Roll No. _____

| MCA. : Semester-2 (Aux Exam Aug-22)	Course Code: MCA205
Course Name: Design & Analysis of Algorithms	
August 22, 2021	Monday, 05.00PM
Time: 2 Hours, M. Marks: 100	Name of Faculty: Dr. Rajiv Kumar,

Note : Attempt All questions. All parts of a Question should be done at one place. Assume any logical data with reasoning, if missing.

1   Given a chain of four matrices A_1, A_2, A_3, and A_4 with orders 4 x 10, 10 x 3,   3 x 12, 12 x 20 respectively. Find M[1, 4] and also write the order (Parentheses wise i.e. which two matrices should be multiplied first and so on.) in which the matrices should be multiplied   20

2   Solve the following traveling sales person problem with dynamic programming approach. The distances are given in miles in a 4 – city tour. Assume the start vertex as 1.

1	2	3	4
0	120	220	150
120	0	100	110
220	80	0	160
150	110	160	0

20

3   How would you use Dijkstra algorithm to find the minimum spanning tree? Write the assumptions, constraints or change in updation rule which you are making to achieve the same. Apply the changed approach to the following graph to find the minimum spanning tree:
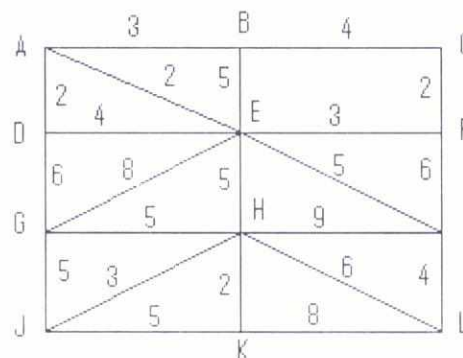
Present your solution in various tables, changed at each stage.   20

4   Solve the continuous – knapsack problem for n = 6, m = 140, $(w_1, w_2, w_3, w_4, w_5, w_6) =$ (20, 50, 60, 15, 20, 30) and $(p_1, p_2, p_3, p_4, p_5, p_6) =$ (2, 3, 4, 4, 1, 6)   20

5   a)   A person proposes the following version of binary search:

```
bsearch ( L, i, j, key) {
    if(i>j)
        return -1
    k= ( i + j ) / 2
    if ( key = = L [ k ] )          return k
    if ( key < L [ k ])
        return bsearch(L, i, k, key)
    else
        return bsearch(L, k +1, j, key)
}
```

Is this version correct? If yes, then what is the worst – case time?

b) What would be the order of the following loops

(i)
```
for i = 1 to 2n step 2
    for j = n to 1 step -1
        x = x * ( i * j ) / 2
```

(ii)
```
for i = n to 1
    { for j = 1 to i
        for k = 1 to j
            x = x * i * j
        i = i / 2
    }
```

(iii)
```
i = n
while(i ≥ 0)
    {   for j = 1 to n / 2
            y = y + i /2
        i = i – 1
    }
```

10,10