**School of Computer Engineering**

**KIIT deemed to be University**

**Laboratory Lesson Plan – Autumn’2023 (3rd Semester)**

**Discipline:**

**Course name and Code: PROGRAMMING LABORATORY ( CS13001)**

**(L-T-P-Cr: 0-2-4-4 )**

***Instructor Name:* Dr. Mainak Biswas (Ph:8788463370)**

***Instructor Chamber:* Campus 14, FB402 (E)**

|  |  |  |
| --- | --- | --- |
| **Sr #** | **Details** | **Week#** |
| 1 | Fundamentals of computer, Number systems and basic Linux commands. | 1 |
| 2 | Practice and write programs on simple input and output operations. | 2 |
| 3 | Practice and write programs on Operators and Expressions. | 2 |
| 4 | Practice and write programs on branching statements (if-else). | 3 |
| 5 | Practice and write programs on looping (control) statements. | 4, 5 |
| 6 | Practice and write programs on Arrays. | 6,7 |
| 7 | Practice and write programs on Functions. | 8,9 |
| 8 | More practice problems, tests | 10 |
| 9 | *Mid Sem Exam (16th to 21st October)* | 11 |
| 10 | Practice and write programs on Character Arrays | 12 |
| 11 | Practice and write programs on Pointers | 13, 14 |
| 12 | Practice and write programs on Structures and Unions | 14, 15 |
| 13 | Practice simple programs on file handling | 16 |
| 14 | *Sessional Exam (4th to 9th December)* | 17 |

**Technical Assistants Names: Mr. Rahul Sahoo, Mr. Sarbeswar Mishra**

**Course Contents : Week-wise lesson plan**

**List of Experiments (Day wise):**

**Introduction To Programming, Linux Commands**

**Week1- Day 1, Day2**

|  |  |
| --- | --- |
|  | Introduction to computer fundamentals, memory |
|  | Flow chart, algorithm |
|  | Number system representation (Binary-decimal) and numerical |
|  | Linux commands   * man * ls * pwd * cd * mkdir * cp * mv * rm * rmdir * whereis |
|  | Hello World program |

**Operators & Expressions, Simple Input & Output Statements**

**Week2 - Day 3, Day4**

**Day 03 : Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to perform the addition of two integers and display the result. Input must be given by user. | Enter 1st number:12  Enter 2nd number:13 | Sum is 25. |
| 2. | WAP to find Fahrenheit for a given centigrade temperature. | Enter the temperature in Centigrade: 30 | The Fahrenheit temperature is: 86 |
| 3. | WAP to calculate area of a circle while taking radius as user input. | Enter the radius of the circle: 11 | The area is: 380.12 |
| 4 | WAP to calculate area of a triangle who’s base and height are user input. | Enter the height of the triangle: 12  Enter the base of the triangle: 10 | The area of the triangle is: 60. |
| 5 | Write a C program to perform swapping of two integers using a third variable. | Enter num1: 10  Enter num2: 20 | Before Swapping  num1=10, num2=20  After Swapping  num1=20, num2=10 |

**Day 03 : Home Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | Write a C program to perform swapping of two integers without using a third variable. | Enter num1: 10  Enter num2: 20 | Before Swapping  num1=10  num2=20  After Swapping  num1=20  num2=10 |
| 2. | WAP to find the average mark of 5 subjects of a student and find the percentage. Assume full mark of each subject is 200. All the input must be given by user. | Enter the number of 1st subject: 160  Enter the number of 2nd subject: 170  Enter the number of 3rd subject: 165  Enter the number of 4th subject: 180  Enter the number of 5th subject: 185 | The average is: 172.  The percentage is: 86% |
| 3 | WAP to convert given paisa into its equivalent rupee and paisa as per the following format. | Enter the amount:550 paisa. | 550 paisa = 5 Rupee and 50 paisa |

**Day 04 : Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to convert given second into its equivalent hour, minute and second as per the following format. | Enter the time:7560 second. | 7560 second = 2 Hour, 27 Minute and 40 Second |
| 2. | WAP to convert a distance in meter entered through keyboard into its equivalent kilometer and meter as per the following format. | Enter the distance: 2430 meter. | 2430 meter = 2 Km and 430 meters. |
| 3. | WAP to find the sum of 1st and last of a six-digit number. Number must be a user input. | Enter the number: 234459 | Sum of digits is: 11. |
| 4. | WAP to find the sum of all digits of a three-digit number. Number must be a user input. | Enter the number: 354 | Sum of digits is: 12. |
| 5. | The mark price and discount and buying price are entered through keyboard. Sometimes seller gets profit or some time loss depends on discount. WAP to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss incurred. | **Set 1:**  Enter the buying price: 80  Enter the marker price: 100.  Enter the discount: 25%  **Set 2:**  Enter the buying price: 80  Enter the marker price: 100.  Enter the discount: 25% | **Set 1:**  Seller made a loss of 6.25%.  **Set 2:**  Seller made a profit of 12.50%. |

**Day 04 : Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to reverse a three-digit number. Number must be a user input. | Enter the number: 376. | Sum of digits is: 673. |
| 2. | WAP swap the contents of two variables by using a single statement for swap in C. | Enter num1: 10  Enter num2: 20 | Before Swapping  num1=10,num2=20  After Swapping  num1=20,num2=10 |
| 3. | WAP to add two times in hour, minute & second format entered through the keyboard in the format hh:mm:ss | Enter two times: 11:45:34 and 09:28:41  [Input must be taken in such a way so that sum should not exceed 24 hours] | Output time is 21:14:15 |

**Branching Statements: if..else, switch..case**

**Week 3 - Day 5,6**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to find the largest between two numbers. | Enter two numbers:  80, 990 | The largest number is 990 |
| 2 | WAP to read an alphabet from the user and convert it into uppercase if the entered alphabet is  in lowercase, otherwise display an appropriate message. | Set 1  Enter an alphabet: k  Set 2  Enter an alphabet: M | Set 1  The upper case of the entered letter is ‘K’  Set 2  You have entered ‘M’ which is already in upper case |
| 3 | WAP to read a character from the user and test it whether it a vowel or consonant or not an alphabet. | Set 1:  Enter an alphabet: B  Set 2 :  Enter an alphabet: % | Set 1:  The entered character B is a consonant  Set 2:  The entered character % is not an alphabet |
| 4 | WAP to determine whether a year entered through the keyboard is a leap year or not. | Set 1:  Enter the year:2005  Set 2:  Enter the year:1996 | Set 1:  2005 is not a leap year.  Set 2:  1996 is a leap year. |
| 5 | WAP to find the roots of a quadratic equation ax2+bx+c=0 using if-else statement. | **Set1**  Input values for a, b and c=>1  2  1  **Set2**  Input values for a, b and c=>1 8 3  **Set 2**  Input values for a, b and c=>3 5 7 | **Set1**  Input values for a, b and c=>1  2  1  **Set2**  The Roots are real & unequal.  Roots are -0.39 and -7.61  **Set 3**  The Roots are imaginary  Root1=-0.17+i1.28  Root2=-0.17-i1.28 |
| 6 | WAP to display the grade system of KIIT University based on total marks secured by a student in a  semester. Assume marks are integer values. Use multiple if-else statement.  The grade is calculated is as follows:  Marks Grade  90 to 100 O  80 to 89 E  70 to 79 A  60 to 69 B  50 to 59 C  40 to 49 D  < 40 F | **Set-1**  Enter total mark secured by a student: 55  Secured grade is C  **Set-2**  Enter total mark secured by a student: 95  Secured grade is O | **Set-1**    Secured grade is C  **Set-2**  Secured grade is O |
| 7 | WAP to input any two integers, and provide a menu to the user to select any of the options as  add, subtract, multiply, divide and display the result accordingly | Enter 2 numbers:  9  100  Select the operation from the menu  (A for Add, S for Subtract, M for Multiplication, D for Division) :  A | The Sum is 109 |
| 8 | Print weekday name program according to given weekday number using switch-case weekday number (0-6) and print weekday name (Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday) | Enter the week day: 3 | This is Wednesday |
| 9 | WAP to display the grade system of KIIT University based on total marks secured by a  student in a semester. Use else..if ladder statement. | Set-1  Enter total mark secured by a student: 77  Secured grade is C  Set-2  Enter total mark secured by a student: 92  Secured grade is O | Set-1  Secured grade is A  Set-2  Secured grade is O |
| 10 | WAP to find the roots of a quadratic equation ax2+bx+c=0 using switch-case statement. | Input values for a, b and c=>  1  2  1  Set2  Input values for a, b and c=>1 8 3  Set 2  Input values for a, b and c=>3 5 7 | Input values for a, b and c=>1  2  1  Set2  The Roots are real & unequal.  Roots are -0.39 and -7.61  Set 3  The Roots are imaginary  Root1=-0.17+i1.28  Root2=-0.17-i1.28 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to test whether a number entered through keyboard is ODD or EVEN. | Set 1  Enter a number : 19  Set 2  Enter a number : 100 | Set 1  19 is an ODD number  Set 2  100 is an even number |
| 2 | Write a C program to determine eligibility for admission based on the following criteria:  Eligibility Criteria :  Marks in Maths >=65 and Marks in Phy >=55 and Marks in Chem>=50 and  Total in all three subject >=190 or Total in Maths and Physics >=140 | Input the marks obtained in Physics :65 Input the marks obtained in Chemistry :51 Input the marks obtained in Mathematics :72 | The candidate is not eligible for admission. |
| 3 | Write a C Program to check whether the triangle is equilateral isosceles or scalene (Triangle consists of three sides of provided lengths n1, n2 and n3 units). | Set 1: n1=3, n2=3, n3=4 | Set 1: isosceles |

**Looping: while, do…while and for**

**Week 4 & 5 - Day 7,8,9,10**

**Day 7**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to print even series within 50. |  | 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 |
| 2 | WAP to print the natural numbers from 1 to n (value of n is user input). | SET 1  n=5  SET 2  n=7 | SET 1  1 2 3 4 5  SET 2  n=7  1 2 3 4 5 6 7 |
| 3 | WAP to print the natural numbers from n to 1(value of n is user input). | SET 1  n=5  SET 2  n=7 | SET 1  5 4 3 2 1  SET 2  7 6 5 4 3 2 1 |
| 4 | WAP to take 10 different numbers as input. Print their sum and average. | Enter 10 numbers:  54  32  56  76  87  90  23  12  44  55 | The sum is 529  The average is 52.900002 |
| 5 | WAP to find out sum of digits of a number. | SET 1  n=234  SET 2  n=123 | SET 1  The sum of digits of 234 is 9  SET 2  The sum of digits of 123 is 6 |
| 6 | WAP to find out reverse of a number. | SET 1  n=234  SET 2  n=123 | SET 1  The reverse of 234 is 432  SET 2  The reverse of 123 is 32` |

**Home Assignments**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** | |
| 1 | WAP to find out factors of a number. | SET 1  n=6  SET 2  n=4 | | SET 1  The factors are  1 2 3 6  SET 2  The factors are  1 2 4 |
| 2 | WAP to test whether a number is Armstrong Number or not.  (A number is said to be Armstrong when the sum of cubes of its digit is equal with the original number.  Ex-153) | SET 1  n=153  SET 2  n=121 | SET 1  The given number is Armstrong  SET 2  The given number is not Armstrong | |
| 3 | WAP to test whether a number is Palindrome Number or not.  (A number is said to be Palindrome when its reverse is equal with the original number.  Ex-121) | SET 1  n=234  SET 2  n=121 | SET 1  The given number is not Palindrome  SET 2  The given number is Palindrome | | |

**Day 8**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
|  | WAP to print Fibonacci series up to n terms. | SET 1  n=5  SET 2  n=10 | SET 1  0 1 1 2 3  SET 2  0 1 1 2 3 5 8 13 21 34 |
| 2 | WAP to test whether a number is Perfect Number or not.  (A number is said to be Perfect when the sum of factors excluding the number itself is equal to the original number.  Ex-6) | SET 1  n=7  SET 2  n=28 | SET 1  The given number is not Palindrome  SET 2  The given number is Palindrome |
| 3 | WAP to check whether a number n is prime number or not. | Set 1:  Enter a number:17  Set 2 :  Enter a number:25 | Set 1:  You have entered 17, 17 is a prime number  Set 2:  You have entered 25, 25 is NOT a prime number |
| 4 | The first few numbers of the Lucas sequence which is a variation on the Fibonacci sequence are:  1 3 4 7 11 18 29 …  WAP to generate the Lucas sequence. | 1 3 4 7 11 18 29 … | 1 3 4 7 11 18 29 … |
| 5 | WAP to print GCD and LCM of two numbers. | 12  18 | GCD of 12 and 18 is 6  LCM of 12 and 18 is 36 |
| 6 | WAP to find out factorial of a number. | SET 1  n=5  SET 2  n=4 | SET 1  Factorial is 120  SET 2  Factorial is 24 |
| 7 | WAP to test whether an inputted number is a strong number or not.  (A number is said to be Strong if sum of factorial of digits is equal to the original number) | SET 1  n=145  SET 2  n=121 | SET 1  The given number is Strong  SET 2  The given number is not Strong |
| 8 | WAP to display this series (3 in a single loop). | Enter the value of n:  9 | 0 1 1 2 4 7 13 24 44 |

**Home Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
|  | WAP to sum the following series S=1+(1+2)+(1+2+3)+...+(1+2+3+...+n) | Enter the value of n: 4 | 20 |
|  | WAP to find out 1/n! | Enter the value of n:  6 | The value of 1/6! is 0.001389 |
|  | WAP to find out xn/n! | Enter the value of x and n:  2 2 | The value is 2.0 |
|  | WAP to find out sum of series up to n terms.  (1+1/2+1/3………) | Enter the range:  13 | The sum of series is 3.180134 |
| 5. | WAP to find out sum of series up to n terms. | Enter the value of x and n:  2 2 | The value is 4.0 |

**Day 9**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
|  | WAP to find out sum of series up to n terms  1+22+33+……….+nn | Enter the value of n:  7 | The sum of series is 873612.0 |
|  | WAP to find out sum of series up to n terms | Enter the value of n:  7 | The sum of series is 13.477573 |
|  | WAP to print the following pattern for rows = 4  1 1 1 1  2 2 2 2  3 3 3 3  4 4 4 4 | Enter Row Number : 4 | 1 1 1 1  2 2 2 2  3 3 3 3  4 4 4 4 |
|  | WAP to print the following pattern  1  1 2  1 2 3  1 2 3 4  1 2 3 4 5 | Enter Row Number : 5 | 1  1 2  1 2 3  1 2 3 4  1 2 3 4 5 |
|  | WAP to print the following pattern  1  2 2  3 3 3  4 4 4 4  5 5 5 5 5 |  | 1  2 2  3 3 3  4 4 4 4  5 5 5 5 5 |
|  | WAP to print the following pattern  1 3 7 15 31……. | Enter the value of n:  5 | 1 3 7 15 31 |
|  | WAP to print the following pattern  \*  \* \*  \* \* \*  \* \* \* \*  \* \* \* \* \* | Enter the value of n:  5 | \*  \* \*  \* \* \*  \* \* \* \*  \* \* \* \* \* |

**Home Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
|  | WAP to print the following pattern  \*  \*\*\*  \*\*\*\*\*  \*\*\*\*\*\*\*  \*\*\*\*\*\*\*\*\* | Enter the value of n:  5 | \*  \*\*\*  \*\*\*\*\*  \*\*\*\*\*\*\*  \*\*\*\*\*\*\*\*\* |
|  | WAP to print the following pattern  A  B A  C B A  D C B A  E D C B A | Enter the value of n:  5 | A  B A  C B A  D C B A  E D C B A |
|  | Write a C program to print a hollow square pattern using a while loop. For row=4  \*\*\*\*\*  \* \*  \* \*  \*\*\*\*\* | Enter the value of n:  4 | \*\*\*\*\*  \* \*  \* \*  \*\*\*\*\* |
|  | WAP to print the following pattern  \*\*\*\*\*\*\*\*\*  \*\*\*\*\*\*\*  \*\*\*\*\*  \*\*\*  \* | Enter the value of n:  5 | \*\*\*\*\*\*\*\*\*  \*\*\*\*\*\*\*  \*\*\*\*\*  \*\*\*  \* |
| 21 | WAP to print the following pattern  1  2 1  1 2 3  4 3 2 1  1 2 3 4 5 | Enter the value of n:  5 | 1  2 1  1 2 3  4 3 2 1  1 2 3 4 5 |

**Array**

**Week 6&7**

**Day 11 : Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to create an array that can store N integers and display the contents of the array | Enter array size (N): 5  Enter number1: 45  Enter number2: 35  Enter number3: 38  Enter number4: 31  Enter number5: 49 | Array Contents are:  45 35 38 31 49 |
| 2. | WAP to find out the sum of the N numbers stored in an array of integers. | Enter array size (N): 5  Enter number1: 45  Enter number2: 35  Enter number3: 38  Enter number4: 31  Enter number5: 49 | Sum of the numbers stored in array: 198 |
| 3. | WAP to find the average of N numbers using arrays. | Enter array size (N): 5  Enter number1: 45  Enter number2: 35  Enter number3: 38  Enter number4: 31  Enter number5: 49 | Average of the numbers stored in array = 39.6 |
| 4. | WAP to find largest element stored in an array. | Enter array size (N): 5  Enter number1: 45  Enter number2: 35  Enter number3: 38  Enter number4: 31  Enter number5: 49 | Largest element stored in an array: 45 |
| 5. | WAP to insert an element in an 1-d array. | **Set 1:**  Enter no of elements : 5  1 2 3 4 5  Enter the element to be inserted : 6  Enter the location: 2 | The resultant array:  1 6 2 3 4 5 |
|  | **PRACTICE ASSIGNMENT** | | |
| 1. | WAP to search an element in an 1-d array. | **Set 1:**  Enter no of elements : 5  11 22 33 44 55  Enter the elements to be searched : 44  **Set 2:**  Enter no of elements : 5  11 22 33 44 55  Enter the elements to be searched : 77 | **Set 1:**  Number found at the location = 4  **Set 2:**  Number not found |
| 2. | WAP to Count the total number of duplicate elements in an array. | Input the number of elements to be stored in the array :5  Input 5 elements in the array :  element - 0 : 1  element - 1 : 1  element - 2 : 2  element - 3 : 3  element - 4 : 3 | Total number of duplicate elements found in the array: 2 |
| 3. | WAP to find out the multiplication of the numbers stored in an array of integers. | **Set 1:**  Enter array size: 5  Enter array elements: 1 2 3 5 6 | **Set 1:**  Product of the array elements = 180 |
| 4. | WAP to find the second largest element in an array. | Input the size of array : 5  Input 5 elements in the array :  element - 0 : 2  element - 1 : 9  element - 2 : 1  element - 3 : 4  element - 4 : 6 | The Second largest element in the array is : 6 |
| 5. | WAP to delete an element at desired position from an array. | Input the size of array : 5  Input 5 elements in the array in ascending order:  element - 0 : 1  element - 1 : 2  element - 2 : 3  element - 3 : 4  element - 4 : 5 | Input the position where to delete: 3    The new list is : 1 2 4 5 |
|  | **DAY-12** | | |
|  | **TOPIC : 1D Arrays** | | |
| 1. | WAP to display the array elements in ascending order. | RUN-1  Enter how many numbers :7  Enter the value of 7 Numbers:-  7 6 4 5 2 4 8  RUN-2  Enter how many numbers :10  Enter the value of 10 Numbers:-  12 34 56 78 90 34 56 799 122 56 | RUN-1  The Numbers in ascending order are  2 4 4 5 6 7 8  RUN-2  The Numbers in ascending order are  12 34 34 56 56 56 78 90 122 799 |
| 2. | WAP to Print all unique elements of an array. | Input the number of elements to be stored in the array: 4  Input 4 elements in the array :  element - 0 : 3  element - 1 : 2  element - 2 : 2  element - 3 : 5 | The unique elements found in the array are:  3 5 |
| 3. | WAP to print all the even and odd numbers in an 1-d array. | **Set 1:**  Enter number of elements in the array: 6  Enter 6 elements in the array: 12 19 45 69 98 23 | **Set 1:**  Even numbers in the array are: 12 98  Odd numbers in the array are: 19 45 69 23 |
| 4. | WAP to reverse the array elements. | **Set 1:**  Enter size of the array: 5  Enter Array Elements: 1 2 3 4 5 | **Set 1:**  Reversed array is: 5 4 3 2 1 |
| 5. | Given an array arr[] of non-negative integers and an integer sum, find a  subarray that adds to a given sum. | Input:  Enter array size: 6  Enter array elements: 1 4 20 3 10 5  Enter sum = 33 | Sum found between indexes 2 and 4 |
|  | **PRACTICE ASSIGNMENT** | | |
| 1. | Given an integer array, find the peak element in it. A peak element is an element that is greater than its neighbours. There might be multiple peak elements in an array, and the solution should report any peak element. | Enter array size: 5  Enter array elements:  8 9 10 12 15 | The peak element is 15 |
| 2. | Given an array A of N elements. Find the majority element in the array. A majority  element in an array A of size N is an element that appears more than N/2 times in  the array. | Enter array size: 5  Enter array elements:  3 1 3 3 2 | 3  Explanation:  Since, 3 is present more than N/2 times, so it is the majority element. |
| 3. | Given an array of integers arr[ ] of size N and an integer, the task is to rotate the array elements to the left by d positions. | arr[] =  {1, 2, 3, 4, 5, 6, 7},  d = 2 | Output: 3 4 5 6 7 1 2 |

**DAY-13 , 14**

**TOPIC : 2D Arrays**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP for a two dimensional to store and display the elements.( Store temperature of two cities for a week and display it) | Enter no of City : 2  1 2  Enter no of days : 7  Enter the Temp: Chosen value | Displaying values:  City 1, Day 1 = 33  City 1, Day 2 = 34  City 1, Day 3 = 35  City 1, Day 4 = 33  City 1, Day 5 = 32  City 1, Day 6 = 31  City 1, Day 7 = 30  City 2, Day 1 = 23  City 2, Day 2 = 22  City 2, Day 3 = 21  City 2, Day 4 = 24  City 2, Day 5 = 22  City 2, Day 6 = 25  City 2, Day 7 = 26 |
| 2. | WAP to find the sum of two matrices of order 2\*2 using multidimensional arrays. | Enter elements of 1st matrix  Enter a11: 2;  Enter a12: 0.5;  Enter a21: -1.1;  Enter a22: 2;  Enter elements of 2nd matrix  Enter b11: 0.2;  Enter b12: 0;  Enter b21: 0.23;  Enter b22: 23; | Sum Of Matrix:  2.2 0.5  -0.9 25.0 |
| 3. | WAP to multiply two matrices and display it. | RUN-1:  Enter value of matrix a  111111111  Enter value of matrix b  222222222  RUN-2:  Enter value of matrix a  222222222  Enter value of matrix b  333333333 | RUN-1  Value of matrix a  1 1 1  1 1 1  1 1 1  Value of matrix b  2 2 2  2 2 2  2 2 2  After Multiplication resultant matrix is  6 6 6  6 6 6  6 6 6  RUN-2  Value of matrix a  2 2 2  2 2 2  2 2 2  Value of matrix b  3 3 3  3 3 3  3 3 3  After Multiplication resultant matrix is  18 18 18  18 18 18  18 18 18 |
| 4. | WAP to find the sum of elements of upper triangular. | **Set 1:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix :  Enter a[0][0] value : 9  Enter a[0][1] value : 8  Enter a[0][2] value : 7  Enter a[1][0] value : 6  Enter a[1][1] value : 5  Enter a[1][2] value : 4  Enter a[2][0] value : 3  Enter a[2][1] value : 2  Enter a[2][2] value : 1 | **Set 1:**  The given matrix is :  9 8 7  6 5 4  3 2 1  Sum of upper triangular matrix = 19 |
| 5. | WAP to check whether two matrices are equal or not. | **Set 1:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix A :  Enter a[0][0] value : 1  Enter a[0][1] value : 2  Enter a[0][2] value : 3  Enter a[1][0] value : 4  Enter a[1][1] value : 5  Enter a[1][2] value : 6  Enter a[2][0] value : 7  Enter a[2][1] value : 8  Enter a[2][2] value : 9  Enter values to the matrix B :  Enter a[0][0] value : 1  Enter a[0][1] value : 2  Enter a[0][2] value : 3  Enter a[1][0] value : 4  Enter a[1][1] value : 5  Enter a[1][2] value : 6  Enter a[2][0] value : 7  Enter a[2][1] value : 8  Enter a[2][2] value : 9 | **Set 1:**  The given matrix A is :  1 2 3  4 5 6  7 8 9  The given matrix B is :  1 2 3  4 5 6  7 8 9  Matrix A is not equal to Matrix B |
|  | **PRACTICE ASSIGNMENT** | | |
| 1. | WAP to check whether a matrix is identity matrix or not. | **Set 1:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix :  Enter a[0][0] value : 1  Enter a[0][1] value : 0  Enter a[0][2] value : 0  Enter a[1][0] value : 0  Enter a[1][1] value : 1  Enter a[1][2] value : 0  Enter a[2][0] value : 0  Enter a[2][1] value : 0  Enter a[2][2] value : 1  **Set 2:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix :  Enter a[0][0] value : 1  Enter a[0][1] value : 2  Enter a[0][2] value : 3  Enter a[1][0] value : 0  Enter a[1][1] value : 1  Enter a[1][2] value : 0  Enter a[2][0] value : 0  Enter a[2][1] value : 2  Enter a[2][2] value : 1 | **Set 1:**  The given matrix is an Identity Matrix.  1 0 0  0 1 0  0 0 1  **Set 2:**  The given matrix is not an Identity Matrix.  1 2 3  0 1 0  0 2 1 |
| 2. | WAP to find out the frequency of even and odd numbers in a matrix. | **Set 1:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix :  Enter a[0][0] value : 1  Enter a[0][1] value : 2  Enter a[0][2] value : 3  Enter a[1][0] value : 4  Enter a[1][1] value : 5  Enter a[1][2] value : 6  Enter a[2][0] value : 7  Enter a[2][1] value : 8  Enter a[2][2] value : 9 | **Set 1:**  The given matrix is  1 2 3  4 5 6  7 8 9  The frequency of occurrence of odd number = 5  The frequency of occurrence of even number = 4 |
| 3. | WAP to find the transpose of a matrix. | **Set 1:**  Enter no. of rows : 3  Enter no. of cols : 3  Enter values to the matrix :  Enter a[0][0] value : 1  Enter a[0][1] value : 3  Enter a[0][2] value : 5  Enter a[1][0] value : 7  Enter a[1][1] value : 9  Enter a[1][2] value : 2  Enter a[2][0] value : 4  Enter a[2][1] value : 6  Enter a[2][2] value : 8 | **Set 1:**  The given matrix is :  1 3 5  7 9 2  4 6 8  Transpose of matrix A :  1 7 4  3 9 6  5 2 8 |
| 4. | WAP to find the Trace(sum of the diagonal element) of a given mxn matrix | Enter the order of the square matrix A :- 3  Enter the values of matrix A  3 4 5  6 8 9  1 3 4 | sum of diagonal values=15 |

**Functions**

**Week 8 & 9 - Day 15,16,17,18**

**Day 15**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to add two numbers entered through the keyboard by using a suitable user defined function. | **Set 1:**  Enter two number:  17 10  **Set 2:**  Enter two number:  5 -12 | **Set 1:**  Sum of 17 and 10 = 27  **Set 2:**  Sum of 5 and -12 = -7 |
| 2. | WAP to find the factorial of a number *n* by using a suitable user defined function. | **Set 1:**  Enter a number: 5  **Set 2:**  Enter a number: 0 | **Set 1:**  Factorial of 5 = 120  **Set 2:**  Factorial of 0 = 1 |
| 3. | A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence (Fi = Fi-1 + Fi-2). WAP to find out the value of nth term of the Fibonacci sequence by writing a suitable user defined function. | **Set 1:**  Enter Fibonacci term serial number: 2  **Set 2:**  Enter Fibonacci term serial number: 8 | **Set 1:**  Fibonacci term serial number: 2  Fibonacci number: 1  **Set 2:**  Fibonacci term serial number: 8  Fibonacci number: 13 |
| 4 | Write a C program to determine a number is prime or not using a function named as “PRIME”. | **Set 1:**  Enter an integer: 7  **Set 2:**  Enter an integer: 6 | **Set 1:**  7 is prime.  **Set 2:**  6 is not prime. |
| 5 | Write a C program to perform swapping of two integers using a function SWAP. | **Set 1:**  Enter num1: 10  Enter num2: 20  **Set 2:**  Enter num1: 15  Enter num2: 30 | **Set 1:**  Before Swapping  num1=10  num2=20  After Swapping  num1=20  num2=10  **Set 2:**  Before Swapping  num1=15  num2=30  After Swapping  num1=30  num2=15 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to test whether a number entered through the keyboard is a number in the Fibonacci sequence or not. (Using function) | **Set 1:**  Enter the number to test whether it is in Fibonacci sequence or not: 10  **Set 2:**  Enter the number to test whether it is in Fibonacci sequence or not: 8 | **Set 1:**  Entered number: 10 Number is in Fibonacci sequence: No  **Set 2:**  Entered number: 8 Number is in Fibonacci sequence: Yes |
| 2. | WAP by designing a recursive function to calculate the sum of the digits of any given integer until it becomes a single digit number using function. | **Set 1:**  Enter a number: 589  **Set 2:**  Enter a number: 25 | **Set 1:**  Sum of the digits (up to single digit) of 589 = 4  **Set 2:**  Sum of the digits (up to single digit) of 25 = 7 |
| 3 | WAP to print all prime numbers between 1 to 100 using function. |  | **Prime numbers between 1 to 100:**  2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97 |
| 4. | Write a function that will return the counting of Zeros in a Positive Integer | **Set 1:**  Input: 110560  **Set 2:**  Input: 178655 | **Set 1:**  No of zeros: 2  **Set 2:**  No of zeros: 0 |
| 5. | |  | | --- | | WAP to test whether a number n is palindrome number or not. | | **Set 1:**  Enter a number to test for palindrome: 123  **Set 2:**  Enter a number to test for palindrome: 1551 | **Set 1:**  Entered number: 123  Number is not palindrome.  **Set 2:**  Enter a number to test for palindrome: 1551  Number is palindrome. |

|  |
| --- |
| **Day : 16** |
| **TOPIC : Functions with 1D Arrays** |

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to design a user defined function to calculate the sum of the elements of an integer 1-D array. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Sum of the elements of the given array: 23  **Set 2:**  Sum of the elements of the given array: 3 |
| 2. | WAP to sort the elements of an 1-D array in ascending order by using a suitable user defined function for sort operation. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Before sorting elements of the given array: 3 5 7 2 6  After sorting elements of the given array: 2 3 5 6 7  **Set 2:**  Before sorting elements of the given array: 5 0 -2  After sorting elements of the given array: -2 0 5 |
| 3. | Write a C program to determine the largest and smallest element of a 1-D array. Use functions LARGEST and SMALLEST for the given purpose. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Largest element of array is 7  Smallest element of array is 2  **Set 2:**  Largest element of array is 5  Smallest element of array is -2 |
| 4. | Write a C program to determine the second largest element of a 1-D array of using a function SECLARGEST. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Second largest element of array is 6  **Set 2:**  Second largest element of array is 0 |
| 5. | Write a C program to swap the first and last element of a 1-D array of using a function SWAP. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Entered array: 3 5 7 2 6  Array after swapping: 6 5 7 2 3  **Set 2:**  Entered array: 5 0 -2  Array after swapping: -2 0 5 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | |  | | --- | | Write a C program to swap the largest and smallest element of a 1-D array of using a function SWAP. | | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Entered array: 3 5 7 2 6  Array after swapping: 3 5 2 7 6  **Set 2:**  Entered array: 5 0 -2  Array after swapping: -1 0 5 |
| 2. | |  | | --- | | Write a C program to find the sum of only odd values in a 1-D array using a function ODDSUM. | | |  | | --- | | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | | **Set 1:**  Sum of prime values = 15  **Set 2:**  Sum of prime values = 5 |
| 3. | |  | | --- | | Write a C program to find the sum of only PRIME values in a 1-D array using a function PRIMESUM. | | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | |  | | --- | | **Set 1:**  Sum of odd values = 15  **Set 2:**  Sum of prime values = 5 | |

|  |
| --- |
| **Day : 17** |
| **TOPIC : Functions with 2D Arrays** |

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | Write a C program to determine the sum of elements of a 2-D array using a function ELESUM. | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | **Set 1:**  Sum of the elements of the given array: 44  **Set 2:**  Sum of the elements of the given array: 38 |
| 2. | Write a C program to determine the sum of main diagonal elements of a 2-D array of size 3x3 using a function SUMDIAGONAL. | **Set 1:**  Enter a 3x3 size matrix:  1 2 3  4 5 6  7 8 9  **Set 2:**  Enter a 3x3 size matrix:  1 1 1  2 2 2  3 3 3 | **Set 1:**  Sum of the main diagonal elements of the given array: 15  **Set 2:**  Sum of the elements of the given array: 6 |
| 3. | Write a C program to determine the largest and smallest element of a 2-D array. Use functions LARGEST and SMALLEST for the given purpose. | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | **Set 1:**  Largest element of array is 9  Smallest element of array is -2  **Set 2:**  Largest element of array is 8  Smallest element of array is -7 |
| 4. | Write a C program to find the sum of only PRIME values in a 2-D array using a function PRIMESUM. | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | **Set 1:**  Sum of prime elements = 17  **Set 2:**  Sum of prime elements = 18 |
| 5. | Write a C program to perform addition of two matrices and display the result using 3rd matrix. | **Set 1:**  Enter matrix1:  1 2 3  4 5 6  7 8 9  Enter matrix2:  1 1 1  2 2 2  3 3 3  **Set 2:**  Enter matrix1:  1 2 3  -4 5 -6  7 -8 9  Enter matrix2:  1 1 1  1 1 1  1 1 1 | **Set 1:**  Result matrix  2 3 4  6 7 8  10 11 12  **Set 2:**  Result matrix  2 3 4  3 6 5  8 7 10 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | |  | | --- | | Write a C program to determine the sum of largest and smallest element of a 2-D array. | | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | **Set 1:**  Sum of largest and smallest elements: 7  **Set 2:**  Sum of largest and smallest elements: 1 |
| 2. | |  | | --- | | Write a C program to swap the largest and smallest element of a 2-D array of using a function SWAP. | | |  |  | | --- | --- | | |  | | --- | | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | | | **Set 1:**  Entered matrix  4 5 6 2  1 9 3 0  7 -2 1 8  Matrix after swapping  4 5 6 2  1 -2 3 0  7 9 1 8  **Set 2:**  Entered matrix  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0  Matrix after swapping  5 6 2  4 3 0  8 1 -7  4 4 5  0 3 0 |
| 3. | |  | | --- | | Write a C program to sort the elements of a values in a 2-D array using a function SORTELE. | |  | | |  | | --- | | **Set 1:**  Enter the row and column size of the matrix: 3 4  Enter the matrix:  4 5 6 2  1 9 3 0  7 -2 1 8  **Set 2:**  Enter the row and column size of the matrix: 5 3  Enter the matrix:  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0 | | |  |  | | --- | --- | | |  | | --- | | **Set 1:**  Entered matrix  4 5 6 2  1 9 3 0  7 -2 1 8  Matrix after sorting  -2 0 1 1  2 3 4 5  6 7 8 9  **Set 2:**  Entered matrix  5 6 2  4 3 0  -7 1 8  4 4 5  0 3 0  Matrix after sorting  -7 0 0  0 1 2  3 3 4  4 4 5  5 6 8 | | |
| 4 | Write a C program to perform multiplication of two matrices of size 3x3 and display the result using 3rd matrix. | **Set 1:**  Enter matrix1:  2 3 4  3 5 6  4 5 3  Enter matrix2:  1 2 1  -1 2 1  3 2 1  **Set 2:**  Enter matrix1:  2 3 1  7 4 1  9 -2 1  Enter matrix2:  9 -2 -1  5 7 3  8 1 0 | **Set 1:**  Entered matrix1:  2 3 4  3 5 6  4 5 3  Entered matrix2:  1 2 1  -1 2 1  3 2 1  Result matrix  11 18 9  16 28 14  8 24 12  **Set 2:**  Enter matrix1:  2 3 1  7 4 1  9 -2 1  Enter matrix2:  9 -2 -1  5 7 3  8 1 0  Result matrix  41 18 7  91 15 5  79 -31 -15 |

|  |
| --- |
| **Day 18** |
| **Recursion** |

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to find the factorial of a number n by writing a recursive function for it. | **Set 1:**  Enter a number: 4  **Set 2:**  Enter a number: 1 | **Set 1:**  Factorial of 4 = 24  **Set 2:**  Factorial of 1 = 1 |
| 2. | WAP to calculate GCD/HCF of two numbers by using a recursive function. | **Set 1:**  Enter two numbers:  105 60  **Set 2:**  Enter two numbers:  5 70 | **Set 1:**  GCD of 105 and 60 = 15  **Set 2:**  GCD of 5 and 70 = 5 |
| 3. | WAP by designing a recursive function to calculate the sum of the digits of any given integer until it becomes a single digit number. | **Set 1:**  Enter a number: 589  **Set 2:**  Enter a number: 25 | **Set 1:**  Sum of the digits (up to single digit) of 589 = 4  **Set 2:**  Sum of the digits (up to single digit) of 25 = 7 |
| 4 | Write a recursive function to count the digits of a positive integer (do also for sum of digits) | **Set 1:**  Input: 13478635  **Set 2:**  Input: 5875014 | **Set 1:**  Sum of digits: 37  **Set 2:**  Sum of digits: 30 |
| 5 | WAP to find out the maximum element of an integer array by using recursion. | **Set 1:**  Enter the size of the array: 5  Enter the elements of the array: 3 5 7 2 6  **Set 2:**  Enter the size of the array: 3  Enter the elements of the array: 5 0 -2 | **Set 1:**  Entered Array: 3 5 7 2 6  Maximum elements of the given array: 7  **Set 2:**  Entered Array: 5 0 -2  Maximum elements of the given array: 5 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1. | WAP to count number of digits of a positive integer n by using a recursive function. | |  | | --- | | **Set 1:**  Enter a number: 10  **Set 2:**  Enter a number: 2105 | | |  | | --- | | **Set 1:**  Number of digits of 10 = 2  **Set 2:**  Number of digits of 2105 = 4 | |
| 2. | WAP to find the nth Fibonacci number using recursion. | |  | | --- | | **Set 1:**  Enter the value of n: 10  **Set 2:**  Enter the value of n: 4 | | |  | | --- | | **Set 1:**  n = 10  nth Fibonacci number = 34  **Set 2:**  n = 4  nth Fibonacci number = 2 | |
| 3 | Write a recursive function to reverse a null terminated string | **Set 1:**  Input: Hello  **Set 2:**  Input: I am going to school. | **Set 1:**  Output: olleH  **Set 2:**  Output: .loohcs ot gniog ma I |
| 4. | Write a recursive function to copy one array to another | **Input:** Please Enter the Array Size : 5  Please Enter the Array Elements : 3  5  7  8  9 | **Output:** Elements of Second Array are:  Value Inside Array b[0] = 3  Value Inside Array b[1] = 5  Value Inside Array b[2] = 7  Value Inside Array b[3] = 8  Value Inside Array b[4] = 9 |
| 5. | |  | | --- | | Write a recursive function to convert a decimal number to binary | | **Set 1:**  Input: 765 | **Set 1:**  Output: 1011111101 |

**Character Arrays/Strings**

**Week 12 - Day 23, 24**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
|  | WAP to find the length of a string with/without using library function for getting length of the string | Programming | Length of the entered String is 11 |
|  | Write a program to extract last character of every word present in a sentence. | How are You | weu |
|  | Write a program to concatenate two strings without using any library function. | 1: KIIT String  2: University | KIIT University |
|  | Write a program to check whether an entered string is palindrome or not. | Set1: Kalinga  Set2 : Madam | Set1: Not Palindrom  Set2: Palindrome |
|  | Write a C program to extract a substring from a given string. Prompt the user to enter the starting position and length of the substring. | Industrial 2 4 | dust |
|  | Write a C program to find the largest word in a given sentence. Assume that words are separated by spaces. | You are very good boy. | very |
|  | Write a program to count the number of vowels, consonants, new lines and the total number of characters and words present in a string. | This is the best university. | Vowels=3 , consonants=9 , new lines=1 , total number of characters=23 , Total words=5. |
|  | Write a program to count the frequency of each character present in a string. | Hello World | H=1, e=1, l=3, o=2, w=1, r=1, d=1 |
|  | Write a program to replace all the occurrence of a particular character in a string by it’s previous 3rd character, If any. | Hello World, character= l | HeHeo Worod |
|  | Write a C program to remove all leading and trailing spaces from a given string, if any. | Hello world | Hello world |
|  | Write a C program to replace multiple occurrences of a specific word present in a given sentence. | You are a very very good boy | You a very good boy |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| **1** | Write a C program to capitalize the first letter of each word in a given sentence. Assume that words are separated by spaces. | Kalinga institute of industrial technology | Kalinga Institute Of Industrial Technology |
| 2 | Write a C program to check if a given string is a valid email address. Use appropriate validation criteria, such as the presence of '@' and '.' symbols. | Case 1:  student@kiit.ac.in  Case 2:  studentkiit.ac.in | Case 1:  This maild is is valid  Case 2:  This maild is is not valid |
| 3 | Write a C program to check if two strings are anagrams. An anagram is a word or phrase formed by rearranging the letters of another word or phrase. | worth | throw |
| 4 | Write a C program to remove all duplicate characters from a given string. The resulting string should contain each character only once. | College | Coleg |
| 5 | Write a C program to reverse the order of words in a given sentence. | Hello World | World Hello |
| 6. | Write a C program to remove all consecutive duplicate characters from a given string. | aaabbbcccdddeee | abcde |
| 7. | Write a C program to find the common characters between two strings. Display the common characters in alphabetical order. | Institute Industrial | I n s t u |
| 8. | Write a C program to compare two strings without using the built-in strcmp() function. | Case 1: kiit kiit  Case 2: kite bite | Case 1:0  Case 2:9 |
| 9. | Write a C program to convert a string of digits into an integer value. | "12345" | 12345 |
| 10. | Write a C program to remove all vowels from a given string. Consider both uppercase and lowercase vowels. | Hello World | Hll Wrld |

**Pointer, Dynamic Memory Allocation**

**Week 13, 14 - Day 25, 26, 27**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to multiply two numbers using pointers. | 5  6 | 30 |
| 2 | WAP to swap two numbers using call by reference. | Enter value of a : 8  Enter value of b: 10 | After swap,  The value of a : 10  Enter value of b: 8 |
| 3 | WAP to compute the sum of all elements in an array using pointer. | No. Of elements: 3  1  2  3 | Sum=6 |
| 4 | WAP to print a string in reverse using a pointer. | Set 1:  Input a string : KIIT  Set 2 :  Input a string : MADAM | Set 1:  Reverse of the string is : TIIK  Set 2:  Reverse of the string is : MADAM |
| 5 | WAP to count vowels and consonants in a string using pointer. | Set 1:  Input a string : HelloWorld  Set 2:  Input a string : string | Set 1:  Number of vowels in String:3  Number of Consonants in String:7  Set 2:  Number of vowels in String:1  Number of Consonants in String:5 |
| 6 | WAP to sort an array using Pointer. | Set 1:  Enter the number of elements to store in the array : 5  Enter 5 number of elements in the array :  element - 1 : 25  element - 2 : 45  element - 3 : 89  element - 4 : 15  element - 5 : 82  Set 2:  Enter the number of elements to store in the array : 6  Enter 6 number of elements in the array :  element - 1 : 75  element - 2 : 45  element - 3 : 39  element - 4 : 15  element - 5 : 92  element - 6 : 12 | Set-1:  The elements in the array after sorting :  element - 1 : 15  element - 2 : 25  element - 3 : 45  element - 4 : 82  element - 5 : 89  Set-2:  The elements in the array after sorting :  element - 1 : 12  element - 2 : 15  element - 3 : 39  element - 4 : 45  element - 5 : 75  element - 6 : 92 |
| 7 | WAP to compute the sum of all elements in an array using dynamic memory  Allocation. | **No. Of elements: 3**  **1**  **2**  **3** | **Sum=6** |
| 8 | WAP to find the largest element stored in an array of n elements by using dynamic memory  allocation. | Set-1:  Enter the total number of elements: 5  Number1: 3.4  Number2: 2.4  Number3: -5  Number4: 24.20  Number5: 6.7  Set-2:  Enter the total number of elements: 4  Number1: 8  Number2: 14  Number3: 56  Number4: 34 | Set-1:  Largest number is 24.20  Set-2:  Largest number is 56 |
|  | Dynamically allocate the size of an array using calloc, insert elements into the array, then print the elements. Change the sixe of the array, get the new elements and print the array. Finally free the memory. | Enter number of elements: 5  Enter the elements of the array are: 1, 2, 3, 4, 5  Enter the new size of the array: 10  Enter new elements of the array : 6, 7, 8, 9, 10, | Enter number of elements: 5  Memory successfully allocated using calloc.  The elements of the array are: 1, 2, 3, 4, 5,  Enter the new size of the array: 10  Memory successfully re-allocated using realloc.  The elements of the array are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| **1** | WAP to swap three numbers in cyclic order using Call by Reference. In other words, WAP that  takes three variable (a, b, c) in as separate parameters and rotates the values stored so that  value a goes to be, b, to c and c to a. | Set-1:  Enter a, b and c respectively: 1  2  3  Set-2:  Enter a, b and c respectively: 5  6  7 | Set-1:  Value before swapping:  a = 1  b = 2  c = 3  Value after swapping:  a = 3  b = 1  c = 2  Set-2:  Value before swapping:  a = 5  b = 6  c = 7  Value after swapping:  a = 7  b = 5  c = 6 |
| 2 | WAP to change the value of constant integer using pointers. | Set-1:  Before changing - value of a: 10  Set-2:  Before changing - value of a: 50 | Set-1:  After changing - value of a: 20  Set-2:  After changing - value of a: 60 |
| 3 | WAP to count distinct number of vowels and consonants present in a string using pointer. | Set-1:  Enter the string: Java | Set-1:  Consonants are:  J-1  v-1  Vowels are:  a-2 |
| 4 | WAP to swap two consecutive characters starting from left to right of a string. | Set-1:  Enter a String: help  Set-2:  Enter a String: Hello | Set-1:  String:ehpl  Set-2:  The length of the string is Odd. |
| 5 | Dynamically allocate memory using malloc() and calloc().  Check if the memory has been successfully allocated by malloc or not.  Check if the memory has been successfully allocated by calloc or not.  Finally Free the memory. | Enter number of elements: 5 | Memory successfully allocated using malloc.  Malloc Memory successfully freed.  Memory successfully allocated using calloc.  Calloc Memory successfully freed. |

**User Defined Data Types –Structures and Unions**

**Week 14, 15 - Day 28, 29, 30**

**Day 28 : Lab Assignments**

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| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
|  | WAP to store one student’s information (i.e. student’s roll no, name, gender, marks etc) of an  educational institute and display all the data, using structure | Enter the students data:  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Marks:95 | The students details are  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Marks:95 |
|  | WAP to store n student’s information (i.e. student’s roll no, name, gender, marks in 5 subjects  etc) of an educational institute and display all the data with total marks of each student, using  array of structure. If full mark of each subject is considered as 100 and pass mark as 40, then  display the list of students failed in a particular subject. | Set 1:  Enter the number of student : 1  Enter the students data:  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Mark in subject 1: 95  Mark in subject 2: 85  Mark in subject 3: 35  Mark in subject 4: 65  Mark in subject 5: 55  Enter subject number whose fail list to be displayed : 3  Set 2 :  Enter the number of student : 2  Enter the students data:  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Mark in subject 1: 95  Mark in subject 2: 85  Mark in subject 3: 50  Mark in subject 4: 30  Mark in subject 5: 55  Enter the students data:  Roll Number: 1505202  Name: Yashraj Behera  Gender:M  Mark in subject 1: 90  Mark in subject 2: 80  Mark in subject 3: 45  Mark in subject 4: 35  Mark in subject 5: 75  Enter subject number whose fail list to be displayed : 4 | Set 1:  The students details are  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Mark in subject 1: 95  Mark in subject 2: 85  Mark in subject 3: 75  Mark in subject 4: 65  Mark in subject 5: 55  Total marks : 375  List of fail students : 1  Set 2:  The students details are  Roll Number: 1505201  Name: Rajesh Agarwal  Gender:M  Mark in subject 1: 95  Mark in subject 2: 85  Mark in subject 3: 50  Mark in subject 4: 30  Mark in subject 5: 55  Total marks : 315    Roll Number: 1505202  Name: Yashraj Behera  Gender:M  Mark in subject 1: 90  Mark in subject 2: 80  Mark in subject 3: 45  Mark in subject 4: 35  Mark in subject 5: 75  Total marks : 325  List of fail students : 2 |
|  | WAP to add two distances (in km-meter) using structures. | Set-1  Enter data for 1st distance :  Enter km: 6  Enter meter: 600  Enter data for 2nd distance  Enter km: 7  Enter meter: 500  Set-2  Enter data for 1st distance :  Enter km: 7  Enter meter: 700  Enter data for 2nd distance  Enter km: 8  Enter meter: 500 | Set-1  Sum of distances = 14 km 100 m  Set-2  Sum of distances = 16 km 200 m |
|  | WAP to add two times (in hr-min-sec) by passing structure to a function. | Set-1  Enter Time 1 -> 3 : 40 : 50  Enter Time 2 -> 2 : 45 : 50  Set-2  Enter Time 1 -> 5 : 10 : 45  Enter Time 2 -> 6 : 40 : 45 | Set-1  Sum of time is -> 6 : 26 : 40  Set-2  Sum of time is -> 11 : 51 : 30 |
|  | WAP to store n employees data such as employee name, gender, designation, department, basic pay etc using structures with dynamically memory allocation. Calculate the gross pay of each employees as follows:  Gross pay=basic pay + HR + DA  HR=25% of basic, DA=75% of basic | Set-1  Enter the number of employees: 3  Enter Employee details-  Enter employee name: John Doe  Enter employee gender (M/F): M  Enter employee designation: Manager  Enter employee department: Sales  Enter employee basic pay: 50000  Enter Employee details-  Enter employee name: Jane Smith  Enter employee gender (M/F): F  Enter employee designation: Engineer  Enter employee department: Engineering  Enter employee basic pay: 35000  Enter Employee details-  Enter employee name: Alex Johnson  Enter employee gender (M/F): M  Enter employee designation: Analyst  Enter employee department: Finance  Enter employee basic pay: 45000 | Set-1  Details of Employee-  Name: John Doe  Gender: M  Designation: Manager  Department: Sales  Basic Pay: 50000.00  Gross Pay: 87500.00  Details of Employee-  Name: Jane Smith  Gender: F  Designation: Engineer  Department: Engineering  Basic Pay: 35000.00  Gross Pay: 61250.00  Details of Employee-  Name: Alex Johnson  Gender: M  Designation: Analyst  Department: Finance  Basic Pay: 45000.00  Gross Pay: 78750.00 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to create a new data type DATE (dd-mm-yyyy) with the help of structure and typedef. Write the following user defined functions for the date manipulations.  a) To increment date by 1 day  b) To increment date by 1 month  c) To increment date by 1year  d) to add few days in a date.  e) To add few months in a date.  f) To add few years in a date.  g) To return month name from a date.  h) To display date in DD.MM.YY format | Set-1  Enter a date : 24-03-2023  No. of days to add : 9  No. of months to add : 2  No. of years to add : 3 | Set-1  Next day is : 25-03-2023  Next month : 24-04-2023  Next year is : 24-03-2024  After addition of days :  2-04-2023  After addition of months :  24-05-2023  After addition of years :  24-03-2026  Month name : March  Date : 24.03.23 |

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| **Day : 29** |
| **TOPIC : Structure and Union** |

**Lab Assignments**

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| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to declare an union named as ABC having three members a, b and c as character, integer  and double respectively. Assign user entered values to these members respectively one by one  and display these values immediately. Again assign these user entered values to a, b, c one by  one , all together and display these values at last. Find the difference. | Set-1  Values entered one by one:  Enter a character: A  Enter an integer: 42  Enter a double: 3.14  Set-2  Enter a character, an integer, and a double all together:  A  42  3.14 | Set-1  Character: A  Integer: 42  Double: 3.140000  Set-2  Values entered all together:  character: @  integer: 10586  double: 3.14 |
| 2 | Use structures to perform addition, subtraction, multiplication and division operations on two complex numbers. | Set-1  Enter the real and imaginary units of first complex number:  First real = 7  First Imaginary = 8  Enter the real and imaginary units of the second complex number:  Second real = 3  Second Imaginary = 6 | Set-1  You have entered 1st no. As = 7.0 + 8.0 i  You have entered 2nd no. As = 3.0 + 6.0 I  What do you want to do?  Press e for exit  Press a for addition  Press s for subtraction  Press m for multiplication  Press d for division : a  Your ans is:  10.0 + 14.0 i  What do you want to do?  Press e for exit  Press a for addition  Press s for subtraction  Press m for multiplication  Press d for division : s  Your ans is:  4.0 + 2.0 i  What do you want to do?  Press e for exit  Press a for addition  Press s for subtraction  Press m for multiplication  Press d for division : m  Your ans is:  -27.0 + 66.0 i  What do you want to do?  Press e for exit  Press a for addition  Press s for subtraction  Press m for multiplication  Press d for division : d  Your ans is:  1.5 + 0.4 i  What do you want to do?  Press e for exit  Press a for addition  Press s for subtraction  Press m for multiplication  Press d for division : e |
| 3 | Use an array of structures to calculate the gross salary and solve the increment issue in an office. Also, calculate the new salary structure after increment. Given basic: Rs 12500, DA: 50%, and HRA 10%. | Set-1  What do you want to do?  A.Enter new employee details:  B.Search employee details:  C. Increment the salary: A  What do you want to do?  A.Enter new employee details:  B.Search employee details:  C. Increment the salary: B  What do you want to do?  A.Enter new employee details:  B.Search employee details:  C. Increment the salary: C  What do you want to do?  A.Enter new employee details:  B.Search employee details:  C. Increment the salary: B | Set-1  Enter employee details:  First Name: Arjun  Last Name: Mohanty  Enter Category: Clerk  Enter Address: Patia Square, Kalarahanga  Enter Basic Salary: 12500  Enter First Name: Arjun  Name: Arjun Mohanty  Address: Patia Square, Kalarahanga  Gross Salary: 20000  Enter First Name: Arjun  Percentage Increase: 10  Enter First Name: Arjun  Name: Arjun Mohanty  Address: Patia Square, Kalarahanga  Gross Salary: 22000 |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to calculate the difference between two time periods. Times are given in (hr:min:sec) User has to choose whether 12hr or 24 hr format. | Set-1  Enter Choice :   1. 12 hr format 2. 24 hr format   1  Enter time1-  09:25:30  Enter time2-  06:10:10  Set-2  Enter Choice :   1. 12 hr format 2. 24 hr format   2  Enter time1-  14:20:10  Enter time2-  13:10:05 | Set-1  Difference between Time 1 and Time-2 is-  3 hrs 15 mins 20 secs  Set-2  Difference between Time 1 and Time-2 is-  1 hrs 10 mins 5 secs |
| 3 | WAP to extract individual bytes from an unsigned int using union. | Set-1  Enter an unsigned integer: 4294967295  Set-2  Enter an unsigned integer: 987654321 | Set-1  Individual bytes: FF FF FF FF  Set-2  Individual bytes: 31 2D FB 3A |

**File Handling**

**Week 16 : Day 31, 32**

**Lab Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to read and print the content of a file test.txt | Content of test.txt  From the small beginnings KIIT has developed into a leading university | From the small beginnings KIIT has developed into a leading university |
| 2 | WAP to write the text From the small beginnings KIIT has developed into a leading university into a file test.txt |  | Content of test.txt  From the small beginnings KIIT has developed into a leading university |
| 3 | WAP to append the phrase with a strong interdisciplinary culture and a commitment to teaching excellence into the file test.txt | Content of test.txt  From the small beginnings KIIT has developed into a leading university | Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence |
| 4 | WAP to count the total number of characters in the file test.txt | Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence | 150 |
| 5 | WAP to count the total number of words in the file test.txt | Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence | 22 |
| 6 | WAP to change all small letters in the file test.txt to capital letters | Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence | Content of test.txt  FROM THE SMALL BEGINNINGS KIIT HAS DEVELOPED INTO A LEADING UNIVERSITY WITH A STRONG INTERDISCIPLINARY CULTURE AND A COMMITMENT TO TEACHING EXCELLENCE |
| 7 | WAP to copy contents of the file test.txt to another file new.txt | Content of test.txt  FROM THE SMALL BEGINNINGS KIIT HAS DEVELOPED INTO A LEADING UNIVERSITY WITH A STRONG INTERDISCIPLINARY CULTURE AND A COMMITMENT TO TEACHING EXCELLENCE | Content of new.txt  FROM THE SMALL BEGINNINGS KIIT HAS DEVELOPED INTO A LEADING UNIVERSITY WITH A STRONG INTERDISCIPLINARY CULTURE AND A COMMITMENT TO TEACHING EXCELLENCE |
| 8 | Write all the programs 1-7 where all the related filenames will be given at command line | Same as previous | Same as previous |

**Home Assignments (Practice Problems)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q#** | **Experiment Details** | **Input** | **Output** |
| 1 | WAP to generate factorial of number given as input through a file test.txt and append the factorial value in the file. | Content of test.txt  5 | Content of test.txt  5  120 |
| 2 | WAP to count the case-insensitive occurrences of a given word in a file test.txt | Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence  Set 1  Input the word to search: a  Set 2  Input the word to search: THE | Set 1  3  Set 2  1 |
| 3 | WAP to count total number of words in each paragraph in a file test.txt | Set 1  Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence | Set 1  Paragraph -1 words – 22  Set 2  Paragraph -1 words – 22  Paragraph -2 words - 12 |
| 4 | Check if contents of two files are same | Set 2  Content of test.txt  From the small beginnings KIIT has developed into a leading university with a strong interdisciplinary culture and a commitment to teaching excellence.  Today, KIIT offers professional education to around 35,000 students from across India. |  |
| 5 | WAP to check if there exists any date in dd-mm-yyyy format in a file testdate.txt | Set 1  Content of testdate.txt  Today date is 01-01-2023  Set 1  Content of testdate.txt  Today date is 1st January of 2023 | Set 1  YES  Set 2  NO |
| 6 | WAP to check if a filepath, given as the commandline argument, exists in the system | Set 1  test1.txt  Set 2  test.txt | Set 1  Filepath doesnot exist  Set 2  Filepath exists |
| 7 | WAP to delete a file if that exists in the system, where the filepath is given as the commandline argument | Set 1  test1.txt  Set 2  test.txt | Set 1  Filepath doesnot exist  Set 2  Fie deleted successfully |

**Grading Policies:**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No.** | **Internal/Sessional** | **Assessment**  **Component** | **Weightage / Marks** |
| **1** | **Internal (Sample)**  **(60 Marks)** | Lab Report + Attendance | 20 |
| Viva | 10 |
| Quiz | 10 |
| Programming Test | 10 |
| Continuous Evaluation | 10 |
| **2** | **Sessional**  **(40 Marks)** | Quiz | 20 |
| Programming Test | 20 |

**Reference Materials:-**

1. **Text books**

T1: Programming in ANSI C (8th Edition) by E. Balagurusamy

1. **Reference books**

R1:The C Programming Language by Brian Kernighan and Dennis Ritchie (Second Edition)

1. **Links to e-resources (NPTEL, YouTube, Swayam, Virtual lab etc)**

* **<https://onlinecourses.nptel.ac.in/noc22_cs40/preview>**

**email:mainak.biswasfcs@kiit.ac.in**