| **Ex.No.1** | **TECHNICAL PROBLEMS AND FLOWCHART** | **Reg.No:- URK23CS1261** |
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| **13-09-23** |

| **1a)**  **Aim:** The objective of this activity is to develop a Flowchart for Electricity Billing.  **Algorithm**  Step 1 : Start  Step 2 : Read the previous unit and current unit  Step 3 : Calculate the used units by subtracting the current unit and previous unit  Step 4 : Calculate the Electricity bill from the used units  Step 5 : Print the amount of Electricity Bill  Step 6 : Stop    **Result:**  The algorithm has successfully depicted the process behind the electric billing system for the suitable input and desired output.  **1b)**  **Aim:** The objective of this activity is to develop a Flowchart Retail Shop Billing System  **Algorithm**  Step 1 : Start  Step 2 : Read the barcode of the product  Step 3 : Display the product name and amount  Step 4 : Check if more products available, if available go to step 2, otherwise go to step 5 Step Step 5 : Calculate the total cost of the products  Step 6 : Print the total cost  Step 7 : Stop    **Result:**  The algorithm has successfully depicted the process behind the retail shop billing system for the suitable input and desired output.  **1c)**  **Aim :** The objective of this activity is to develop a Flowchart, an electric current calculation in 3 phase AC circuit.  **Algorithm :**  Step 1 : Start  Step 2 : Get the value of voltage, resistance, current and power factor  Step 3 : Compute the electric current by multiplying voltage, resistance, current and power  factor with 3  Step 4 : Print the calculated electric current  Step 5 : Stop  **Pseudocode :**  READ voltage, resistance, current and power factor  COMPUTE Electric current = 3 x voltage x resistance x current x power factor  PRINT Electric current  **Result:**  The algorithm has successfully depicted the process behind the calculation of electric current for the suitable input and desired output.  1d)  **Aim:** The objective of this activity is to develop a Flowchart for calculating the weight of a motorcycle.  **Algorithm :**  Step 1: Start  Step 2: Input weight values  Step 3: Enter the weight of the motorcycle frame.  Step 4: Enter the weight of the motorcycle engine.  Step 5: Enter the combined weight of all motorcycle wheels.  Step 6:Enter the weight of any additional accessories.  Step 7: Calculate the total weight  Step 8: Sum up the weight values to find the total weight.  Step 9: Output the total weight.  Step 10: Stop  **Pseudocode :**  BEGIN  TotalWeight = 0  INPUT "Enter the weight of the motorcycle frame:", FrameWeight  TotalWeight = TotalWeight + FrameWeight  INPUT "Enter the weight of the motorcycle engine:", EngineWeight  TotalWeight = TotalWeight + EngineWeight  INPUT "Enter the combined weight of all motorcycle wheels:", WheelsWeight  TotalWeight = TotalWeight + WheelsWeight  INPUT "Enter the weight of any additional accessories:", AccessoriesWeight  TotalWeight = TotalWeight + AccessoriesWeight  PRINT "Total weight of the motorcycle is:", TotalWeight  END    **Result:**  The algorithm has successfully depicted the process behind calculating the weight of a motorcycle for the suitable input and desired output.  1e)  **Aim:** The objective of this activity is to develop a Flowchart for generate a sine series  **Algorithm :**  Step 1: Start  Step 2: Get Value of x.  Step 3: Using Sine series formula getting the result  Step 4: Looping the formula for each number.  Step 5: Print the result.  Step 6: Stop    **Result:**  The algorithm has successfully depicted the process behind calculating the sine series for the suitable input and desired output. |
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| **Ex.No.2** | **STATEMENTS AND EXPRESSIONS** |  |
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| **16.09.23** |

| 2b)  **Aim:** The objective of this program is to exchange the values stored in two variables with and without using a third variable.  **i). Exchanging values with third variable**  Algorithm:  1. Start the program.  2. Declare three variables.  3. Assign the value of the first variable to a temporary variable.  4. Assign the value of the second variable to the first variable.  5. Assign the value of the temporary variable to the second variable.  6. End the program  **Program:**  #include<stdio.h>  int main(void) {  // Variable declaration  int a, b, temp;  printf("Enter two numbers a and b ");  scanf("%d %d", &a, &b);  // Swap logic  temp = a;  a = b;  b = temp;  printf("\n After swapping \na = %d\nb = %d\n", a, b);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  **ii). Exchanging value of two variables without using third variable**  **Algorithm:**  1.Start the program  2. Read the values of two variables X and Y.  3. Compute the new values of X and Y as follows,  X= X + Y.  Y= X - Y  X = X – Y  4. Print the values of X and Y  5. End the program  **Program**  #include<stdio.h>  int main() {  int X=10, Y=20;  printf("Before swap X=%d Y=%d",X,Y);  X=X+Y;  Y=X-Y;  X=X-Y;  printf("\nAfter swap X=%d Y=%d",X,Y);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  2b)  **Aim:** The objective of this program is to find the distance between two points.  **Algorithm:**  Step 1: StartInput the coordinates of Point-1 as (x\_1, y\_1).  Step 2: Input the coordinates of Point-2 as (x\_2, y\_2).  Step 3: Calculate the differences in x and y coordinates  Step 4: diff\_x = x\_2 - x\_1diff\_y = y\_2 – y\_1  Step 5: Calculate the distance using the Pythagorean theorem  Step 6: distance = sqrt(diff\_x^2 + diff\_y^2)  Step 7: Output the calculated distance.  Step 8: Stop  **Program:**  #include <stdio.h>  #include <math.h>  int main() {  float x\_1, y\_1, x\_2, y\_2, distance, fin\_x, fin\_y;  printf("Enter Point-1 (x1 y1): ");  scanf("%f %f", &x\_1, &y\_1);  printf("Enter Point-2 (x2 y2): ");  scanf("%f %f", &x\_2, &y\_2);  fin\_x = x\_2 - x\_1;  fin\_y = y\_2 - y\_1;  distance = sqrt((fin\_x \* fin\_x) + (fin\_y \* fin\_y));  printf("Distance = %f\n", distance);  return 0;  }  //gcc -o nameanything program.c -lm → can name output file too //cc program.c -lm → -lm for we are using math fun ,sqrt.  **Output:**    **Result:**  Thus, the program executed successfully.  2c)  **Aim:** The objective of this program is to print the result of arithmetic expression.  **Algorithm:**  Step : 1 Start.  Step : 2 Declare integer variables a, b, and c.  Step : 3 Input two integers a and b.  Step : 4 Calculate c as the square of the sum of a and b, i.e., c = (a + b) \* (a + b).  Step :5 Output the value of c.  Step :6 Stop  **Program:**  #include <stdio.h>  int main() {  int a,b,c;  printf("Enter two numbers a and b: ");  scanf("%d %d",&a,&b);  c = (a+b)\*(a+b);  printf("\nSquare of a=%d b=%d is %d\n",a,b,c);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.3** | **CONDITIONALS AND ITERATIVE LOOPS** |  |
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| **18.09.23** |

| 3a)  **Aim:** The objective of this program is to calculate the sum of n natural odd numbers.  **Algorithm:**  Step 1: Start the program.  Step 2: Read the range  Step 3: Use for loop to iterate up to the range  Step 4: Print the result  Step 5: Stop the program  **Program:**  #include <stdio.h>  int main() {  int i,n,sum=0;  printf("\nInput number of terms: ");  scanf("%d",&n);  printf("The odd numbers are: ");  for(i=1;i<=n;i++){  printf("%d ",2\*i-1);  sum+= 2\*i-1;  }  printf("\nThe Sum odd numbers up to %d terms: %d\n",n,sum);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  3b)  **Aim:** The objective of this program is to generate patterns, right angle triangle using an asterisk  **Algorithm:**  Step 1: Start the program  Step 2: Read the range  Step 3: Use for loop to iterate through the rows and columns  Step 4: Print the result  Step 5: Stop the program  **Program:**  #include <stdio.h>  void main() {  int i,j,rows;  printf("Input number of rows : ");  scanf("%d",&rows);  for(i=1;i<=rows;i++) {  for(j=1;j<=i;j++)  printf("\*");  printf("\n");  }  }  **Output:**  **Result:**  Thus, the program executed successfully.  3c)  **Aim:** The objective of this program is to generate the sum of even number series for n terms  **Algorithm:**  Step 1: Start  Step 2: Declare integer variables i, n, and sum, and initialize sum to 0.  Step 3: Output "Input number of terms: " to prompt the user for input.  Step 4: Read an integer value from the user and store it in the variable 'n' using scanf.  Step 5: Output "The even numbers are: " to indicate the list of even numbers.  Step 6: Initialize a for loop with 'i' ranging from 1 to 'n'  Step 7: End of the for loop.  Step 8: Output "The Sum of even numbers up to 'n' terms: " followed by the value of 'sum'.  Step 9 : Stop  **Program:**  #include <stdio.h>  int main() {  int i,n,sum=0;  printf("Input number of terms: ");  scanf("%d",&n);  printf("The even numbers are: ");  for(i=1;i<=n;i++){  printf("%d ",2\*i);  sum+= 2\*i;  }  printf("\nThe Sum even numbers up to %d terms: %d\n",n,sum);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  3d)  **Aim:**The objective of this program is to print the following number pattern  1  1 2  1 2 3  1 2 3 4  1 2 3 4 5  **Algorithm:**  Step 1: Start  Step 2: Prompt the user to enter the number of rows by displaying "Input number of rows: ".  Step 3: Read the user's input and store it in the 'rows' variable.  Step 4: Initialize a loop with 'i' starting from 1 and ending at 'rows' and printing the results  Step 5: Stop  **Program:**  #include <stdio.h>  int main() {  int i,j,rows;  printf("Input number of rows: ");  scanf("%d",&rows);  for(i=1;i<=rows;i++){  for(j=1;j<=i;j++){  printf("%d ",j);  }  printf("\n");  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  3e)  **Aim:** The objective of this program is to generate the Floyd‟s triangle using looping.  **Algorithm:** Step 1: Start  Step 2: Prompt the user to enter the number of rows by displaying "Input number of rows: ".  Step 3: Read the user's input and store it in the 'rows' variable.  Step 4: Initialize a loop with 'i' starting from 1 and ending at 'rows' and making nested loops. By using newline(\n) printing the result  Step 5: Stop.  **Program:**  #include <stdio.h>  int main() {  int i,j,x,rows;  printf("Input number of rows: ");  scanf("%d",&rows);  for(i=1;i<=rows;i++){  for(j=1;j<=i;j++){  x+=1;  printf("%d ",x);  }  printf("\n");  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.4** | **FUNCTIONS** |  |
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| **04.10.23** |

| 4a)  **Aim:** The objective of this program is to find the factorial of a number using a function.  **Algorithm:**  Step 1: Start the program  Step 2: In main function, declare variable n, fact and function fact1()  Step 3: Read the number n to find factorial  Step 4: call fact1(n)  Step 5: In the fact1(int n), initialize the variables x=1 and fact=1  Step 6: If x<=n then goto step 7 else goto step 12  Step 7: Calculate fact=fact \* x  Step 8: Increment x by 1 and goto step 6  Step 9: Return fact  Step 10: print factorial  Step 11: Stop the program  **Program:**  #include <stdio.h>  int fact1(int);  int main() {  int fact,n;  printf("Enter a number to find factorial: ");  scanf("%d",&n);  fact = fact1(n);  printf("The factorial of %d is: %d\n",n,fact);  return 0;  }  int fact1(int n) {  int x, fact=1;  for(x=1;x<=n; x++)  fact=fact\*x;  return fact;  }  **Output:**    **Result:**  Thus, the program executed successfully.  4b)  **Aim:** The objective of this program is to find the largest number in the list using function  **Algorithm:**  Step 1: Start  Step 2: Declare an integer function named function\_largest that takes two parameters: an integer array input\_list and an integer input\_num.  Step 3: Declare integer variables input\_num and an integer array input\_list of size 10.  Step 4: Prompt the user for the number of elements by outputting "How many elements are present in the list: " and store the input in input\_num.  Step 5: Output "What are the elements in the list?".  Step 6: Read input\_num integers from the user and store them in the input\_list array.  Step 7: Call the function\_largest function with input\_list and input\_num as arguments.  Step 8: In the function\_largest(input\_list, input\_num) function:  Step 8.1: Initialize largest\_number to the first element of the input\_list.  Step 8.2: Loop through the elements of input\_list:  Step 8.2.1: Compare the current element with largest\_number.  Step 8.2.2: If the current element is greater than largest\_number, update largest\_number.  Step 8.3: Output the largest\_number, which is the largest number in the list.  Step 9: Stop  **Program:**  #include <stdio.h>  int function\_largest(int[],int);  int input\_num,input\_list[10];  int main() {  printf("How many elements are present in the list: ");  scanf("%d",&input\_num);  printf("\nWhat are the elements in the list?\n ");  for(int x=1; x<= input\_num; x++){  printf("\n%d ==> ",x);  scanf("%d", &input\_list[x-1]);  }  function\_largest(input\_list,input\_num);  return 0;  }  int function\_largest(int input\_list[], int input\_num){  int largest\_number = input\_list[0] ;  for(int y=0; y<=input\_num;y++){  if(input\_list[y] > largest\_number){  largest\_number = input\_list[y];  }  }  printf("%d", largest\_number);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  4c)  **Aim:** The objective of this program is to find the area of a triangle using function.  **Algorithm:** Step 1: Start the program.  Step 2: Declare the necessary variables a, b, and areaoftriangle as doubles.  Step 3: Input the user to enter the first number and read the input into a.  Step 4: Input the user to enter the second number and read the input into b.  Step 5:Calculate the area of the triangle using the formula areaoftriangle = 0.5 \* a \* b.  Step 6:Print the calculated area using printf with two decimal places.  Step 7: Stop  **Program:**  #include <stdio.h>  void area\_of\_triangle(double, double);  int main() {  double a,b;  printf("Enter the first number: ");  scanf("%lf", &a);  printf("Enter the second number: ");  scanf("%lf", &b);  area\_of\_triangle(a,b);  return 0;  }  void area\_of\_triangle(double a, double b) {  double areaoftriangle = 0.5\*a\*b;  printf("\nArea of triangle: %.2lf\n", areaoftriangle);  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.5** | **STRINGS** |  |
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| **11.10.23** |

| 5a)  **Aim:** The objective of this program is to reverse a string using a for loop.  **Algorithm:**  Step 1. Start the program.  Step 2. Declare a character array „str‟ of size 50 to store the input string and initialize it.  Step 3. Declare variables „i‟, „initial‟, „end‟, and „len‟ of type int.  Step 4. Print the initial given string.  Step 5. Calculate the length of the string using the „strlen()‟ function and store it in the „len‟ variable.  Step 6. Initialize „initial‟ to 0 and „end‟ to „len – 1‟.  Step 7. Use a for loop to swap characters in the string:  a. For each iteration of the loop, swap the character at index „i‟ with the character at index „end‟.  b. Increment „i‟ and decrement „end‟ to move towards the middle of the string. c. Continue this process until „i‟ is less than end.  Step 8. Print the reversed string.  Step 9. End the program.  **Program:**  #include <stdio.h>  #include <string.h>  int main(){  char str[50]="tutorial", temp;  int initial, end, len;  printf(" Given String = %s \n", str);  len = strlen(str);  end = len - 1;  for (initial=0; initial < end; initial++) {  temp = str[initial];  str[initial] = str[end];  str[end] = temp;  end--;  }  printf("\nReversed String = %s\n", str);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  5b)  **Aim:** The objective of this program is to check whether the given string is palindrome or not.  **Algorithm:**  Step 1. Start the program.  Step 2. Including the required pre-defined directories header files of stdio and string.  Step 3. Declaring variables and arrays word, palindrome word.  Step 4. Prompting the word from the user.  Step 5. Defining e as string length to use in for loop.  Step 6. By using string comparison, we can find the palindrome with if conditions.  Step 7. Printing the results.  Step 8 End  **Program:**  #include <stdio.h>  #include <string.h>  int main(){  char word[20],palindrom\_word[20];  int i,e;  printf("Want to check if your word is a palindrome or not?\nThen enter the word: ");  scanf("%s",word);  printf("So you want to check palindrome for this word \"%s\"!", word);  e=strlen(word)-1;  for(i=0; i<=e; i++){  palindrom\_word[i] = word[e-i];  }  if (strcmp(word,palindrom\_word) == 0){  printf("\nWord : \"%s\" is a palindrome!\n",word);  }  else {  printf("\nWord : \"%s\" is not a palindrome!\n",word);  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  5c)  **Aim:** The Objective of this program is to count the length of a string and search for a character in the string, replace a character in a string.  **Algorithm:**  1. Start the program.  2. Including the required pre-defined directories header files of stdio and string.  3. Declaring variables and arrays word, palindrome word.  4. Prompting the word from the user.  5. Defining e as string length to use in for loop.  6. Prompting the user again for the number where the character is present.  7. Using a for loop to check each and every letter whether they are matching or not and finally changing the word.  8. Printing the result.  9. End  **Program:**  #include <stdio.h>  #include <string.h>  int main(){  char word[20], in\_char;  int i,e,num\_letter;  printf("Want to change a letter in word?\nThen enter the word: ");  scanf(" %s",word);  e=strlen(word);  printf("\nSo now which letter you want to change in this word(len %d) :\"%s\"|\nLetter num: ",e,word);  scanf(" %d", &num\_letter);  printf("\nFor what char you want to change this letter (%d) to ?: ",num\_letter);  scanf(" %c", &in\_char);  for (i=0; i<=e; i++){  if (i == num\_letter-1){  word[i] = in\_char;  }  }  printf("Word: %s\n", word);  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.6** | **VALIDATION** |  |
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| **18-10-23** |

| 6a)  **Aim:** The Objective of this program is to create a program to validate the age of a voter.  **Algorithm:**  Step 1.Start  Step 2.Declare an integer variable age  Step 3.Output: "Enter your age: "  Step 4.Input the value of age  Step 5.If age is greater than or equal to 18, go to step 6, else go to step 7  Step 6.Output: "You are eligible to vote!"  Step 7.Output: "Sorry, you are not eligible to vote."  Step 8.End  **Program:**  #include <stdio.h>  int main() {  int age;  // Input age from user  printf("Enter your age: ");  scanf("%d", &age);  // Validate age  if (age >= 18) {  printf("You are eligible to vote!\n");  }  else {  printf("Sorry, you are not eligible to vote.\n");  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  6b)  **Aim:** The Objective of this program is to find the marks ranges of students .  **Algorithm:**  Step 1. Start the program.  Step 2.Declare two variables: marks to store the student's marks and grade to store the corresponding grade.  Step 3.Prompt the user to enter their marks and read the input using scanf.  Step 4.Check the value of marks using a series of if and else if conditions:  a. If marks is equal to 100, assign "A+" to the grade using strcpy.  b. If marks are in the range of 90 to 99, assign 'A' to the first character of grade.  c. If marks are in the range of 80 to 89, assign 'B' to the first character of grade.  d. If marks are in the range of 70 to 79, assign 'C' to the first character of grade.  e. If marks are in the range of 51 to 69, assign 'D' to the first character of grade.  f. If marks are less than 50, assign 'F' to the first character of grade.  Step 5.Print the calculated grade using printf.  Step 6.End.  **Program:**  #include <stdio.h>  #include <string.h>  int main() {  int marks;  char grade[3];  printf("Enter Your Marks: ");  scanf("%d", &marks);  if (marks == 100) {  strcpy(grade, "A+");  }  else if (marks >= 90 && marks <= 99) {  grade[0] = 'A';  }  else if (marks >= 80 && marks <= 89) {  grade[0] = 'B';  }  else if (marks >= 70 && marks <= 79) {  grade[0] = 'C';  }  else if (marks >= 51 && marks <= 69) {  grade[0] = 'D';  }  else if (marks < 50) {  grade[0] = 'F';  }  printf("Your Grade: %s\n", grade);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  6c)  **Aim:** The Objective of this program is to avoid divide by zero error.  **Algorithm:**  Step 1. Include header file <stdio.h>.  Step 2. Declare variables a, b, and c.  Step 3. Prompt the user to enter two numbers.  Step 4. Read the input numbers into variables a and b.  Step 5. If b is 0, display an error message and exit.  Step 6. Calculate the result c as a floating-point division of a by b.  Step 7. Display the result c with two decimal places.  Step 8. End.  **Program:**  #include <stdio.h>  int main(){  int a,b;  float c;  printf("Enter two numbers: ");  scanf("%d %d",&a,&b);  if (b==0){  printf("-\_- Can't Divide by 0!\n");  }  else {  c =(float)a/b;  printf("Value: %.2f\n",c);  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.7** | **REAL-TIME/TECHNICAL APPLICATIONS USING FUNCTIONS** |  |
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| **18-10-23** |

| 7a)  **Aim:** The Objective of this program is to calculate the grades for five subjects based on the marks scored using functions  **Algorithm:**  Step 1. Start the program.  Step 2. Declare an array to store the marks for five subjects as floating-point numbers. 3. Declare two variables to store the total marks and average marks.  Step 4. Prompt the user to enter the marks for each subject one by one using a loop, and store them in the array.  Step 5. Calculate total marks by adding all the elements of the array.  Step 6. Calculate the average mark by dividing the total by 5.  Step 7. Define a function that takes a single parameter mark and returns the corresponding grade based on the predefined grading scale.  Step 8. The function uses conditional statements to check the value of `marks` and return the appropriate grade 'A', 'B', 'C', 'D', or 'F', if the mark is >=90, 80<=, 70<=, 60<=,<60, F respectively.  Step 9. Print the grades for each subject by calling the function for each subject marks in the array, along with the subject number.  Step 10. Print the average Marks and the overall grade for the student by calling the function with the average mark.  Step 11. End the program.  **Program:**  #include <stdio.h>  char calculateGrade(float marks){  if (marks >= 90){  return 'A';  }  else if (marks >= 80){  return 'B';  }  else if (marks >= 70){  return 'C';  }  else if (marks >= 60){  return 'D';  }  else{  return 'F';  }  }  int main()  {  float subjectMarks[5],totalMarks = 0.0,averageMarks;  printf("Enter the marks for five subjects:\n");  for (int i = 0; i < 5; i++){  printf("Subject %d: ", i + 1);  scanf("%f", &subjectMarks[i]);  totalMarks += subjectMarks[i];  }  averageMarks = totalMarks / 5;  printf("\nGrades for each subject:\n");  for (int i = 0; i < 5; i++){  printf("Subject %d: %c\n", i + 1, calculateGrade(subjectMarks[i]));  }  printf("\nAverage Marks: %.2f\n", averageMarks);  printf("Grade: %c\n", calculateGrade(averageMarks));  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  7b)  **Aim:** The Objective of this program is to compute area using functions  **Algorithm:**  Step 1.Include the header file <stdio.h>.  Step 2.Define a constant float PI with a value of 3.14.  Step 3.Create four functions to calculate the areas of different shapes: circle\_area, rectangle\_area, square\_area, and triangle\_area.  Step 4.Inside each area calculation function, compute the respective area using appropriate formulas and return the result.  Step 5.In the main function, declare variables for user input: choice for the shape selection and area to store the calculated area.  Step 6.Prompt the user to choose a shape and read their choice into the choice variable.  Step 7.Use a switch statement to handle different shape choices, prompting the user for the necessary parameters (e.g., radius, length, width, base, and height) and calling the appropriate area calculation function.  Step 8.Display the calculated area with two decimal places.  Step 9. End  **Program:**  #include <stdio.h>  const float PI = 3.14;  int circle\_area(float radius){  float area = PI\*radius\*radius;  return area;  }  int rectangle\_area(float length,float width){  float area = length\*width;  return area;  }  int square\_area(float length){  float area = length\*length;  return area;  }  int triangle\_area(float base, float height){  float area = (1/2)\*(base\*height);  return area;  }  int main(){  int choice;  float area;  printf("I can find areas of these shapes :\n1.Circle\n2.Rectangle\n3.Square\n4.Triangle\nWhat shapes area you want to find? (Enter in numbers): ");  scanf(" %d",&choice);  switch (choice) {  case 1:  float radius;  printf("\nYour choice: Circle!");  printf("\nEnter radius of the circle: ");  scanf(" %f",&radius);  area = circle\_area(radius);  break;  case 2:  float length, width;  printf("\nYour choice: Rectangle!");  printf("\nEnter the value of length in the rectangle: ");  scanf(" %f",&length);  printf("Enter the value of width in the rectangle: ");  scanf(" %f",&width);  area = rectangle\_area(length,width);  break;  case 3:  printf("\nYour Choice: Square!");  printf("\nEnter the value of length in the square: ");  scanf(" %f",&length);  area = square\_area(length);  break;  case 4:  float base,height;  printf("\nYour Choice: Triangle!");  printf("\nEnter the value of base in the triangle: ");  scanf(" %f",&base);  printf("\nEnter the value of height in the triangle: ");  scanf(" %f",&height);  area = triangle\_area(base,height);  break;  default:  printf("Invalid choice\n");  return 1;  }  printf("\nArea = %.2f",area);  }  **Output:**    **Result:**  Thus, the program executed successfully.  7c)  **Aim:** The Objective of this program is to compute Employee Payroll using functions.  **Algorithm:**  Step 1. Include the header file <stdio.h>.  Step 2. Define two functions, gross\_pay and tax, to calculate gross pay and tax deductions, respectively. These functions take appropriate parameters and return the calculated values.  Step 3. In the main function, declare variables to store input values and the final results: hrs\_worked, hrly\_pay, in\_tax, fin\_gross\_pays, fin\_taxs, and fin\_amount.  Step 4. Prompt the user to enter the number of hours worked and read the input into the hrs\_worked variable.  Step 5. Prompt the user to enter the hourly pay rate and read the input into the hrly\_pay variable.  Step 6. Prompt the user to enter the tax percentage (in the range 1.00 to 100.00) and read the input into the in\_tax variable.  Step 7. Calculate the gross pay using the gross\_pay function, passing hrs\_worked and hrly\_pay as arguments, and store the result in the fin\_gross\_pays variable.  Step 8. Calculate the tax deduction using the tax function, passing fin\_gross\_pays and in\_tax as arguments, and store the result in the fin\_taxs variable.  Step 9. Calculate the net worth by subtracting fin\_taxs from fin\_gross\_pays and store the result in the fin\_amount variable. Then, display the gross pay, tax deduction, and net worth with two decimal places.  Step 10. End  **Program:**  #include <stdio.h>  float gross\_pay(float hrs\_worked, float hrly\_pay) {  return hrs\_worked \* hrly\_pay;  }  float tax(float gross\_pay, float in\_tax) {  return (in\_tax/100) \* gross\_pay;  }  int main() {  float hrs\_worked, hrly\_pay, fin\_gross\_pays, fin\_taxs, fin\_amount,in\_tax;  printf("Enter hours you worked: ");  scanf("%f", &hrs\_worked);  printf("Enter hourly how much you earn: ");  scanf("%f", &hrly\_pay);  printf("Enter tax percentage(1.00-100.00): ");  scanf("%f", &in\_tax);  fin\_gross\_pays = gross\_pay(hrs\_worked, hrly\_pay);  fin\_taxs = tax(fin\_gross\_pays,in\_tax);  fin\_amount = fin\_gross\_pays - fin\_taxs;  printf("Gross Pay: ₹%.2f\n", fin\_gross\_pays);  printf("Tax Deduction: ₹%.2f\n", fin\_taxs);  printf("Net worth: ₹%.2f\n", fin\_amount);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.8** | **POINTERS** |  |
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| **25.10.23** |

| 8a)  **Aim:** The objective of this program is to do arithmetic operations using pointers.  **Algorithm:**  Step 1.Start the program  Step 2.Read two values for doing arithmetic operations  Step 3. Assign the address of those two values to two pointers ptr1 and ptr2.  Step 4. Perform the arithmetic operations such as addition, subtraction, multiplication and division  Step 5. Print the result of each operation.  Step 6.Stop the program.  **Program:**  #include<stdio.h>  int main()  {  int no1,no2;  int \*ptr1,\*ptr2;  int sum,sub,mult;  float div;  printf("Enter number1:\n");  scanf(" %d",&no1);  printf("Enter number2:\n");  scanf(" %d",&no2);  ptr1=&no1;//ptr1 stores address of no1  ptr2=&no2;//ptr2 stores address of no2  sum=(\*ptr1) + (\*ptr2);  sub=(\*ptr1) - (\*ptr2);  mult=(\*ptr1) \* (\*ptr2);  div=(\*ptr1) / (\*ptr2);  printf("sum= %d\n",sum);  printf("subtraction= %d\n",sub);  printf("Multiplication= %d\n",mult);  printf("Division= %.2f\n",div);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  8b)  **Aim:** The objective of this program is to store n elements in an array,compute the sum of n elements and print the elements and sum using a pointer.  **Algorithm:**  Step 1. Start the program  Step 2. Declaring variables and arrays and prompts the user for getting the number of elements in the list .  Step 3. Read the number of values in a list.  Step 4. Assigning the size of the array but getting the number of elements in the list.  Step 5. Assign the address of the array to the pointer.  Step 6. Using FOR loop and reading the elements from the user, while taking results, take sum variable and add the input elements.  Step 7. Print the result.  Step 8.Stop the program.  **Program:**  #include <stdio.h>  int main(){  int num\_in\_ls;  printf("Enter the elements in the list: ");  scanf("%d",&num\_in\_ls);  int input\_list[num\_in\_ls],sum;  int\* pointer = input\_list;  printf("Enter the numbers in the elements\n");  for(int x=1; x<= num\_in\_ls; x++){  printf(" %d ==> ",x);  scanf("%d", &input\_list[x-1]);  sum += \*(pointer++);  }  printf("%d\n",sum);  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.9** | **STRUCTURES** |  |
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| **2-11-23** |

| 9a)  **Aim:** The objective of this program is to create a simple student information management system that allows users to store and display student details using structure  **Algorithm:**  Step 1. Start the program.  Step 2. Declare a structure named “Student” with the fields name, age, roll, and marks.  Step 3. Declare an integer variable “n” to store the number of students.  Step 4. Declare an array of structures named “s” to store multiple student details. Choose an appropriate size for the array (e.g., n or 100).  Step 5. Prompt the user to enter the number of students and read the input into the “n” variable.  Step 6. Use a loop to input the details of each student:  a. For each student, print " Enter Student Details:".  b. Enter the student's name and read it into the name field of the i-th element in the “s” array.  c. Enter the student's age and read it into the age field of the i-th element in the “s” array.  d. Enter the student's roll number and read it into the roll field of the i-th element in the “s” array.  e. Enter the student's marks and read it into the marks field of the i-th element in the “s” array.  Step 7. After the loop, display the student details:  a. Print “Student Details:”.  b. Use a loop to iterate through the “s” array:  i. Print the student's name, age, roll number, and marks from the “s” array.  Step 8. End the program.  **Program:**  #include <stdio.h>  struct student {  int roll;  char name[50];  int age;  float marks;  };  int main() {  int i, n;  printf("\nEnter the Total Number Of Student: ");  scanf("%d", &n);  struct student s[n];  printf("\nEnter Student Details: \n");  for (i = 0; i < n; i++)  {  printf("\nEnter Student Roll No: ");  scanf("%d", &(s[i].roll));  printf("Enter Student Name: ");  scanf("%s", s[i].name);  printf("Enter Student Age: ");  scanf("%d", &(s[i].age));  printf("Enter Student Marks: ");  scanf("%f", &(s[i].marks));  }  printf("\n\nDisplay Student Details:\n");  for (i = 0; i < n; i++) {  printf("\nStudent Roll No: %d", s[i].roll);  printf("\nStudent Name: %s", s[i].name);  printf("\nStudent Age: %d", s[i].age);  printf("\nStudent Marks: %f", s[i].marks);  printf("\n\n");  }  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  9b)  **Aim:** The objective of this program is to create a simple payroll of employees using structure and pointers.  **Algorithm:**  Step 1. Include necessary header files.  Step 2. Define the 'employees' structure.  Step 3. Declare a global pointer to an array of 'employees' structures.  Step 4. In the 'main' function:  a. Declare a variable 'no\_employees' to store the number of employees.  b. Prompt the user to input 'no\_employees'.  c. Allocate memory for the 'employees' array.  d. Check for memory allocation failure.  Step 5. Input employee details in a loop and calculate relevant values.  Step 6. Display employee details in a loop.  Step 7. Free the dynamically allocated memory.  Step 8. Return 0 to indicate successful execution.  Step 9. End  **Program:**  #include <stdio.h>  #include <stdlib.h>  #include <string.h>  struct employees {  char name[10];  int age;  float hrs\_worked;  float hrly\_pay;  float tax;  float gross\_pay;  float fin\_tax;  double fin\_amount;  };  struct employees\* pointer\_em;  int main() {  int no\_employees = 0;  printf("How many employees do you have: ");  scanf("%d", &no\_employees);  pointer\_em = (struct employees\*)malloc(sizeof(struct employees) \* no\_employees);  if (pointer\_em == NULL) {  printf("Memory allocation failed.\n");  return 1;  }  for (int i = 0; i < no\_employees; i++) {  printf("\nEnter the name of employee: ");  scanf(" %30[^\n]", pointer\_em[i].name);  printf("Enter the age of %s: ", pointer\_em[i].name);  scanf(" %d", &pointer\_em[i].age);  printf("Enter the number of hours %s worked: ", pointer\_em[i].name);  scanf(" %f", &pointer\_em[i].hrs\_worked);  printf("Enter the per hour pay for %s: ", pointer\_em[i].name);  scanf(" %f", &pointer\_em[i].hrly\_pay);  printf("Enter the tax rate (%%) for %s: ", pointer\_em[i].name);  scanf(" %f", &pointer\_em[i].tax);  pointer\_em[i].gross\_pay = pointer\_em[i].hrs\_worked \* pointer\_em[i].hrly\_pay;  pointer\_em[i].fin\_tax = (pointer\_em[i].tax / 100) \* pointer\_em[i].gross\_pay;  pointer\_em[i].fin\_amount = pointer\_em[i].gross\_pay - pointer\_em[i].fin\_tax;  }  for (int i = 0; i < no\_employees; i++) {  printf("\nEmployee %d: Name: %s\nAge: %d\nHours Worked: %.2f\nHourly Pay: %.2f\nGross Pay: %.2f\nTax(%%): %.2f\nTax Reduction: %.2f\nFinal Amount: %.2f\n",  i + 1,  pointer\_em[i].name,  pointer\_em[i].age,  pointer\_em[i].hrs\_worked,  pointer\_em[i].hrly\_pay,  pointer\_em[i].gross\_pay,  pointer\_em[i].tax,  pointer\_em[i].fin\_tax,  pointer\_em[i].fin\_amount  );  }  free(pointer\_em);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully. |
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| **Ex.No.10** | **FILE HANDLING** |  |
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| **4-11-23** |

| 10a)  **Aim:** The objective of this program is to create a program which copies content of a file to another file.  **Algorithm:**  Step 1. Start the program  Step 2. Open the source file in read mode.  Step 3. Check if the source file was successfully opened. If not, display an  Step 4. Error message and exit the program.  Step 5. Open the destination file in write mode.  Step 6. Check if the destination file was successfully opened. If not, display an error message, close the source file, and exit the program.  Step 7. Read characters from the source file one by one until the end of the file is reached (EOF).  Step 8. Write each character to the destination file.  Step 9. lose both the source and destination files.  Step 10. Print a success message.  Step 11. Stop the program  **Program:**  #include <stdio.h>  #include <stdlib.h>  int main() {  FILE \*sourceFile, \*destFile;  char ch;  sourceFile = fopen("source.txt", "r"); // Open the source file in read mode  if (sourceFile == NULL) {  perror("Error opening source file");  return 1;  }  destFile = fopen("destination.txt", "w"); // Open the destination file in write mode  if (destFile == NULL) {  perror("Error opening destination file");  fclose(sourceFile); // Close the source file before exiting  return 1;  }  while ((ch = fgetc(sourceFile)) != EOF) {  fputc(ch, destFile); // Write each character from source to destination }  printf("File copied successfully!\n");  fclose(sourceFile);  fclose(destFile);  return 0;  }  }  **Output:**    **Result:**  Thus, the program executed successfully.  10b)  **Aim:** Objective of this program is to find the word count and the longest word in a file.  **Algorithm:**  Step 1. Start the program  Step 2. Open the source file in read mode.  Step 3. Check if the words file was successfully opened. If not, display an  Step 4. Error message and exit the program.  Step 5. Increment num\_words.  a. If the length of the current word is greater than largest\_word\_length  b. update largest\_word\_length.  c. copy the word to largest\_word.  Step 6. Close the file.  Step 7. Print the results: num\_words, largest\_word\_length, and largest\_word.  Step 8. End.  **Program:**  #include <stdio.h>  #include <string.h>  int main(){  char word [50]="", largest\_word[50]="";  int num\_words = 0, largest\_word\_length=0;  FILE \*wordsfile;  wordsfile = fopen("word.txt", "r");  if (wordsfile == NULL){  perror("I Can't find the file...");  }  else {  while(fscanf(wordsfile, "%s",word) != EOF){  num\_words++;  int current\_words\_length = strlen(word);  if (current\_words\_length > largest\_word\_length){  largest\_word\_length = current\_words\_length;  strcpy(largest\_word, word);  }  }  printf("Words found : |%d|\nLargest Length: {%d}\nWord: [%s]\n",num\_words, largest\_word\_length,largest\_word);  }  fclose(wordsfile);  return 0;  }  **Output:**    **Result:**  Thus, the program executed successfully.  10c)  **Aim:** The objective of this program is to store, retrieve and display students details using file.  **Algorithm:**  Step 1. Start the program.  Step 2. Define struct Student for storing student details.  Step 3. Open a binary file for student details using fopen.  a. Check for file open errors.  Step 4. Display a menu with options (Store, Display, Exit).  Step 5. If Store is chosen:  a. Prompt the user for student details (name, roll number, marks).  b. Create a Student object and write it to the file using fwrite.  Step 6. If Display is chosen:  a. Read and display all student details from the file using a loop.  Step 7. If Exit is chosen, terminate the program.  Step 8. Loop back to step 3 until Exit is chosen.  Step 9.. Close the file when done using fclose.  Step 10. End  **Program:**  #include <stdio.h>  #include <stdlib.h>  struct Student {  char name[50];  int rollNumber;  float marks;  };  void storeStudentDetails(FILE \*file) {  struct Student student;  printf("Enter student name: ");  scanf("%s", student.name);  printf("Enter roll number: ");  scanf("%d", &student.rollNumber);  printf("Enter marks: ");  scanf("%f", &student.marks);  fprintf(file, "Name: %s\nRoll Number: %d\nMarks: %.2f\n\n", student.name, student.rollNumber, student.marks);  printf("Student details stored successfully.\n");  }  void displayStudentDetails(FILE \*file) {  struct Student student;  printf("Student Details:\n");  while (fscanf(file, "Name: %s\nRoll Number: %d\nMarks: %f\n", student.name, &student.rollNumber, &student.marks) != EOF) {  printf("Name: %s\n", student.name);  printf("Roll Number: %d\n", student.rollNumber);  printf("Marks: %.2f\n\n", student.marks);  }  }  int main() {  int choice;  do {  printf("1. Store Student Details\n");  printf("2. Display Student Details\n");  printf("3. Exit\n");  printf("Enter your choice: ");  scanf("%d", &choice);  FILE \*file;  file = fopen("student\_details.txt", "a+");  if (file == NULL) {  printf("Error opening the file.\n");  return 1;  }  switch (choice) {  case 1:  storeStudentDetails(file);  fclose(file);  break;  case 2:  displayStudentDetails(file);  fclose(file);  break;  case 3:  printf("Exiting the program.\n");  break;  default:  printf("Invalid choice. Please try again.\n");  }  } while (choice != 3);  return 0;  }  **Output:**    **Result:** Thus, the program executed successfully. |
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