | | Revision - 2 | | | |
|---|---|---|---|---|---|---|
| | | | Revision - 3 | | | |

## SESSION WISE TEACHING – LEARNING PLAN

**SESSION NUMBER: 01**
**Session Outcome:** At the end of this session on INTRODUCTION, ALGORITHMS AND FLOWCHARTS, Students will be able
1. To write algorithms for linear problems.
2. To write flowcharts for linear problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Introduction:**<br>Introduction about the need of C&DS course | | | |
| 10 | Course handout discussion:-<br>Regarding Syllabus and text books, evaluation pattern, division of course competencies, regarding lab taken to class evaluation procedure. | 1 | Lecturing, Discussion | |
| 15 | What is a flowchart and Algorithm? And its need in s/w development. How to draw flowchart and how to design an algorithm for a given application (or program)? Example program: Write an algorithm and draw flowchart to withdraw cash from ATM**(Medium)** | 1 | Lecturing, Discussion | |
| 15 | Draw flowchart & algorithm to illustrate the following. Vishnu Limited calculates discounts allowed to customers on the following basis **(Hard)**<br><br>| Order quantity | Normal discount |<br>|---|---|<br>| 1-99 | 5% |<br>| 100-199 | 7% |<br>| 200-499 | 9% |<br>| 500 and above | 10% | | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 02**
**Session Outcome:** At the end of this session on ALGORITHMS AND FLOWCHARTS, Students will be able:
1. To design algorithms for iterative problems.
2. To design flowcharts for iterative problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction**<br>Recap previous class topic and introduction to algorithms and charts. | | | |
| 20 | Use an algorithm to print all natural numbers from 1 to N to make the students to understand design of algorithm and flow chart for iterative problems.**(Easy)** | 1 | Lecturing, Discussion | |
| 20 | Ask the Students to do the following practicing problem.<br>1. Write an algorithm and flowchart to print all even numbers between 1 to N**(Medium)**<br>2. Write an algorithm and flowchart to print sum of first N natural numbers. **(Hard)** | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 03**

**Session Outcome:** At the end of this session on INTRODUCTION TO C LANGUAGE, Students will be able:
1. To know the structure of the C program
2. To know the pre-processor directives and formatted IO.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** Recap previous class topic and introduction to C Language | | | |
| 20 | Explanation of structure of C program with one example program- to find the area of a circle.**(Easy)** | 1 | Lecturing, Discussion | |
| 15 | Explanation of pre-processor and directives with one example program to find the potential energy of a body with a mass dropped from a height (Hint acceleration due to gravity g=9.8m/sec2) **(Easy)** | 2 | Lecturing, Discussion | |
| 10 | Explanation of formatted I/O with the above 2 examples. | | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 04**

**Session Outcome:** At the end of this session on INTRODUCTION TO C LANGUAGE, Students will be able:
1. To know the character set of C Language.
2. To know the C tokens.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** Explain brief history and characteristics of C programming | | | |
| 10 | Definition of compiler, interpreter, and their difference. | 1 | Lecturing, Discussion | |
| 10 | Explanation of C character set, tokens, identifiers, keywords, operators, constants with possible examples. | 1 | Lecturing, Discussion | |
| 20 | Explanation of tokens (keywords, identifiers, and constants) | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 05**

**Session Outcome:** At the end of this session on DATA TYPES student will be able:
To understand the various data types and their usage.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap/Introduction:** Recap previous class topic | | | |
| 30 | Explanation of various primitive data types (size and range of values). Introduction to pointers, explanation about the pointers and its usage with below example Explanation of input and output statements. | 1 | Lecturing, Discussion | |
| 10 | Ask the student to find the required data types to store age of a person, sex, mobile number and his weight in kgs (Eg.71.25 kgs). **(Easy)** | 2 | Lecturing, Discussion | |

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| | 1. *Write a C program to find Voltage (V) between two points of an electronic iron for the given Resistance(R) and Current (I).*<br>2. Ask the student to find sum of two numbers using pointers. **(Medium)** | 3 | | |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER:  06**
**Session Outcome:** At the end of this session on FILES student will be able:
1.  To re direct input and output of a program to a file.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap/Introduction:**<br>Recap all previous class topics and introduction to Files in C. | | | |
| 25 | Explanation of use of files, different file operations(r,w,a+,w+),fopen(),fclose(),fscanf(),fprintf() | 1 | Lecturing, Discussion | |
| 15 | Ask the student to read two different numbers from the file(numbers.dat), with the help of the pointers calculate product of it and rewrite the result into the same file.**(Medium)** | 2 | Lecturing, Discussion | |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER: 07**
**Session Outcome:** At the end of this session on OPERATORS, Students will be able:
1.  To use arithmetic and relational operators in different C programs.
2.  To write decision making C programs.
3. To use bitwise operators

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:**<br>Explain the use of operators in C | | | |
| 10 | 1. A computer programming contest requires teams of 5 members each. Write a program that asks for the number of players and then give the number of teams and number of players leftover?**(Easy)** | 1 | Lecturing, Discussion | |
| | 2. Ask the students to write either algorithm or program to find given number is positive or negative or zero number.**(Medium)** | 2 | | |
| | 3. *Write a C program to find the potential difference between the ends of second resistor. If the current passing through this piece of circuit is i, power spent on the first*  *resistance is 100watt.* **(Medium)**  $100watt=i^2.4\Omega$ | 3 | | |

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 15 | Explanation of arithmetic, relational and conditional operators with above problems. | 1 | Lecturing, Discussion | |
| 20 | Explanation of logical operators.  Explain how to use pointers in expressions and possible arithmetic operations on pointers. | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |

**SESSION NUMBER:  08**

**Session Outcome:** At the end of this session on OPERATORS, Students will be able:

1.  To use increment and decrement operators in different programs.
2.  To use assignment operators in different programs.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 15 | Explain increment and decrement operators, assignment operator with examples. | 1 | Lecturing, Discussion | |
| 15 | 1. Identify the output of the following code snippet **(Medium)**<br>1.   int  i=3,y,x=4;<br>    y = i++ + x;<br>    printf("%d",y);<br>2.   int  i=3,y,x=4;<br>    y = ++i + x;<br>    printf("%d",y);<br>3.   int  i=3,y,x=4;<br>    y = i++ + x + i;<br>    printf("%d",y);<br><br>2.  *Write a C Program to find out Distillation Column height and diameter* **(Medium)** | 2<br><br>3 | Lecturing, Discussion | Test  Question |
| 15 | 3.  Given the following declarations:<br>    int x=10, y = 10;<br>    int *p1 = &x, *p2=&y;<br>  What is the value of each of the following expressions? **(Medium)**<br>(a)   (*p1)++<br>(b)   −(*p2)<br>(c)   *p1 + (*p2)--<br>(d)   ++(*p2) - *p1 | 2 | Lecturing, Discussion | Test  Question |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |

**SESSION NUMBER:  09**

**Session Outcome:** At the end of this session on EXPRESSION EVALUATION RULES, Students will be able:

1.  To understand the precedence and associativity of C operators
2.  To evaluate the C expressions.
3.  To use special operators.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 5 | **Recap/Introduction:**<br>Recap all previous class operators and Expression evaluation rules. | | | |
| 10 | Explain special operators. | | | |
| 15 | 1. Evaluate the following expression using BODMAS rule. **(Easy)**<br>7+(8%3)-12*30/6.<br><br>2. find o/p of following: **(Easy)**<br>void main()<br>{<br>Int a,b=3;<br>char c='a';<br>a=b+c;<br>printf("%d\n",a);<br>}<br>3. *Write a C Program to find out Reynold Number, Prandtl No., Heat Transfer Coefficients, Catalyst Surface temperature.* **(Medium)**<br><br>4. *Write a C Program for "Newton Raphson" method (To find out the root of the equation).* **(Medium)** | 1<br><br>2<br><br><br><br><br><br><br><br>3 | Lecturing, Discussion | QUIZ |
| 15 | We will explain precedence and associativity of all operators in C. we will explain rules for expression evaluation. And also explain implicit and explicit type conversion. | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||| 

**SESSION NUMBER : 10**
**Session Outcome:** At the end of this session on BIT WISE Operators student will be able:
1. To understand the operations
2. To evaluate the expression with bitwise operators

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap/Introduction:**<br>Recap all previous class operators. | | | |
| 10 | Explanation of Bitwise operators (Bitwise AND,OR,NOT,XOR) | 1 | Lecturing, Discussion | |
| 10 | Ask the students to practice the following problems **(Easy)**<br>1. Void main()<br>{<br>int a=12,b=25;<br>printf("a&b=%d",a&b);<br>printf("a\|b=%d",a\|b);<br>printf("~a=%d",~a);<br>printf("~b=%d",~b);<br>}<br>2. Swap two values by using XOR operators.<br>3. *Write a C Program to simulate AND, OR and NOT logic gates by allowing the user input binary values for A and B.* | 2<br><br><br><br><br><br><br><br><br><br>3 | Lecturing, Discussion | |

| 10 | Explanation of Bitwise shift operators (left shift, right shift) | 1 | Lecturing, Discussion | |
|---|---|---|---|---|
| 10 | Ask the student to solve the following problems: **(Medium)** <br> 1. Void main() <br> { <br> int a=212,b,c; <br> b=a<<2; <br> c=a>>3; <br> printf("b=%d,c=%d",b,c); <br> 2. Ask the student how to double and half the values by using bitwise left shift and right shift operators. | 2 | Lecturing, Discussion | |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER: 11**

**Session Outcome:** At the end of this session on **SIMPLE-IF STATEMENTS**, Students will be able:

1. To use simple conditional statements in real time applications
2. To write C programs using decision making.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap/Introduction:** <br> Recap all previous class Bitwise operators and Simple-if statements. | | | |
| 15 | Ask the student to write an algorithm to illustrate the following. <br> Indian Cricket Team went to toss with its opposite team captain. If India wins the toss display "India selected to bat" otherwise display "India selected to Field" as the message. | 2 | Lecturing, Discussion | |
| 15 | Use the above problem to explain the syntax and execution flow of simple if and if-else statements. Discuss running time complexities. | 1 | Lecturing, Discussion | |
| 10 | Ask the student to practice the following program (with and without pointers) and also Find time complexity. **(Medium)** <br> 1. To check given input character is vowel or consonant. <br> 2. Write a program to find whether the number can be divisible by both 5 and 3 or not. | 2 | Lecturing, Discussion | QUIZ |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER: 12**

**Session Outcome:** At the end of this session on **ELSE-IF LADDER STATEMENT and Switch**, Students will be able:

1. To solve multi decision problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** Introduction to Else-If Ladder Statement | | | |

| | | | | |
|---|---|---|---|---|
| 10 | 1. Ask the student Write a program (using pointers) to read a positive number and then find out whether it is one digit number or 2-digit number or 3-digit number or 4-digit number or 5-ditgit number or other than these cases number. | 2 | Lecturing, Discussion | |
| 10 | Use above program to make them to understand syntax of else-if ladder statement and its execution flow. | 1 | Lecturing, Discussion | |
| 10 | Ask the student to execute practice session-1 program in their laptops. **(Medium)**<br>1. Ask the student to execute the following a number is special if it is divisible by 15. A number is big if it is greater than 999. A number is weird if it is divisible by 5 and 6 but not 18. A number is scary if it is big or weird. Declare four variables called special, big, weird and scary and make suitable assignments to these variables as a number is tested.<br>2. *Reynolds number is a dimensionless property, it is used to find the flow type of the fluid. This data is useful is Fluid Mechanics, Heat and Mass transfer and many other subjects. But for our discussion the user will enter the Reynold's number and we will determine the type of the flow using the table below. We will accomplish the task using Matlab.*<br><br>| Flow Type | Reynolds Number(Re) |<br>|---|---|<br>| Laminar | Re< 2300 |<br>| Transient | 2300<Re<4000 |<br>| Turbulent | Re>4000 | | 2<br><br><br><br><br><br><br><br><br><br>3 | Lecturing, Discussion | QUIZ |
| 10 | Explain syntax of switch-case statement and its execution flow.<br>1. Write a program to read a number between 1 to 7 and then display its corresponding day name. **(Medium)** | 2 | Lecturing, Discussion | |
| | 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | |

**SESSION NUMBER:  13**
**Session Outcome:**  At the end of this session on **NESTED IF-ELSE STATEMENT**, Students will be able:
1. To solve multi decision problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:**<br>Recap all previous class and Introduction to nested if else statement | | | |
| 10 | Ask student to write an algorithm for biggest of 3 numbers. **(Easy)** | 1 | Lecturing, Discussion | |

| 10 | Explanation of nested if else with above problem. | 2 | Lecturing, Discussion | |
|---|---|---|---|---|
| 10 | Ask the student to execute the practice session problem1. | 2 | | |
| 10 | Ask the student to write algorithm for following problems and also execute. **(Hard)**<br>Raja went to Trendset mall on x vehicle to buy dresses for his family. He parked the vehicle in malls paid parking area and completed shopping. After he returns he has to pay for the parking. Now you have to calculate the parking charges for the vehicle. Enter the type of the vehicle as a character(c for car, b for bike, a for auto).you have to read the hours and minutes when the vehicle enters the parking slot and when it is leaving. Write a C program to Calculate the total parking fees. The Trendset mall has fixed the rates as shown below.(Using nested if else)<br><br>| Vehicle name | Rate till 3 hours | Rate after 3 hours |<br>|---|---|---|<br>| Truck/Auto | 20 | 30 |<br>| Car | 10 | 20 |<br>| Motorcycle/Scooter | 5 | 10 | | 2 | Lecturing, Discussion | |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER:  14**

**Session Outcome:**  At the end of this session on **control structures** Students will be able:

1. Basic concepts of While loop
2. Exercise problems on While loop

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:**<br>Introduction of control structures<br>1. Recap conditional or decision statements.<br>2. Introduction of iterative statements(for,while,do-whie) | | | |
| 10 | Syntax and flow chart explanation of **While** loop | 1 | Lecturing, Discussion | |

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 30 | 1. Write a program to print numbers from 1 to 10 using while loop. **(Easy)** <br><br> 2. Give a task to students to print first 10 even numbers using while loop. **(Medium)** <br><br> 3. Write a program to print multiplication table up to N multiples using While loop. **(Medium)** <br><br> 4. Write a program to print fibanocci sequence up to N terms. **(Medium)** <br><br> 5. **(Medium)** <br> 1 <br> 1 2 <br> 1 2 3 <br> 1 2 3 4 <br> 1 2 3 4 5 <br><br> 6. Write a C program to enter any number and find its first and last digit. **(Medium)** <br><br> 7. Write a C program to enter any number and calculate sum of its digits. **(Easy)** | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 15**

**Session Outcome:** At the end of this session on **FOR LOOP STATEMENT**, Students will be able:

1. To write iterative programs on for loop.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** <br> Just make them to recall previous topic and Introduce For Loop. | | | |
| 15 | Explanation on syntax of **for** statement and its execution flow. With a simple program. | 1,2 | Lecturing, Discussion | |
| 10 | Ask the student to write a program and execute to print the series 2,4,8,16,32… **(Medium)** | 3 | Lecturing, Discussion | |
| 15 | Student will execute the following practicing program. Consider a goods train with 70 bogies. It starts from station X to station Y via 58 stations. In its travel, in every $i^{th}$ station where 'i' is prime, it drops out 2 bogies and proceeds. Find with how many bogies, it will reach station Y. (prime calculation). **(Medium)** | 3 | Lecturing, Discussion | Case Study |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 16**

**Session Outcome:** At the end of this session, Students will be able:
1. To write iterative programs using **for loop.**
2. To write iterative programs using **do-while.**

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap** Just make them to recall previous topic and Introduce do-while Loop. | 1 | | |
| 15 | Ask students to write & execute program for the following: **(Medium)** 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder. What is the smallest positive number that is evenly divisible by all the numbers from 1 to 20? | 3 | Lecturing, Discussion | |
| 10 | Explain the syntax of **Do-while** statement and its execution flow. | 1,2 | Lecturing, Discussion | |
| 15 | Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89,... By considering the terms in the Fibonacci sequence up to whose values do not exceed four million, find the sum of the even-valued terms. Write program to generate Fibonacci sequence. **(Medium)** | 2,3 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 17**

**Session Outcome:** At the end of this session on **control structures** Students will be able:

1. Basic concepts of NESTED loops
2. Usage of break and continue in loops
3. Exercise problems on LOOPS, NESTED LOOPS and BREAK and CONTINUE.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction** 1. Recap control structures. 2. Introduction of NESTED loops 3. Usage of BREAK and CONTINUE with best example. | | | |

| | | | | | |
|---|---|---|---|---|---|
| 10 | 1. Syntax and flow chart explanation of nested loops<br>2. Explanation of importance of goto and break statements with example<br>    Programs.<br>3. Syntax and flowchart of loops (for,while,do-while), differentiate and<br>    explain a program to add all the numbers entered by a user until user<br>    enters 0. **(Easy)** | 1 | Lecturing, Discussion | |
| 30 | 1. Write a program to find given number is a) palindrom b) armstrong<br>    c) prime d) perfect number or not **(Medium)**<br>2. Write a c program to find frequency of each digit in a given number.<br>    **(Easy)**<br>3. Write a C program to find power of a number using while loop. **(Easy)**<br>4. Write a C program to find all factors of a number. **(Medium)**<br>5. Write a program to print fibanocci sequence upto N terms. **(Medium)**<br>6. Write a program to print all alphabets from a to z using loops. **(Easy)**<br>7. Write a program uses a **nested loops** to find the prime numbers from<br>    2 to 100  **(Medium)** | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | | |

**SESSION NUMBER:  18**

**Session Outcome:** At the end of this session on **Functions –Basic concepts**, Types, Categories of functions students will be able
1.  Know the benefits of function in computer programming.
2.  Apply structured programming concepts in solving problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 10 | What is a function, necessity of function | | | |
| 10 | Function declaration, definition, function prototype in C.<br>**Example:** *Write a C Function to get parity of number n. It returns 1 if n has odd parity, and returns 0 if n has even parity.(*Easy) | 1,2 | Lecturing, Discussion | |
| 25 | Categories of functions-without argument without return type, With argument without return type, Functions without argument with return type, with argument and with return.<br>**Example:** Write a program to take radius as an argument to function area() and calculate area of circle and return its value.**(Easy)** | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER:  19**

**Session Outcome:** At the end of this session on **Functions –function pointer, call by value & call by reference** students will be able to

1.  Write functions using call- by – value & call- by- reference.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 10 | Explain function pointer & pointer to a function. | | Lecturing, Discussion | |
| 20 | Explain call by value & call-by – reference. | | Lecturing, Discussion | |
| 15 | **Example:** Given a number x update the value of it using call by value and call by reference. **(Easy)** | 1 | Lecturing, Discussion | Test Question |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||||

**SESSION NUMBER: 20**
**Session Outcome:** At the end of this session on **Recursive Function – Introduction, Examples.**

students will be able to:

1.  Think in logical way to solve real-time applications using functions.
2.  Solve computer applications with recursive concept.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** Recursive Function | | | |
| 20 | Explain what a recursion is & how recursive functions work? | 1 | Lecturing, Discussion, visualization | |
| 10 | Write a C program to find sum of natural numbers using recursive function.**(Medium)** | 1,2 | Lecturing, Discussion | |
| 10 | Given F(0) =1 and F(1) = 1. Then write a function to find F(n).Where F(n) = F(n-1) + F(n-2). Ask students to generate a Fibonacci series. **(Medium)** | 1,2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||||

**SESSION NUMBER: 21**
**Session Outcome:** At the end of this session on **Recursive Function –** solve complex problems with recursion Examples.

Students will be able to:

1. Think in logical way to solve any complex applications using recursive functions.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction.** | | | |

| 20 | C program to count digits of a number using recursion. This program will read an integer number and count its total digits using recursion, for example: input value is 34562, and then total number of digits is: 5. **(Medium)** | 2 | Lecturing, Discussion | QUIZ |
| 20 | Given F(0) =1 and F(1) = 1. Then write a function to find F(n).Where F(n) = n * F(n-1).  Ask students to print the factorial of a given number? **(Medium)** | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 22**

**Session Outcome:** At the end of this session on **Storage Classes – Introduction, Types, and Examples.**

Students will be able to:

1. Solve computer applications using structured programming.
2. Think in logical way to solve real-time applications using storage classes.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction:** Storage Classes | | | |
| 15 | Explanation of different types of storage classes (auto, register, static, and extern) with programs. 1. Program to perform addition of two numbers using auto keyword **(Easy)** 2. Program to perform addition of two numbers using registers keyword.  **(Easy)** | 1 | Lecturing, Discussion | |
| 15 | We will ask students to write  programs 1. To print the series of integer numbers up to 'n' using static keyword. **(Easy)** 2. Program to read and display the values using extern keyword. **(Easy)** 3. What is the output of the following programs: **(Easy)** void main() { static int a=6; printf("\n a=%d",a--); if(a!=0) main(); } | 2 | Lecturing, Discussion | |
| 10 | Explanation of Local and global variables, #define and some of the macros with examples | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 23**

**Session Outcome:** At the end of this session on **Arrays – 1 Dimensional** students will be able to

1. Write programs to solve problems that involve homogeneous collection of data (List).

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction.** Arrays-1 Dimensional | | | |
| 10 | *Write a C Program to find equivalent resistance of Serial combination of resistive circuits.* **(Easy)** | | | |
| 15 | Explain one-dimensional array. Input / Output statement and how to use it in coding. | 1 | Lecturing, Discussion, visualization | |

| 15 | Write a program to process a collection of daily high temperatures. Your program should count and print the number of hot days (high temperature 85 or higher), the number of pleasant days (high temperature 60–84), and the number of cold days (high temperatures less than 60). It should also display the category of each temperature. Test your program on the following data:<br>55 62 68 74 59 45 41 58 60 67 65 78 82 88 91 92 90 93 87 80 78 79 72 68 61 59. **(Medium)** | 2 | Lecturing, Discussion | |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER: 24**

**Session Outcome:** At the end of this session on **Arrays – pointer to an array & array of pointers.** Students will be able to

1. Write programs that use list data and refer the data by means of addresses.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap / Introduction.** pointer to an array & array of pointers | | | |
| 20 | Explain array of pointers & pointer to an array. | 1 | | |
| 20 | Ask students to write a program (using pointers) that calculates the average of n numbers & then compute the deviation of each number about the range. **(Medium)** | 2 | Lecturing, Discussion, visualization | |
| 10 | What will be the output for the following problems: **(Medium)**<br>1. void main()<br>{<br>int a[]={1,2,5,6,9,10};<br>int *b=&a[4];<br>printf("%d\n", b[-3]);<br>}<br>2. void main()<br>{<br>int a[]={1,2,9,8,6,3,5,7,8,9}<br>int *p=a+1;<br>int *q=a+6;<br>printf("%d\n", q-p);<br>} | 3 | Lecturing, Discussion | Quiz |

45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes

**SESSION NUMBER: 25**

**Session Outcome:** At the end of this session on **2 Dimensional arrays** students will be able to:

1. Write  programs with 2D arrays
2. Implement programs with huge data and Passing arrays to functions.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap / Introduction**. 2 Dimensional arrays | | | |

| | | | | |
|---|---|---|---|---|
| 20 | A and B are two m x n matrices. Find the third matrix C= A+B. write algorithm for matrix addition.**(Easy)** Explanation of 2D Array and its syntax. | **2** | Lecturing, Discussion | |
| 10 | Ask the student to write program for problem1. **(Easy)** | **2** | | |
| 10 | In a small company there are 5 salesmen. Each sales man is supposed to sell three products. Draw flow chart & algorithm to print<br>   a.   The total sales by each salesman.<br>   b.   Total sales of each item. **(Medium)** | | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||||

**SESSION NUMBER: 26**
**Session Outcome:** At the end of this session on: **Searching – Linear search** students will be able to:

1.  Understand, how to search an element using linear search?
2.  Think, how to search an element with less time using an array?

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap / Introduction:** Linear Search | | | |
| 15 | Explain about linear search. | **1** | Lecturing, Discussion | |
| 10 | **Ask students to write an algorithm for the following** There are 10 water bottles in a tray, out of 10 bottles; one bottle is getting leaked from the bottom. Now you have to find out which bottle is getting leaked. Provide the solution for the problem statement. **(Medium)** | **2** | Lecturing, Discussion | |
| 15 | Ask student to write program for linear search & execute **(Easy)** | **2** | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||||

**SESSION NUMBER: 27**
**Session Outcome:** At the end of this session on: **Searching –Binary search** students will be able to:

1.  Search an element using Binary search.
2.  Know the advantage of using Binary search.
3.  Solve problems using divide and conquer strategy.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap / Introduction:** Binary Search | | | |

| 10 | In a text book of 520 pages, you need to find a diagram whether it is on 470<sup>th</sup> page. What is the simplification for the above search? Give a solution for the problem statement.<br>**Note:**<br>1) You are not supposed to compare each and every page.<br>2) Every time find out the middle page ((low + high)/2) and compare only with that page.<br>3.1) If it is found print as found and Stop.<br>3.2) Otherwise<br>3.2.1) if the page to be found is less than middle page then<br>     Set high=mid-1 & Repeat steps 2 to 3.<br>3.2.2) if the page to be found is greater than middle page set<br>     low=mid+1 Repeat<br>     steps 2 to 3. Until it is found. | 2 | Lecturing, Discussion | QUIZ |
|---|---|---|---|---|
| 10 | Ask students to Write pseudo code/ algorithm for above program**. (Medium)** | 2 | Lecturing, Discussion | |
| 10 | Explain Drawbacks in Linear Search.<br>Explain binary search. | 1 | Lecturing, Discussion | |
| 10 | Ask students to execute the program for binary search problem.**(Medium)** | 2 | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |||||

**SESSION NUMBER : 28**
**Session Outcome:** At the end of this session on **Sorting - Bubble sort with examples** students will be able to:

1. Sort non-numeric data using bubble sort.
2. Solve computer applications with modular concepts for sorting.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap / Introduction:** Bubble Sort | | | |
| 10 | Design an algorithm to accept the age of 20 students of a class. Rearrange the data in ascending order(smallest value to largest value). Display the age of the youngest and eldest student in the class. **(Medium)** | 2 | Lecturing, Discussion | |
| 20 | Ask students to write an algorithm and C function for above problem.**(Hard)** | 2 | Lecturing, Discussion | |
| 10 | Explain about bubble sort. | 1 | Lecturing, Discussion and visualization | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |||||

**SESSION NUMBER : 29**
**Session Outcome:** At the end of this session on **operations on Strings** students will be able to:
1. Write programs using non-numeric data.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap / Introduction:** Recalling previous topic. | | | |
| 15 | explain string manipulation | 1 | Lecturing, Discussion | |
| 10 | Students will write a Program to count number of vowels, consonants, words, digits and symbols in a line of text. **(Medium)** | 2 | Lecturing, Discussion | |
| 15 | Explanation about string functions with the program to calculate length, string reverse, strcpy, strcat, strcmpi (), strcmp () of the given string. **(Easy)** | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER : 30**

**Session Outcome:** At the end of this session on **operations on strings and pointer to a string** students will be able to:
At the end of this session, Students will be able to:

1.  Write programs on non-numeric data.
2.  Solve real world practical problems.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 05 | **Recap/Introduction:** operations on strings and pointer to a string | | | |
| 10 | Explain pointer to a string using the following:<br>void   strcpy1(char *dst, char *src);<br>void  main()<br>{<br>char  *src = "Hello World";<br>char dst[100];<br>strcpy1(src,dst);<br>printf("%s",dst);<br>}<br>void   strcpy1(char *dst, char *src)<br>{<br>while(*src){<br>*dst++=*src++;}<br>*dst='\0';<br>} | 1 | Lecturing, Discussion | Quiz |
| 15 | Write a  c program for the following:<br>Given two strings s1 & s2, remove those characters from first string which are present in second string. Both the strings are different and contain only lowercase characters. (Amazon) **(Medium)** | 2 | Lecturing, Discussion | |
| 15 | To perform pattern matching. Example: "**Harish saw me in cinema hall"** - pattern to search is "**hall".** Ask students to write algorithm. **(Medium)** | 1 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 31**

**Session Outcome:** At the end of this class on **Introduction to structures** students will be able to:

1. Implement user defined data type structure
2. Apply the concepts of structure variables to store records.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap and introduction** to structures | | | |
| 10 | Study the information displayed on your ID card and analyze their types of data values. Now discuss how to store the above information into a record format. | | Lecturing, Discussion | |
| 10 | Analyze and evaluate about the storage details of account holders of specified Bank branch, Vijayawada. **(Easy)** | 2 | Lecturing, Discussion | |
| 5 | Explanation about user defined data type structure. | 1 | Lecturing, Discussion | |
| 5 | Ask students to write C program for problem1 **(Easy)** | 2 | | |
| 10 | Ask student to execute the problem2. **(Medium)** | 1 | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 32**

**Session Outcome:** At the end of this class on **Pointer to structures** & unions students will be able to:

1. Implement user defined data type structure
2. Apply the concepts of structure variables to store records.

| Time (Min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 10 | Explain DMA (malloc, calloc and free) | | | |
| 10 | Explain structure pointer. | | | |
| 15 | Declare a type-defined structure for an inventory item consisting of 6 fields: part number, part description (DMA string), reorder point (integer), number of items currently on hand (integer), unit measure, and unit price. Display the student details using pointers. **(Medium)** | 1 | Lecturing, Discussion | |
| 5 | Explain the concept of unions and difference between structure and unions | | | |
| 5 | Find the output of the following:  **(Easy)** <br> union student <br> { <br> int  mark; <br> char name[10]; <br> float average; <br> }s; <br> struct student <br> { <br> int  mark; <br> char name[10]; | 2 | Lecturing, Discussion | Quiz |

```
float average;
}s1;

    int main()
  {

printf("%d\n", sizeof(s));
printf("%d",sizeof(s1));
    }
```

| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |

**SESSION NUMBER: 33**

**Session Outcome:** At the end of this class hour on **Implementation of stacks using arrays** my students will be able to:
1.  Implement a LIFO Data Structure STACK.

| Time (min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap** typedef and structures | 1 | Lecturing, Discussion | |
| 10 | Assume that you are attending a function and the dinner is about to start, It's a buffet, you are proceeding towards the queue before it gets too long. If we observe, people form a queue and move towards the pile of plates and take one plate at a time. Once the plates fall of shortage, new set of plates are kept on the top and the plates are picked up from the top. Points to consider:<br>    1.    At a time, a plate is picked from its top end.<br>    2.    If more plates are required, the plates are added to the top.<br>    3.    The plates are added or removed only from one end that is the top.<br>Compare the pile of plates with coins and books. **(Hard)** | 2 | Lecturing, Discussion | |
| 15 | Explanation about stack Data Structure | | | |
| 15 | 1.  Ask students to solve the following problems:<br>    **(Easy)**<br>Consider the following sequence of push and pop operations on an initially empty stack S.<br>S = push(S,1);<br>S = pop(S);<br>S = push(S,2);<br>S = push(S,3);<br>S = pop(S);<br>S = push(S,4);<br>S = pop(S);<br>S = pop(S);<br>Write down the correct order of the values popped<br>2.  Let S represent an instance of the Stack ADT. Let S.push(x) push the value x on to the top of the stack, S.pop() remove the topmost element from the stack and return the value. Consider the following sequence of operations performed on S which initially contains 10 | 2 | Lecturing, Discussion | Quiz |

| | elements with 55 as the top most element (Assume that S is of sufficient capacity). S.push(7); S.push(20); S.push(35); S.pop(); S.push(14); S.pop(); S.pop(); What will be the element at the top of the stack after the above sequence of operations? **(Medium)** | | | |
|---|---|---|---|---|
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes ||||

**SESSION NUMBER: 34**
**Session Outcome:** At the end of this session **Implementation of queues using arrays**
Students will be able to:
1. Implement Queues using arrays

| Time (min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap, Introduction** to implementation of queues using arrays | | | |
| 15 | Assume the luggage scan system adopted by the airport where the baggage unloaded from the aero plane where passed on to a conveyor belt sequentially from one end into the scanning chamber. Here the luggage was scanned for any vulnerable items and latter passed luggage was sent out from the security chamber to the passenger from its other end. Considering the following points<br>1. Only one baggage can be dropped on to the conveyor belt<br>2. Only one baggage comes out of security chamber<br>3. An alert has to be displayed if the conveyor belt contains more than 35 baggage units **(Hard)** | 2 | Lecturing, Discussion | |
| 10 | Explanation on queues DS. | | Lecturing, Discussion | |
| 15 | Ask students to Write a C program to implement queues using arrays. **(Medium)** | | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes |||||

**SESSION NUMBER:  35**
**Session outcome:** At the end of this session **implementing operations on SLL** Students will be able to:
1. Implement linear data structure single linked list.

| Time (min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | **Recap:** Operations on SLL | | | |
| 10 | Explain insert operations of SLL. | 1 | Lecturing, Discussion | |
| 10 | Ask students to write function for inserting a node in the head and tail of SLL. **(Easy)** | 2 | Lecturing, Discussion | |

| Time (min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 10 | Explain deletion and display operations of SLL **(Medium)** | 1 | Lecturing, Discussion | |
| 10 | Ask students to write functions for deletion at specific position and display operations of SLL. **(Hard)** | 2 | | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**SESSION NUMBER: 36**

**Session Outcome:** At the end of this session on INTRODUCTION TO TREES, Students will be able:
1. Understand non-linear data structures
2. To differentiate b/w linear and non-linear data structures.

| Time (min) | Topic | BTL | Teaching/Learning Methodology | Active Learning Methods |
|---|---|---|---|---|
| 5 | Introduction to non-linear data structures. | 1 | | |
| 10 | Explanation on trees and their nomenclature. | 1 | Lecturing, Discussion | |
| 10 | Ask students to Find the length, depth, leaves, height, and degree of the given tree. **(Easy)** | 2 | Lecturing, Discussion | |
| 10 | Explain binary tree, types of binary trees and their tree traversals. | 1 | Lecturing, Discussion | |
| 10 | Ask to students<br>1. To draw all possible binary trees with 3 nodes. **(Hard)**<br>2. To draw a binary tree for the following values and determine in order, preorder and post order for the constructed binary tree. **(Medium)** 20,12,3,14,5,16,78,6,33,56,79. | 2 | Lecturing, Discussion | |
| 45 minutes Total Contact Session + 5 minutes for Attendance and Transition activities = 50 Minutes | | | | |

**PRACTICAL COMPONENT**
**List of Experiments supposed to finish in Open Lab Sessions:**

| Lab session no | Topics | S.No | List of Experiments | CO-Mapping |
|---|---|---|---|---|
| 1 | Introduction to Basic Concepts | 1.a | Introduction to LINUX | CO1 |
| | | 1.b | Addition of two numbers | |
| | | 1.c | Program to print "Hello World!" | |
| 2 | Data types and Format Specifiers | 2.a | Polynomial Equation | CO1 |
| | | 2.b | Ramshewar's Bill | |
| | | 2.c | Sum of two floating point numbers | |
| 3 | Operators and Predefined Functions | 3.a | 10- digit telephone number | CO1 |
| | | 3.b | Biggest among three values using ternary operator | |
| | | 3.c | Two Ships | |
| 4 | Conditional Statements | 4.a | Employee Details | CO2 |
| | | 4.b | Current billing System | |
| | | 4.c | Tax Payment | |
| 5 | Loops | 5.a | Pattern Problem | CO2 |
| | | 5.b | Kangaroo | |
| 6 | Functions | 6.a | Sum of Four | CO3 |
| | | 6.b | Pointers | |
| 7 | Recursion and Arrays | 7.a | Left Rotation | CO3 |
| | | 7.b | Recursion | |
| 8 | SEARCHING & SORTING | 8.a | Ice Cream Parlour | CO3 |
| | | 8.b | Insertion Sort | |
| 9 | STRINGS - I | 9.a | CamelCase | CO4 |
| | | 9.b | Mars Exploration | |
| 10 | STRINGS – II | 10.a | Beautiful Binary String | CO4 |
| | | 10.b | Pangrams | |
| 11 | STACKS | 11.a | Maximum Element | CO4 |
| | | 11.b | Queue using Two Stacks | |
| 12 | LINKED LIST | 12.a | Print the Elements of a Linked List | CO4 |
| | | 12.b | Insert a node at the head of a Linked List | |
| | | 12.c | Delete duplicate-value nodes from a sorted linked list | |

**WEEKLY HOMEWORK ASSIGNMENTS/ PROBLEM SETS:**

| Week | Assignment | Topic | Details | CO |
|------|-----------|-------|---------|-----|
| 1 | A01 | ALGORITHMS AND FLOWCHARTS | 1. A University has 3,000 students. These students are divided in four categories: (i) B. Tech (ii) M. Tech (iii) M.S. (iv) Ph.D. Draw a flow chart and algorithm for finding the percentage of the students in each category.**(Medium)** <br> 2. A farmer has field which is B meters wide and L meters long. The field yields C cubic meters of grain per hectare (1 Hectare = 10,000 square meters). The farmer has a number of rectangular tins, L1 meters long, B1 meters wide and H1 meters high to store the grain. **(Hard)** <br> The program should output, <br> (i) number of completely filled tins, <br> (ii) volume of grain in the partially filled tin. Write algorithm & flowchart. <br> 3. A frog is at the bottom of a 30 meter well. Each day he summons enough energy for one 3 meter leap up the well. Exhausted, he then hangs there for the rest of the day. At night, while he is asleep, he slips 2 meters backwards. How many days does it take him to escape from the well? Note: Assume after the first leap that his hind legs are exactly three meters up the well. His hind legs must clear the well for him to escape**(Medium)** <br> 4. P and Q are the two points of a graph. You are asked to find their Quadrant. Draw flow chart & algorithm. **(Hard).** | CO1 |
| 2 | A02 | INTRODUCTION TO C LANGUAGE | 1. Write a C program that reads the last 3 digits of your roll number & Print it? **(Easy)** <br> 2. Write a C program that reads your mobile number & display it along with your name?**(Easy)** <br> 3. Write a C program to read employee number, name, salary and print it. **(Medium)** | CO1 |
| 3 | A03 | OPERATORS | 1. Assume a vegetable market - selling vegetables Beetroot, Carrot, Onions, Tomato, Chillies, Ladies finger, Brinjal, CauliFlower, Cabbage, Leafy vegetables. Write a C program to Prepare the bill for each customer depending upon the choice of his/her purchase.(bill generation).**(Medium)** | CO1 |

| | | | 2. Ask the student to write algorithm and program to swap two numbers without using temporary variable.**(Easy)**<br>3. Ask the students to write algorithm and program to find the given year is a leap year or not.**(Hard)**<br>4. Ask the students to write algorithm and program to calculate & display the remainder and quotient of a number?, **(Medium)** | |
|---|---|---|---|---|
| 4 | A04 | CONDITIONAL STATEMENTS | 1. Write a program to find whether the given year is a leap year or not. **(Medium)**<br>2. Write a program to find given number is even number or odd number. **(Easy)**<br>3. Write a program to find whether the given year is a leap year or not. **(Medium)**<br>4. Write a program to find given number is even number or odd number. **(Easy)** | CO2 |
| 5 | A05 | CONDITIONAL STATEMENTS | 1. Write a program to read a C character from keyboard and then find out whether it is a vowel or consonant or digit or whitespace or special symbol. **(Medium)**<br>2. A Factory gives the following rates of commission for the monthly sales of its product. **(Medium)**<table><tr><td>Sales</td><td>commission</td></tr><tr><td>Below Rs 10000/-</td><td>No Commission</td></tr><tr><td>100001-15000</td><td>5% Commission</td></tr><tr><td>15001-20000</td><td>7.5% Commission</td></tr><tr><td>Above 20000</td><td>10% Commission</td></tr></table>3. Write a program to read an integer and then find out whether it is positive or negative number or zero number. **(Medium)** | CO2 |
| | | | **Home Assignment:**<br>1. Program to print the name of a given Decimal digit in their Laptops. **(Easy)**<br>2. Write a menu driven program to perform a selected task from any One of the following tasks. **(Hard)**<br>a) Given number is even number or odd number<br>b) Given year is a leap year or not.<br>c) Given C character is a letter character or digit character or whitespace character or special symbol character.<br>3. Find the biggest of given 3 numbers. **(Easy)** | |

| | | | | |
|---|---|---|---|---|
| 6 | A06 | CONDITIONAL STATEMENTS | 4. Write a program to read a number from 1 to 12 and then display its corresponding month name. **(Medium)**<br><br>6. Write a program to input a digit and print it in words? **(Medium)**<br><br>*7. One of the techniques for comparing faces uses ratios of distances between key points on a face, as indicated in Figure 1. These ratios might include the distance between the eyes divided by the distance between the nose and the chin. Because these measurements are ratios, they can be computed from images of different sizes and should still be similar for the same face. The computer programs that compute these measurements must be able to locate a face in an image and then also locate the eyes and other key points on the face. There are additional challenges if the head is turned in a different direction in one of the images.*<br><br><br><br>*Figure 1: Key points for face recognition. For this problem, assume that we have three images of a person looking at the camera. We would like to determine if the two images are likely to be of the same person. The technique that we will use is one that compares ratios of the distances between the outer edges of the eyes to the distances between the tip of the chin and the tip of the nose. Write a C program to read the two distances for each face, compute the ratios, and then determine which two images have the closest ratios. **(Hard)*** | CO2 |
| 7 | A07 | CONTROL STATEMENTS | 1. calculate the sum of N natural numbers **(Easy)**<br><br>2. Give a task to students to print **(Medium)**<br><br>\*\*\*\*\*\*<br>\*\*\*\*\*<br>\*\*\*\* | CO2 |

| | | | | |
|---|---|---|---|---|
| | | | ```<br>       ***<br>        **<br>         *<br>```<br>3. We will give a task to students to print values from 10 to 1 using While loop. **(Medium)**<br><br>4. Write a C program to calculate product of digits of a number. **(Easy)**<br><br>5. Write a C program to calculate sum of digit of a number. **(Easy)**<br><br>6. Two students X and Y are playing a small game. Rules in game are: **(Hard)**<br><br>a). X and Y both must throw an n-face die. Die contains n Positive natural numbers starting from 1 to n without duplicate number.<br><br>b). If both Numbers, which are thrown by X and Y, are having no    common factors except 1 then "game win by X" else "game win by Y".<br><br>7. Write a program to read n value and then find the probability to win X and to win Y. **(Hard)** | |
| | | | 1. Students will practice a program to find the given character is a Consonant or a vowel or a digit or a white space or a special symbol. **(Easy)**<br>2. Students will practice a program arithmetic calculator with menu driven to understand goto and break concepts. **(Medium)**<br>3. Write a C program to find HCF (GCD) of two numbers. **(Medium)**<br>4. Student will execute the following practicing program. Consider a goods train with 70 bogies. It starts from station X to station Y via 58 stations. In its travel, in every $i^{th}$ station where 'i' is prime, it drops out 2 bogies and proceeds. Find with how many bogies, it will reach station Y. (prime calculation). **(Medium)**<br>5. print the sequence **(Hard)**<br>```<br>  5 4 3 2 1<br>  4 3 2 1<br>  3 2 1<br>  2 1<br>  1<br>  2 1<br>``` | |

| 8 | A08 | CONTROL STATEMENTS | 3 2 1<br>4 3 2 1<br>5 4 3 2 1<br><br>6. print the fallowing star pattern **(Hard)**<br><pre>    *<br>   * *<br>   * * *<br>  * * * *<br>  * * * * *<br> * * * * * *</pre>7. How many times "`c programming`" is get printed? **(Medium)**<br><pre>#include<stdio.h><br>int main()<br>{<br>  int x;<br>  for(x=-1; x<=10; x++)<br>  {<br>    if(x < 5)<br>       continue;<br>    else<br>       break;<br>    printf("c programming");<br>  }<br>  return 0;<br>}</pre> | CO2 |
| 9 | A09 | FUNCTIONS | 1. Write a program to Solve Tower-of-Hanoi Problem using Recursion. **(Hard)**<br>2. Write a program to perform GCD of two numbers and exponents of "y" using recursive function.**(Medium)** | CO3 |
| 10 | A10 | STORAGE CLASSES | **1. What is the output of the following: (Medium)**<br>**(a).** void main()<br>{<br>fun1();<br>fun1();<br>}<br>void fun1()<br>{<br>auto int x=0;<br>register int y=0;<br>static int z=0;<br>x++;<br>y++;<br>z++;<br>printf("\n%d%d%d",x,y,z);<br>}<br>**(b) (Easy)**<br> int a=10;<br> void main()<br>{ | CO3 |

| | | | int a=20;<br>{<br>int a=30; printf("%d\n",a);<br>}<br>printf("%d",a);<br>} | |
|---|---|---|---|---|
| 11 | A11 | ARRAYS | 1  Find the number of pairs of elements in array of n numbers. **(Medium)**<br>2  *To find equivalent capacitance of series combination of capacitive circuit.***(Easy)**<br>3  Hacker rank type problems **(Easy)**<br>**Input:**<br> 2 (Test cases)<br> 7<br> 11 22 33 44 55 66 77<br> 5<br> 24 06 98 12 87<br>**Output:**<br>4    3    (Odd & Even Numbers)<br>5    4<br>*4. Program To find equivalent resistance of Parallel combination of resistive circuits.*(***Medium***)<br>*5. To find equivalent capacitance of Parallel combination of capacitive circuit.*(***Medium***) | CO3 |
| | | | 1. There are 10 students sitting in a row, in which the professor wants to select a student with roll no 600 from one end to other end. Give me a solution for the given problem statement.<br>(The roll no's are 200, 320, 390, 400, 420, 460, 480, 600, 850)  **(Medium)**<br><br>2. There are 10 cool drink bottles of different capacity. They are 200ML, 100ML, 180ML, 300ML, 500ML, 90ML, 360ML, 270ML, 1000ML, and 750ML. Arrange the bottles in ascending order / descending order of their capacity. **(Easy)**<br>3.  In a statistics among 15 students of their weight (e.g. 62Kg, 57Kg, …) in physical department at an University is collected.  Write a program for sorting the weights in descending order and print the second biggest weight. **(Medium)**<br>4.  Write a program to sort an array of following elements and print the | |

| 12 | A12 | SEARCHING AND SORTING | count of the same elements in the order. **(Hard)**<br>The given elements are<br>**Input:** 2,5,4,1,3,5,2,5,1<br>**Output:**<br>    1 is repeated for 2 Times<br>    2 is repeated for 2 Times<br>    3 is repeated for 1 Time<br>    4 is repeated for 1 Time<br>    5 is repeated for 3 Times | CO3 |
|---|---|---|---|---|
| 13 | A13 | STRINGS | **1.** Develop a program to find RED color pebble form the given pebbles of different colors. **(Medium)**<br>**2.** For the given paragraph, write a program to count how many times the string "the" present in it. [**Vijayawada** is a beautiful city on the bank of the Krishna River, in the Indian state of Andhra Pradesh ] **(Hard)**<br>**3.** Write a program to reverse a string. **(Medium)**<br>**4.** Every rainbow has seven colors beginning with red and ending with violet or purple. To remember the order of these colors, people use the acronym **VIBGYOR** which stands for Red Orange Yellow Green Blue Indigo and Violet. Your task is to sort the colours of rainbow "VIBGYOR" in alphabetical order.<br>[ Output: 1) Blue, 2) Green 3) Indigo, 4) Orange, 5) Red, 6) Violet and 7) Yellow. ]. **(Medium)**<br>**5.** Write a program to read all lines of text from the keyboard and display the following information **(Medium)**<br><br>    a.    Number of words<br>    b.    Number of characters.<br><br>**6.** Design a function locate() that takes 2 character arrays s1 and s2 and one integer value m as parameters and insert the string s2 into s1 immediately after the index m. **(Hard)** Ex: S1= I enjoy eating while watching Sharukh Khan movie. M=15    S2= Popcorn **Hint:** s2 may be a missing word in s1 that represents a line of text | CO4 |
| 14 | A14 | STRUCTURES | **1.** Define a structure CRICKET whose fields are name of the player, number | CO4 |

| | | | of innings played, total runs scored and getting average. Using CRICKET declare an array x with 50 elements and write a program to read the name, number of innings and total runs scored by each of the 50 players, and find the batting average. Display all the 50 players details sorted by batting average in tabular from. **(Medium)**<br>**2.** Define a structure DATE with the fields: day, month and year. Write a program that will increment the date by one day and return the new date. If the date is the last day in the month, the month field must be incremented by one. If the month is December, the value of the year field must be changed when the day is 31. Also check for the leap year. **(Hard)**<br>**3.** Define a structure COMPLEX whose fields are real and imaginary parts of a complex number. Write a program to find sum of two complex numbers. **(Medium)** | |
| 15 | A15 | LINKED LIST | 1. Write a complete program to create a singly linked list.<br>2. Write function to Count the number of nodes. **(Easy)**<br>3. Write a function to delete a node at the head of SLL. **(Hard)**<br>4. Write a function to delete a node at the tail of SLL. **(Medium)** | CO4 |

## COURSE TIME TABLE

**Course Conduct**

| | | |
|---|---|---|
| **Theory Lecture** | 40 Sections \| 75 Students each \| Class Room \| Course Coordinator | 3 Lectures per week |
| **Practical** | 40 Sections \| 75 Students each \| 3 Batches \| 3 Instructors \| 80 Computers | 1 P per week \| each 2 hrs. 70 minutes Experiment \| 30 minutes Evaluation for 25 students per instructor |

| | Hour | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| **Day** | Component | 7:20 - 8:10 | 8:15 - 9:05 | 9:40-10:30 | 10:35-11:25 | 11:35-12:25 | 12:30-1:20 | 1:30-2:20 | 2:20-3:10 |
| **Mon** | Theory | S8, S9 | S8, S9 | S36, S37, S38 | S36, S37, S38 | | | | |
| | Lab | S21 | | S11, S31 | | S34, S5 | | S19, S38 | |
| **Tue** | Theory | S11, S12, S27, S28, S30, S31, S32 | S27, S28, S30, S31, S32 | S18, S19, S20 | S18, S19, S20 | | S7, S8 | | |
| | Lab | S22 | | S32, S12 | | S6, S33 | | S40, S20 | |
| **Wed** | Theory | S1, S2, S3, S13, S14, S15, S16, S17 | S1, S2, S3, S13, S14, S15, S16, S17 | | | S4, S5, S6 | S4, S5, S6, S9 | | |
| | Lab | S9 | | S3 | | S13, S25 | | S17 | |
| **Thu** | Theory | S4, S5, S6, S33, S34 | S2, S2, S3, S33, S34 | S21, S22, S23, S39, S40 | S21, S22, S23, S39, S40 | | | | |
| | Lab | S30 | | S4 | | S14, S26 | | S18, S36 | |
| **Fri** | Theory | S27, S28, S30, S31, S32 | | S36, S37, S38 | S33, S34, S39 | S24, S25, S26 | S21, S22, S23 | | |
| | Lab | S30 | | S4 | | S14, S26 | | S18, S36 | |
| **Sat** | Theory | S13, S14, S24, S25, S26 | S24, S25, S26 | S18, S19, S20 | S15, S16, S17 | | | | |
| | Lab | S1 | | S23 | | S27, S7 | | S15, S37 | |

**EVALUATION PLAN:**

| Evaluation Type | Evaluation Component | Weightage/Marks | | Assessment Dates | Duration (Hours) | CO1 | CO2 | CO3 | CO4 | CO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blooms Taxonomy Level** | | | | | | 1 | 2 | 3 | 4 | |
| **Semester In Summative Evaluation Total = 28 %** | **Semester In Exam-I** | Weightage | 10 | Semester In Exam-I Dates | 2 | 4 | 4 | | | 2 |
| | | Max Marks | 50M | | | 25 | 25 | | | |
| | **Semester In Exam –II** | Weightage | 10 | Semester In Exam-II Dates | 2 | | | 4 | 4 | 2 |
| | | Max Marks | 50M | | | | | 25 | 25 | |
| | **Lab Semester In Exam** | Weightage | 8 | Lab Semester In Exam Dates | 1 ½ | 2 | 2 | 2 | 2 | |
| | | Max Marks | 40M | | | 10 | 10 | 10 | 10 | |
| **Formative Evaluation Total = 32 %** | **ALMs** | Weightage | 8 | Continuous Evaluation | | 2 | 2 | 2 | 2 | |
| | | Max Marks | 100M | | | 20 | | 20 | | |
| | **Home Assignment + Book** | Weightage | 5 | Continuous Evaluation | | 1 | 1 | 1 | 2 | |
| | | Max Marks | 40M | | | 10 | 10 | 10 | 10 | |
| | **Lab Continuous Evaluation** | Weightage | 14 | Continuous evaluation | | 3 | 4 | 3 | 4 | |
| | | Max Marks | 100M | | | 25 | 25 | 25 | 25 | |
| | **Attendance** | Weightage | 5 | Continuous evaluation | | | | | | |
| | | Max Marks | 5M | | | | | | | |
| **Semester End Summative Evaluation Total = 40 %** | **SE Lab Expt.** | Weightage | 12+4 | Lab External Dates | 1 ½ | 4 | 4 | 4 | 4 | |
| | | Max Marks | 40M | | | 10 | 10 | 10 | 10 | |
| | **Semester End Exam** | Weightage | 24 | Semester End Exam Dates | 3 hrs | 6 | 6 | 6 | 6 | |
| | | Max Marks | 100M | | | 25 | 25 | 25 | 25 | |

**ATTENDANCE POLICY**

Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfil all other tasks assigned to him/her in every course. For Promotion, a Minimum of 50% of internal marks must be obtained. In every course, student has to maintain a minimum of 85% attendance to be eligible for appearing in Semester end examination of the course, for cases of medical issues and other unavoidable circumstances the students will be condoned if their attendance is between 75% to 85% in every course, subjected to submission of medical certificates, medical case file and other needful documental proof to the concerned departments.

**DETENTION POLICY**

In any course, a student has to maintain a minimum of 85% attendance and must secure a minimum of 50% marks in In-Semester Examinations to be eligible for appearing to the Semester End Examination, failing to fulfill these conditions will deem such student to have been detained in that course.

**COURSE TEAM MEMBERS, CHAMBER CONSULTATION HOURS AND CHAMBER VENUE DETAILS:**

Each instructor will specify his / her chamber consultation hours during which the student can contact him / her in his / her chamber for consultation.

| S.No. | Name of Faculty | Chamber Consultation Day (s) | Chamber Consultation Timings for each day | Chamber Consultation Room No: | Signature of Course faculty |
|---|---|---|---|---|---|
| 1 | Mr.N.SreeRam | All working day | 2:00P.M to 3:20 P.M | F206 | |
| 2 | S.SivaKumar | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 3 | G.K. Chakravarthi | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 4 | Naveen kumar | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 5 | S.Harikha | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 6 | P. Gayathri | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 7 | A. Srinivasarao | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 8 | D R Lavanya | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 9 | M.RamKumar | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 10 | A.Krishna | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 11 | G.SaiSudha | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 12 | B.Ashok | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 13 | E.Sridevi | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 14 | Gopal Guptha | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 15 | D.Anand | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 16 | E.RajeshKumar | All working days | 2:00P.M to 3:20 P.M | F206 | |

| | | | | |
|---|---|---|---|---|
| 17 | Dr.Sk.Razia | All working days | 2:00P.M to 3:20 P.M | F202 |
| 18 | N.V.S.PavanKumar | All working days | 2:00P.M to 3:20 P.M | F202 |
| 19 | ZeelanBasha | All working days | 2:00P.M to 3:20 P.M | F206 |
| 20 | V.UdayKumar | All working days | 2:00P.M to 3:20 P.M | F206 |
| 21 | V.L.Sarvani | All working days | 2:00P.M to 3:20 P.M | F206 |
| 22 | T. Ganesan | All working days | 2:00P.M to 3:20 P.M | F206 |
| 23 | Dr.S.SivaKumar | All working days | 2:00P.M to 3:20 P.M | F206 |
| 24 | Dr.P.SivaKumar | All working days | 2:00P.M to 3:20 P.M | F206 |
| 25 | E.Sridevi | All working days | 2:00P.M to 3:20 P.M | F206 |
| 27 | Y. Ayyappa | All working days | 2:00P.M to 3:20 P.M | F206 |
| 28 | G.RamaKrishna | All working days | 2:00P.M to 3:20 P.M | F206 |
| 29 | V.PremaLatha | All working days | 2:00P.M to 3:20 P.M | F206 |
| 30 | Karimunnisa | All working days | 2:00P.M to 3:20 P.M | F206 |
| 31 | S.PradeepRaj | All working days | 2:00P.M to 3:20 P.M | F206 |
| 32 | G.RamaKrishna | All working days | 2:00P.M to 3:20 P.M | F206 |
| 33 | T. Hima Bindhu | All working days | 2:00P.M to 3:20 P.M | F206 |
| 34 | T. Rajeshkumar | All working days | 2:00P.M to 3:20 P.M | F206 |

| 35 | T. Vamsidhar | All working days | 2:00P.M to 3:20 P.M | F209 | |
| 36 | Dorti Kumar | All working days | 2:00P.M to 3:20 P.M | C205 | |
| 37 | T. Yamini | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 38 | P. Neelakanteswara | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 39 | G. Vijayakumari | All working days | 2:00P.M to 3:20 P.M | F206 | |
| 40 | G.ChandraSekhar | All working days | 2:00P.M to 3:20 P.M | F206 | |

## GENERAL INSTRUCTIONS

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

## NOTICES

Most of the notices are available on the LMS platform.
All notices will be communicated through the institution email.
All notices concerning the course will be displayed on the respective Notice Boards.

**Signature of COURSE COORDINATOR:**

**Signature of Department Prof. Incharge Academics & Vetting Team Member:**

**HEAD OF DEPARTMENT:**                    **Approval from: DEAN-ACADEMICS**
                                        **(Sign with Office Seal)**