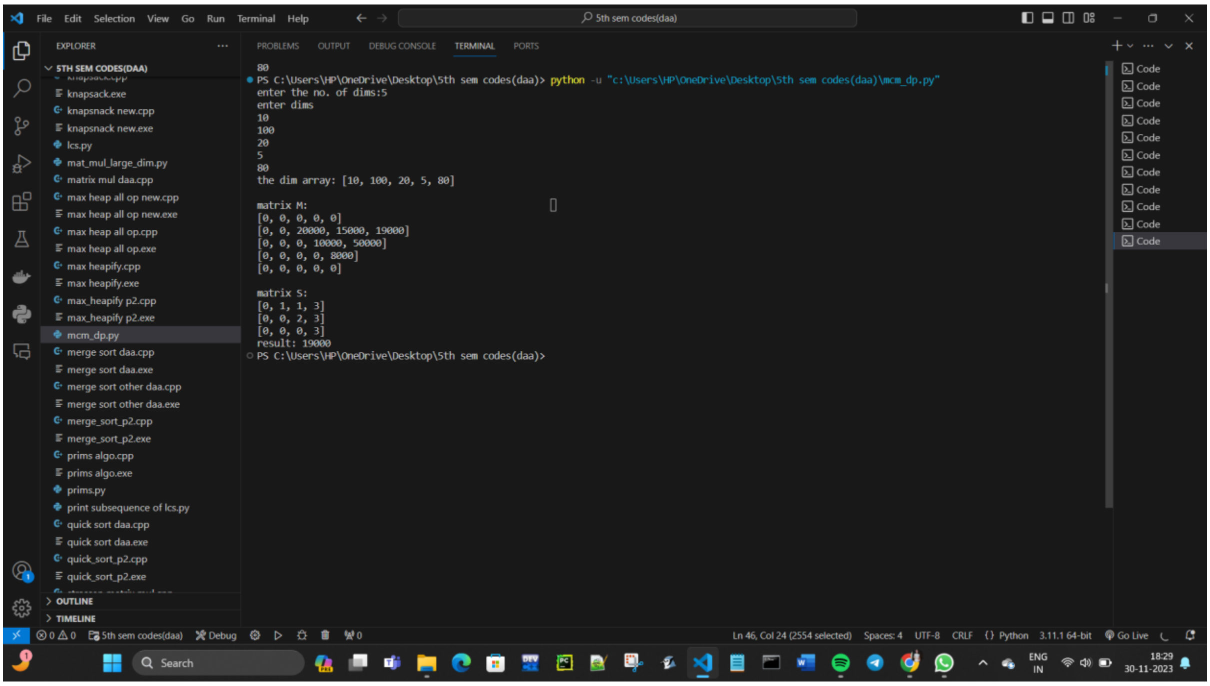
```
#mcm dp
def matrix_chain(p):
    max_val = 99999999
    n = len(p) - 1  #n is calculated as the length of p
minus 1
    M = [[0] * (n + 1) for i in range(n + 1)]   #M is
initialized as a 2D list of size (n+1) x (n+1) filled with
zeros
    S = [[0] * (n) for i in range(2,n + 1)]     #S is
initialized as a 2D list of size (n-1) x n filled with zeros

    for i in range(1, n + 1):
        M[i][i] = 0   #Initializes the main diagonal of
matrix M with zeros. This is because when multiplying a
single matrix, the result is zero.

    #The nested loops iterate over the lower triangle of
matrix M
    for l in range(2, n + 1):  #This outer loop iterates
over the length of the matrix chain, starting from 2 and
going up to n.
        for i in range(1, n - l + 2):  #This inner loop
iterates over the possible starting points of the
subchains.The range ensures that the subchain has at least
two matrices.
            j = i + l - 1    #Calculates the end point of
the current subchain.
            M[i][j] = max_val
            for k in range(i, j):  #This loop iterates over
the possible split points within the current subchain.
                q = M[i][k] + M[k + 1][j] + p[i - 1] * p[k]
* p[j]  #Calculates the result of multiplying the matrices
in the current subchain and adding the cost of multiplying
the resulting subchains.
                # M[i][k] represents the result of the
subchain from i to k.
                # M[k + 1][j] represents the result of the
subchain from k+1 to j.
```

```
                # p[i - 1] * p[k] * p[j] represents the 
actual matrix multiplication result.
                if M[i][j] > q:  #Checks if the calculated 
result q is less than the current result stored in M[i][j].
                    M[i][j] = q   #Updates the result matrix 
with the minimum result for the current subchain
                    S[i-1][j-1] = k  #Updates the split 
matrix S with the optimal split point for the current 
subchain. The indices are adjusted to start from 0.

    print("\nmatrix M:")
    for i in M:
        print(i)

    print("\nmatrix S:")
    for j in S:
        print(j)

    return M[1][n]    #The index [1][n] specifically 
represents the cost of multiplying the matrices from the 
first matrix to the nth matrix.

#main func
#p = [10, 100, 20, 5, 80]
n1=int(input("enter the no. of dims:"))
p=[]
print("enter dims")
for i in range(n1):
    l1=int(input())
    p.append(l1)
print("the dim array:",p)

result = matrix_chain(p)
print("result:",result)
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
80
PS C:\Users\HP\OneDrive\Desktop\5th sem codes(daa)> python -u "c:\Users\HP\OneDrive\Desktop\5th sem codes(daa)\mcm_dp.py"
enter the no. of dims:5
enter dims
10
100
20
5
80
the dim array: [10, 100, 20, 5, 80]
matrix M:
[0, 0, 0, 0, 0]
[0, 0, 20000, 15000, 19000]
[0, 0, 0, 10000, 50000]
[0, 0, 0, 0, 8000]
[0, 0, 0, 0, 0]
matrix S:
[0, 1, 1, 3]
[0, 0, 2, 3]
[0, 0, 0, 3]
result: 19000
PS C:\Users\HP\OneDrive\Desktop\5th sem codes(daa)>