Number of printed pages: 01 Er. No. 22.18.32.9...

Academic Year: 2021-22

## Jaypee University of Engineering & Technology, Guna

T-1 (Odd Semester 2021)

18B11CI311- Data Structures

Maximum duration: 1 Hour

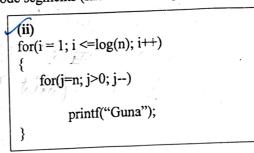
Maximum Marks 15

## Notes:

- 1. This question paper has 3 questions.
- 2. Write relevant answers only.
- write relevant answers only.
   Do not write anything on the question paper except the enrollment number.
- Suppose you have given an array A[N], the elements of this array are arranged as  $A[0] \le A[1] \le A[2] \le \cdots \le A[N-1]$ . Write an efficient recursive algorithm to search an element K in the array A[N]. From your algorithm, derive the recurrence relation and solve the obtained recurrence relation using the backward-substitution method to find the time complexity. Also, discuss the best and worst cases of your algorithm.
- Q2. Write the algorithm of selection sort. Apply selection sort on the following array: [05]
  0, 9, 8, 7, 6, 5, 4, 3, 2, 1
  Show the output of each of the passes. Also, mention the number of swapping operations required in each pass.
- Assume you have given a square matrix M [] [], this matrix has a total number of 100 [02] elements. Each element needs 4 bytes of storage. If the base address at M [0][0] is 1840, determine the address at M [4] [8] when the matrix is stored in Row Major Wise.
  - Analyze the time complexity of the following code segments (show all the steps)

for(i = 2; i <=n; i = i\*i)

{
 for(j=n; j>0; j--)
 printf("JUET");
}



```
(ifi)
for(i = 1; i <=n; i++)
{
for(j=i; j>0; j--)
printf("T1");
}
```

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[03]