```c
#include <stdio.h>

void displayMatrix(int r, int c,int arr[r][c]){
 for(int i =0; i < r; i++)
 {
  if(i == 0){
   for(int j = 0; j < c; j ++){
    printf("___");
   }
   printf("_\n");
  }
  for(int j = 0; j < c; j++){
   if(j == 0){
    printf("|");
   }
   if(arr[i][j] < 0 || arr[i][j] >= 10){
    printf("%d",arr[i][j]);
   }
   else{
    printf(" %d",arr[i][j]);
   }
   printf("|");
  }
   printf("\n");
  for(int j = 0; j < c; j ++){
   printf("___");
  }
  printf("_\n");
 }
}

void transpose(int r, int c, int mat1[r][c], int mat2[c][r]){
 for(int i = 0; i < c; i++){
  for(int j = 0; j < r; j++){
   mat2[i][j] = mat1[j][i];
  }
 }

}

void addition(int n1,int n2, int mat1[n1][n2],int mat2[n1][n2],int mat3[n1][n2]){
 for(int i = 0; i < n1; i++){
  for(int j = 0; j < n2; j++){
   mat3[i][j] = mat1[i][j] + mat2[i][j];
  }
 }
}

void subtraction(int n1,int n2, int mat1[n1][n2],int mat2[n1][n2],int mat3[n1][n2]){
 for(int i = 0; i < n1; i++){
  for(int j = 0; j < n2; j++){
   mat3[i][j] = mat1[i][j] - mat2[i][j];
  }
 }
}

void multiplication(int r1, int c1, int r2, int c2,int mat1[r1][c1], int mat2[r2][c2], int mat3[r1][c2]){
 for(int i = 0; i < r1; i++){
  for(int j = 0; j < c2; j++){
   mat3[i][j] = 0;
   for(int k = 0; k < c1; k++){
    mat3[i][j] += mat1[i][k]* mat2[k][j];
   }
  }
 }
}



int* minorArray(int n1, int n2, int mat[3][3]){
 int arr[4];
 int k = 0;
 while(k != 4){
  for(int i = 0; i < 3; i++){
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    for(int j = 0; j < 3; j++){
     if(i != n1 && j != n2){
      arr[k] = mat[i][j];
      k++;
     }
    }
   }
  }
  return arr;
}

int main(){

  // we will ask user for their choice !
  int choice;
  printf("Transpose -> 1\n");
  printf("Addition -> 2\n");
  printf("Subtraction -> 3\n");
  printf("Multiplication -> 4\n");
  printf("Enter your choice > \n");

  scanf("%d",&choice);

  if(choice == 1){
  //first we will input a matrix by the user !
   int r,c;
   printf("Enter number of rows : ");
   scanf("%d",&r);
   printf("Enter number of columns: ");
   scanf("%d",&c);

   int mat[r][c];
   int transposeMat[c][r];

   for(int i = 0; i < r; i++){
    for(int j = 0; j < c; j++){
     printf("Enter element {%d:%d} > ",i,j);
     int ele;
     scanf("%d",&ele);
     mat[i][j] = ele;
    }
   }
   printf("\nNormal Matrix\n");
   displayMatrix(r,c,mat);
   transpose(r,c,mat,transposeMat);
   printf("\nTranspose Matrix\n");;
   displayMatrix(c,r,transposeMat);
  }
  else if(choice == 2){
   // we will input two matrixes by user
   int r;
   int c;
   printf("Enter number of rows > ");
   scanf("%d",&r);
   printf("Enter number of columns > ");
   scanf("%d",&c);
   printf("\n");

   int mat1[r][c];
   int mat2[r][c];
   int mat3[r][c];

   printf("\n");
   printf("First Matrix Input");
   printf("\n");
   for(int i = 0; i < r; i++){
    for(int j = 0; j < c; j++){
     printf("Enter element {%d:%d} > ",i,j);
     int ele;
     scanf("%d",&ele);
     mat1[i][j] = ele;
    }
   }

   printf("\n");
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```
  printf("This is the first matrix");
  printf("\n");
  displayMatrix(r,c,mat1);

  printf("Second Matrix Input\n");

  for(int i = 0; i < r; i++){
   for(int j = 0; j < c; j++){
    printf("Enter element {%d:%d} > ",i,j);
    int ele;
    scanf("%d",&ele);
    mat2[i][j] = ele;
   }
  }

  printf("\n");
  printf("This is the second matrix");
  displayMatrix(r,c,mat2);
  printf("\n");

  addition(r,c,mat1,mat2,mat3);
  printf("The third matrix which is formed by addition of above two matrix : \n");
  displayMatrix(r,c,mat3);
 }

 else if(choice == 3){

  // we will input two matrixes by user
  int r;
  int c;
  printf("Enter number of rows > ");
  scanf("%d",&r);
  printf("Enter number of columns > ");
  scanf("%d",&c);
  printf("\n");

  int mat1[r][c];
  int mat2[r][c];
  int mat3[r][c];

  printf("\n");
  printf("First Matrix Input");
  printf("\n");

  for(int i = 0; i < r; i++){
   for(int j = 0; j < c; j++){
    printf("Enter element {%d:%d} > ",i,j);
    int ele;
    scanf("%d",&ele);
    mat1[i][j] = ele;
   }
  }

  printf("\n");
  printf("This is the first matrix");
  printf("\n");
  displayMatrix(r,c,mat1);
  printf("\n");

  printf("Second Matrix Input\n");

  for(int i = 0; i < r; i++){
   for(int j = 0; j < c; j++){
    printf("Enter element {%d:%d} > ",i,j);
    int ele;
    scanf("%d",&ele);
    mat2[i][j] = ele;
   }
  }
  printf("\n");
  printf("This is the first matrix");
  printf("\n");
  displayMatrix(r,c,mat2);
  printf("\n");

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```
 subtraction(r,c,mat1,mat2,mat3);
 printf("The third matrix which is formed by subtraction of above two matrix : \n");
 displayMatrix(r,c,mat3);
}

else if(choice == 4){
 int r1;
 int c1;
 int r2;
 int c2;

 printf("Enter number of rows for first matrix : ");
 scanf("%d",&r1);
 printf("Enter number of columns for first matrix : ");
 scanf("%d",&c1);
 printf("Enter number of rows for second matrix : ");
 scanf("%d",&r2);
 printf("Enter number of columns for second matrix : ");
 scanf("%d",&c2);
 printf("\n");

 if(c1 != r2){
  printf("Given matrix order do not satisify the condition for matrix multiplication");
 }
 else{
  int mat1[r1][c1];
  int mat2[r2][c2];
  int mat3[r1][c2];

 printf("\n");
 printf("First Matrix Input");
 printf("\n");

 for(int i = 0; i < r1; i++){
  for(int j = 0; j < c1; j++){
   printf("Enter element {%d:%d} > ",i,j);
   int ele;
   scanf("%d",&ele);
   mat1[i][j] = ele;
  }
 }

 printf("\n");
 printf("This is the first matrix");
 printf("\n");
 displayMatrix(r1,c1,mat1);
 printf("\n");

 printf("Second Matrix Input\n");

 for(int i = 0; i < r2; i++){
  for(int j = 0; j < c2; j++){
   printf("Enter element {%d:%d} > ",i,j);
   int ele;
   scanf("%d",&ele);
   mat2[i][j] = ele;
  }
 }
 printf("\n");
 printf("This is the second matrix");
 printf("\n");
 displayMatrix(r2,c2,mat2);
 printf("\n");

 printf("The Third Matrix which is product of above two matrix : \n");
 multiplication(r1,c1,r2,c2,mat1,mat2,mat3);
 displayMatrix(r1,c2,mat3);

 }
}



return 0;
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300 }
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