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SUBJECT	Design and Analysis of Algorithm
EXPERIMENT NO :	04
DATE OF PERFORMANCE	05/03/2023
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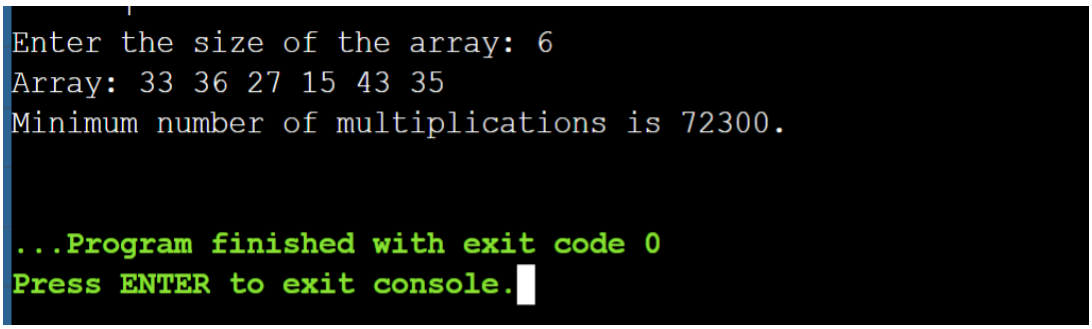
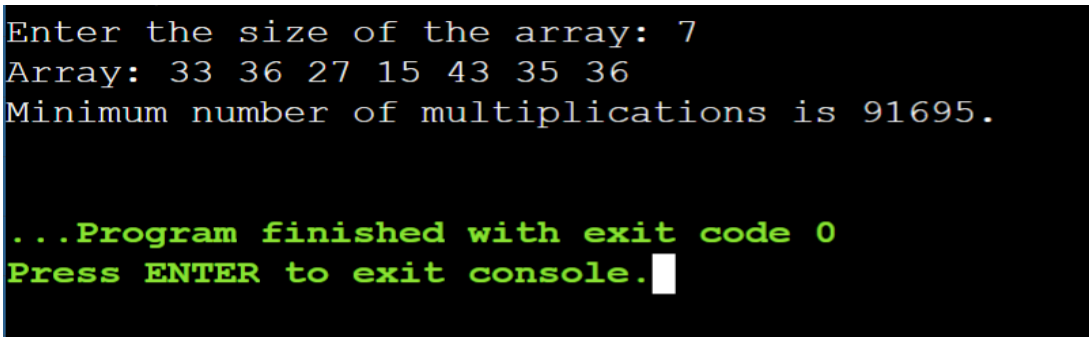
AIM:	To find the minimum matrix chain multiplications required.
PROBLEM STATEMENT 1:	**Matrix chain multiplication of matrices of different order.**
ALGORITHM and THEORY:	MATRIX-CHAIN-ORDER (p) 1. n length[p]-1 2. for i ← 1 to n 3. do m [i, i] ← 0 4. for l ← 2 to n // l is the chain length 5. do for i ← 1 to n-l + 1 6. do j ← i+ l -1 7. m[i,j] ← ∞ 8. for k ← i to j-1 9. do q ← m [i, k] + m [k + 1, j] + pi-1 pk pj 10. If q < m [i,j] 11. then m [i,j] ← q 12. s [i,j] ← k 13. return m and s.

PROGRAM:

```
#include<stdio.h>
#include<math.h>
#include<limits.h>
int MCM(int a[],int i,int j)
{
   if(i==j)
   {
      return 0;
   }
   int k;
   int min=INT_MAX;
   int count;
   for(k=i;k<j;k++)
   {
      count=MCM(a,i,k)+MCM(a,k+1,j)+a[i-1]*a[k]*a[j];
      if(count<min)
      {
         min=count;
      }
   }
   return min;
}
int main()
{
   int n,i,j;
   printf("Enter the size of the array: ");
   scanf("%d",&n);
   int a[n];
   for(i=0;i<n;i++)
   {
      a[i]=rand()%50;
   }
   printf("Array: ");
   for(i=0;i<n;i++)
```

	{
	printf("%d ",a[i]);
	}
	int N=sizeof(a)/sizeof(a[0]);
	printf("\nMinimum number of multiplications is %d.\n",MCM(a,1,n-1));
	return 0;
	}

OUTPUT:	 
CONCLUSION:	By performing above experiment I have understood matrix chain multiplication and its uses thoroughly. This dynamic programming approach reduces time complexity of the matrix chain multiplication.