CIVIL SELF STUDY

- The Program file which is created allows us to find the resultant of coplanar concurrent and non-noncurrent force system.

- Note: If executing the program in turbo c then we need to change iostream to iostream.h and remove "*using namespace std;" line*.

Source Code:

```
#include <iostream>
#include<math.h>
#include<stdlib.h>
using namespace std;
void intro();
void concurrent();
void nconcurrent();
void instructions();


void instructions()
{
   system("cls");
   cout<<" NOTE::\n\n 1. If the force is along (+)ve x-axis enter the value of angle as 0.\n 2. If the force is along (+)ve y-axis enter the value of angle as 90.\n 3. If the force is along (-)ve x-axis enter the value of angle as 180.\n 4. If the force is along (-)ve y-axis enter the value of angle as 270.\n 5. Enter angle in degrees.";
   cout<<"\n\nEnter the force and its angle with x-axis in a format given below:\n 32 60\n 50 90\n\n\n ";
}
```

```
void intro()
{
   int a;
   cout<<"\t\t\t\t!!VERY WARM WELCOME !!\n\n ";
   cout<<"This is a program for solving the problems related to
coplanar force system and non coplanar force system\n\n";
   cout<<" CHOOSE THE FORCE SYSTEM:\n\n";
   cout<<"1. Concurrent Force System\n2. Non-Concurrent
Force System\n3. Quit\n\n\n";
   cout<<" Press 1 for 1st option, 2 for 2nd option and 3 for
exiting the program:";
   cin>>a;
   if(a==1)
   {
      system("cls");
      concurrent();
   }
   else if(a==2)
   {
      system("cls");
      nconcurrent();
   }
   else
   {
       exit(0);
    }

}

void concurrent()
{
   int n,i,c;
```

```
    char m;
    double force[100],angle[100],Fx=0,Fy=0,R,theta;
    cout<<"Enter the total number of forces:";
    cin>>n;
    a:
    instructions();
     cout<<"\nEnter force and corresponding angle:\n\n";
    for(i=0;i<n;i++)
    {
       cin>>force[i]>>angle[i];

    }
    system("cls");
    cout<<" Check The Values Before Submitting:\n\n\n";
    for(i=0;i<n;i++)
    {
       cout<<"F"<<i+1<<" = "<<force[i]<<"  and  angle"<<i+1<<" =
"<<angle[i]<<" degrees";
       cout<<"\n\n";
    }
    cout<<"\n\n\n\n 1. SUBMIT\t\t\t2. RE-ENTER VALUES";
    cout<<"\n\n Enter your choice:";
    l:
    cin>>c;
    if(c==1)
    {
       system("cls");
    }
    else if(c==2){
       system("cls");
       goto a;
    }
    else{
```

```
        cout<<"\nInvalid input  Enter again:";
        goto l;
    }

    for(i=0;i<n;i++)
    {
        angle[i]*=(3.14159265358/180);
       Fx+=force[i]*cos(angle[i]);
       Fy+=force[i]*sin(angle[i]);
    }
     R=sqrt(pow(Fx,2)+pow(Fy,2));
     theta=atan(Fy/Fx)*(180/3.141592653);
    cout<<" Fx = "<<Fx<<"\n\n";
    cout<<" Fy = "<<Fy<<"\n\n";
    cout<<" Resultant = "<<R<<"\n\n"<<" Angle = "<<theta<<"
degrees\n\n\n";
    cout<<"\n\n\n\n Enter M to go to the main menu:";
     s:
     cin>>m;
     if(m=='m'||m=='M')
     {
        system("cls");
        intro();
     }
     else
     {
        cout<<"\nInvalid Input  Enter Again:";
        goto s;
     }
}

void nconcurrent()
{
```

```
   int n,i,c,f,b;
   char m;
   double
Fx=0,Fy=0,forces[100],angle[100],distx[100],disty[100],M=0,d,R
,theta,moment[100],momSum=0;
   cout<<"Enter the total number of forces:";
   cin>>n;
   system("cls");
   a:
   cout<<" NOTE::\n\n 1. If the force is along (+)ve x-axis enter
the value of angle as 0.\n 2. If the force is along (+)ve y-axis
enter the value of angle as 90.\n 3. If the force is along (-)ve x-
axis enter the value of angle as 180.\n 4. If the force is along (-
)ve y-axis enter the value of angle as 270.\n 5. Enter angle in
degrees.\n 6. First Enter the distance from y-axis then from x-
axis.\n 7. Input should be in the format: Force  Angle
Distance_from_y-axis  Distance_from_x-axis\n 8. If the force is
passing through the lowermost left point, enter it's distance as
0\n";
   cout<<"\n\nEnter the force, its angle with x-axis, Distance
from y-axis and x- axis and  in a format given below:\n 32 60 3 4
\n 50 90 1 2\n\n\n ";
   cout<<"\n\nEnter all the values in the format specified\n\n";
   for(i=0;i<n;i++)
   {
      cin>>forces[i]>>angle[i]>>distx[i]>>disty[i];
   }
   system("cls");
   cout<<"\n\n If there are any moments given:\n\n PRESS: 1\n
OTHERWISE PRESS: 2\n\n";
   cin>>f;
   if(f==1)
   {
```

```
        cout<<" Enter number of moments:";
        cin>>b;
        cout<<"\n\n Enter values of moments i.e. (+)ve for anti-
clockwise and (-)ve for clockwise:\n\n";
        for(i=0;i<b;i++)
        {
           cin>>moment[i];
           momSum+=moment[i];
        }
        system("cls");
    }
    else{
        system("cls");
    }
    cout<<"\n Check The Values Before Submitting:\n\n\n";
    for(i=0;i<n;i++)
    {
        cout<<"F"<<i+1<<" = "<<forces[i]<<" , angle"<<i+1<<" =
"<<angle[i]<<" degrees"<<" , x"<<i+1<<" = "<<distx[i]<<"  and
y"<<i+1<<" = "<<disty[i] ;
        cout<<"\n\n";
    }
    cout<<"\n\n\n\n 1. SUBMIT\t\t\t2. RE-ENTER VALUES";
    cout<<"\n\n Enter your choice:";
    c:
    cin>>c;
    if(c==1)
    {
        system("cls");
    }
    else if(c==2){
        system("cls");
        goto a;
```

```
    }
    else{
       cout<<"\nInvalid input  Enter again:";
       goto c;
    }
    for(i=0;i<n;i++)
    {
       angle[i]*=(3.14159265358/180);
       Fx+=forces[i]*cos(angle[i]);
       Fy+=forces[i]*sin(angle[i]);
       M+=(-
forces[i]*cos(angle[i])*disty[i])+forces[i]*sin(angle[i])*distx[i];
    }
    if(Fx<0.0001&&Fx>0||Fx<0&&Fx>-0.0001)
       Fx=0;
    if(Fy<0.0001&&Fy>0||Fy<0&&Fy>-0.0001)
       Fy=0;
    M+=momSum;
    if(M<0.0001&&M>0||M<0&&M>-0.0001)
       M=0;
     R=sqrt(pow(Fx,2)+pow(Fy,2));
    if(Fx!=0)
     theta=atan(Fy/Fx)*(180/3.141592653);
    if(R!=0)
     d=M/R;
     cout<<" Fx = "<<Fx<<"\n\n";
     cout<<" Fy = "<<Fy<<"\n\n";
     cout<<" Resultant = "<<R<<"\n\n";
    if(Fx!=0)
     cout<<" Angle = "<<theta<<" degrees\n\n";
     else{
      cout<<" Angle = Not defined"<<"\n\n";
     }
```

```
    cout<<" Moment = "<<M<<"\n\n";
    if(R!=0)
    cout<<" Distance of Resultant from point A = "<<d<<"\n\n";
    else
   cout<<" Distance of Resultant from point A = Not
Defined"<<"\n\n";
    cout<<" X-Intercept = "<<M/Fy<<"\n\n";
    cout<<" Y-Intercept = "<<M/Fx<<"\n\n";
    cout<<"\n\n\n\n Enter M to go to the main menu:";
    s:
    cin>>m;
    if(m=='m'||m=='M')
    {
       system("cls");
       intro();
    }
    else
    {
       cout<<"\nInvalid Input  Enter Again:";
       goto s;
    }


}

int main()
{
   intro();
   return 0;
}
```

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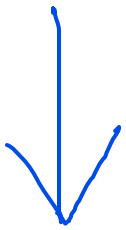
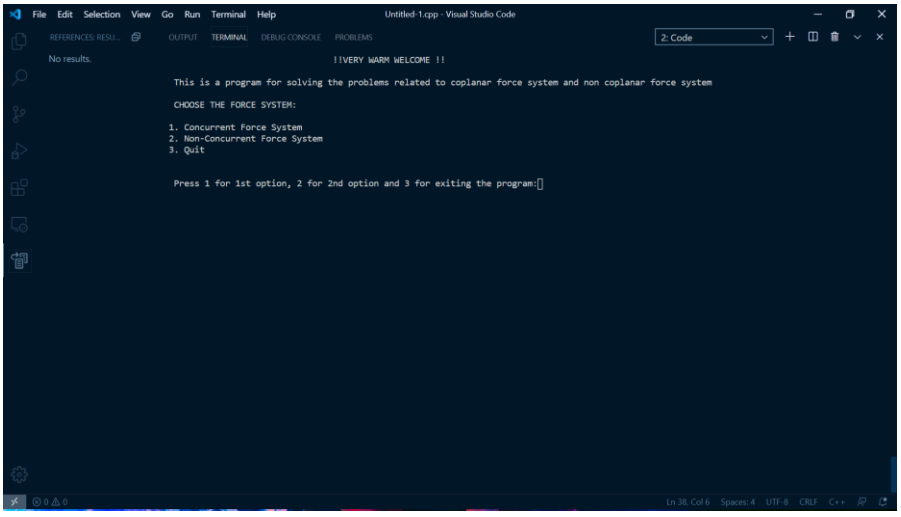
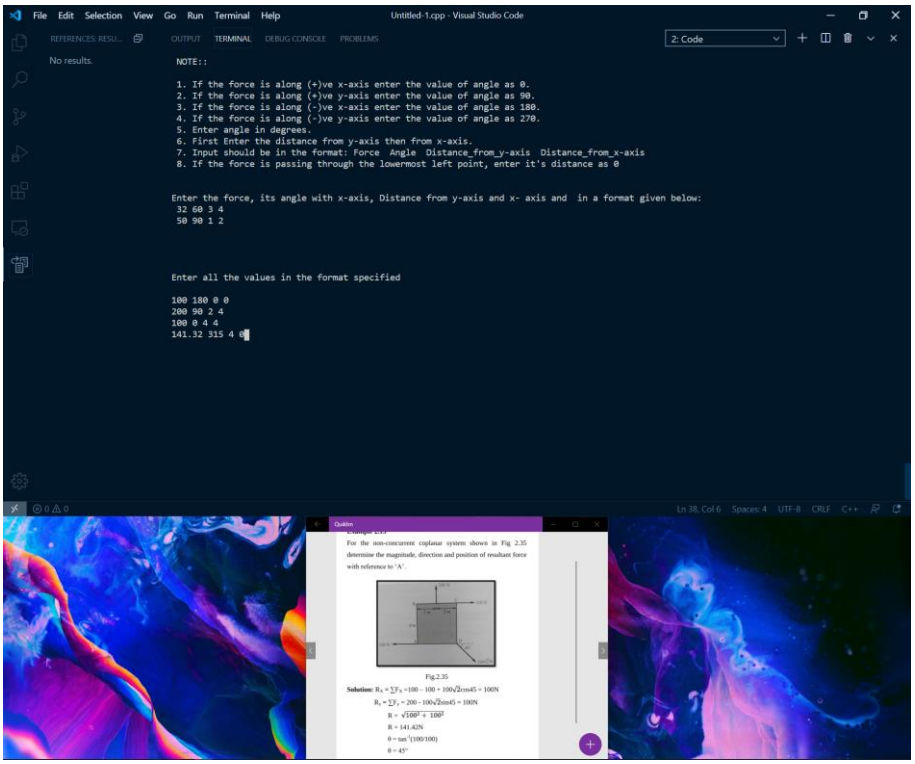
USN :- 1RV19IS046

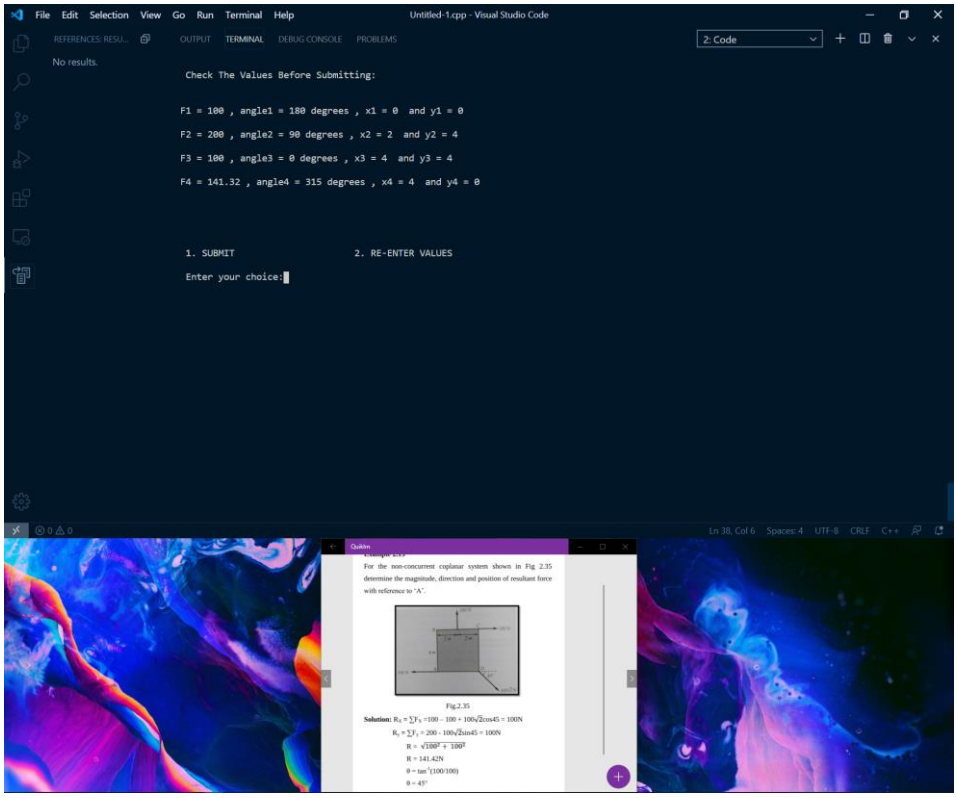
OUTPUTS

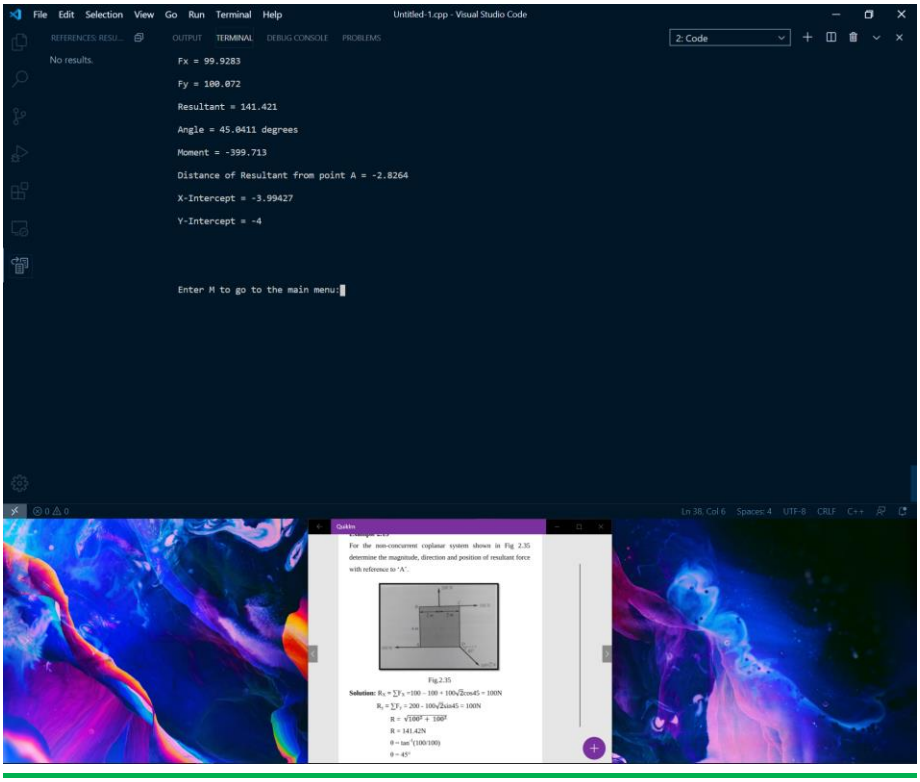


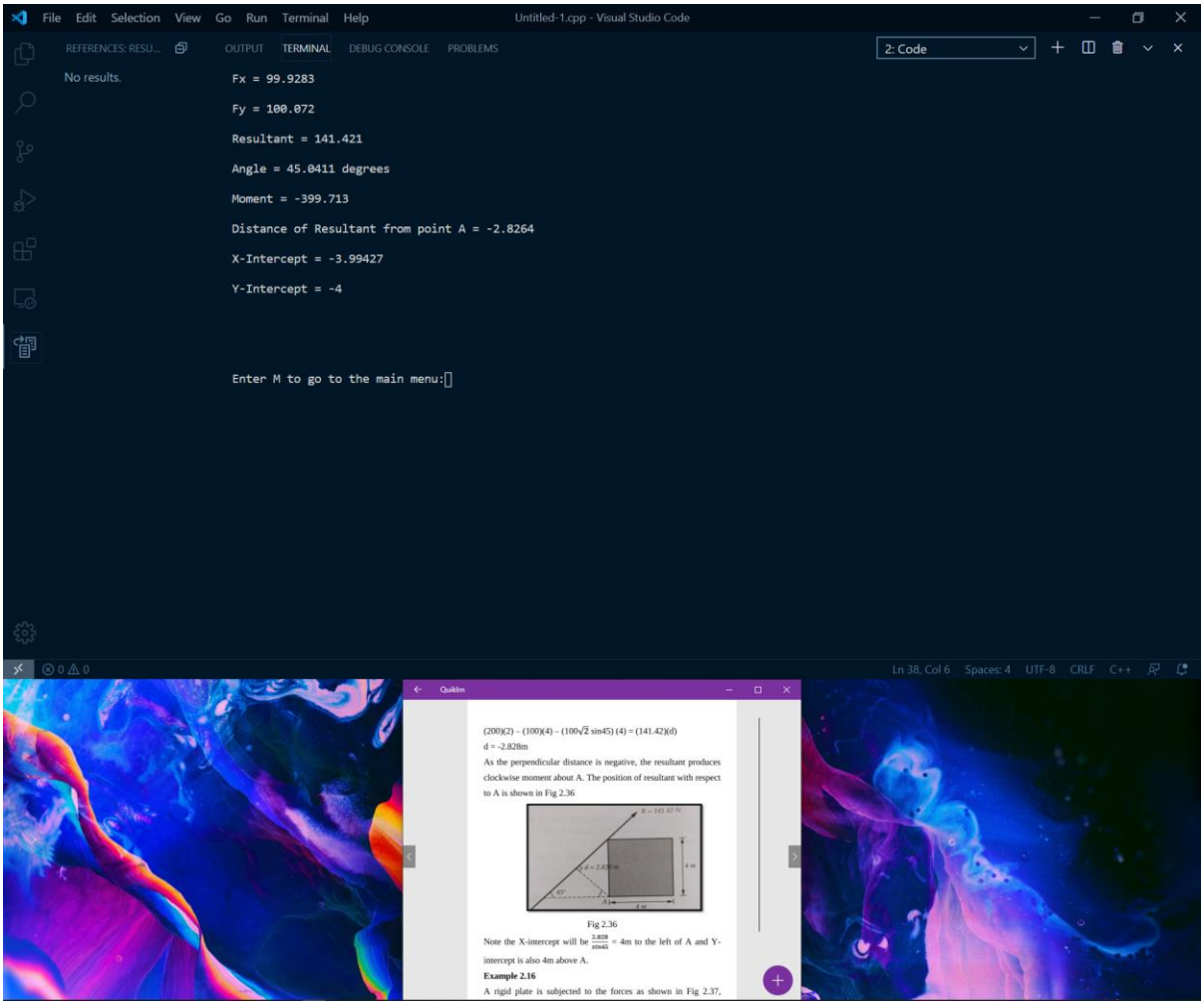
OUTPUTS:


File Edit Selection View Go Run Terminal Help
Untitled-1.cpp - Visual Studio Code
OUTPUT TERMINAL DEBUG CONSOLE PROBLEMS
2: Code
No results.
!!VERY WARM WELCOME !!
This is a program for solving the problems related to coplanar force system and non coplanar force system
CHOOSE THE FORCE SYSTEM:
1. Concurrent Force System
2. Non-Concurrent Force System
3. Quit
Press 1 for 1st option, 2 for 2nd option and 3 for exiting the program:


File Edit Selection View Go Run Terminal Help
Untitled-1.cpp - Visual Studio Code
OUTPUT TERMINAL DEBUG CONSOLE PROBLEMS
2: Code
No results.
NOTE::
1. If the force is along (+)ve x-axis enter the value of angle as 0.
2. If the force is along (+)ve y-axis enter the value of angle as 90.
3. If the force is along (-)ve x-axis enter the value of angle as 180.
4. If the force is along (-)ve y-axis enter the value of angle as 270.
5. Enter angle in degrees.
6. First Enter the distance from y-axis then from x-axis.
7. Input should be in the format: Force Angle Distance_from_y-axis Distance_from_x-axis
8. If the force is passing through the lowermost left point, enter it's distance as 0
Enter the force, its angle with x-axis, Distance from y-axis and x- axis and in a format given below:
32 60 3 4
50 90 1 2
Enter all the values in the format specified
100 180 0 0
200 90 2 4
100 0 4 4
141.32 315 4 0
For the non-concurrent coplanar system shown in Fig 2.35 determine the magnitude, direction and position of resultant force with reference to 'A'.
Fig.2.35


File Edit Selection View Go Run Terminal Help
Untitled-1.cpp - Visual Studio Code
REFERENCES RESU...
OUTPUT
TERMINAL
DEBUG CONSOLE
PROBLEMS
2: Code
No results.
Check The Values Before Submitting:
F1 = 100 , angle1 = 180 degrees , x1 = 0 and y1 = 0
F2 = 200 , angle2 = 90 degrees , x2 = 2 and y2 = 4
F3 = 100 , angle3 = 0 degrees , x3 = 4 and y3 = 4
F4 = 141.32 , angle4 = 315 degrees , x4 = 4 and y4 = 0
1. SUBMIT
2. RE-ENTER VALUES
Enter your choice:
Ln 38, Col 6
Spaces: 4
UTF-8
CRLF
C++
For the non-concurrent coplanar system shown in Fig 2.35 determine the magnitude, direction and position of resultant force with reference to 'A'.
Fig.2.35
Solution: $R_x = \sum F_x = 100 - 100 + 100\sqrt{2}\cos 45 = 100N$
$R_y = \sum F_y = 200 - 100\sqrt{2}\sin 45 = 100N$
$R = \sqrt{100^2 + 100^2}$
$R = 141.42N$
$\theta = \tan^{-1}(100/100)$
$\theta = 45°$


File Edit Selection View Go Run Terminal Help
Untitled-1.cpp - Visual Studio Code
REFERENCES RESU...
OUTPUT
TERMINAL
DEBUG CONSOLE
PROBLEMS
2: Code
No results.
Fx = 99.9283
Fy = 100.072
Resultant = 141.421
Angle = 45.0411 degrees
Moment = -399.713
Distance of Resultant from point A = -2.8264
X-Intercept = -3.99427
Y-Intercept = -4
Enter M to go to the main menu:
Ln 38, Col 6
Spaces: 4
UTF-8
CRLF
C++
For the non-concurrent coplanar system shown in Fig 2.35 determine the magnitude, direction and position of resultant force with reference to 'A'.
Fig.2.35
Solution: $R_x = \sum F_x = 100 - 100 + 100\sqrt{2}\cos 45 = 100N$
$R_y = \sum F_y = 200 - 100\sqrt{2}\sin 45 = 100N$
$R = \sqrt{100^2 + 100^2}$
$R = 141.42N$
$\theta = \tan^{-1}(100/100)$
$\theta = 45°$


File Edit Selection View Go Run Terminal Help
Untitled-1.cpp - Visual Studio Code
REFERENCES: RESU...
OUTPUT
TERMINAL
DEBUG CONSOLE
PROBLEMS
2: Code
No results.
Fx = 99.9283
Fy = 100.072
Resultant = 141.421
Angle = 45.0411 degrees
Moment = -399.713
Distance of Resultant from point A = -2.8264
X-Intercept = -3.99427
Y-Intercept = -4
Enter M to go to the main menu:
Ln 38, Col 6
Spaces: 4
UTF-8
CRLF
C++
Quillim
(200)(2) – (100)(4) – (100√2 sin45) (4) = (141.42)(d)
d = -2.828m
As the perpendicular distance is negative, the resultant produces clockwise moment about A. The position of resultant with respect to A is shown in Fig 2.36
Fig 2.36
Note the X-intercept will be 2.828/sin45 = 4m to the left of A and Y-intercept is also 4m above A.
Example 2.16
A rigid plate is subjected to the forces as shown in Fig 2.37.