END TERM ASSESSMENT– MAY 2021
SEMESTER –IV
B. Tech (Computer Science and Engineering)

Subject Code: CS2008   Subject Name: Analysis and Design of Algorithms
Duration: 2 hours (including time for uploading)
         (10 Minutes Max Grace time)   Max. Marks: 50

INSTRUCTIONS

- Write name and registration number, page number, on all the pages, convert into one PDF, tag it with your registration number_Name_subject code_subject title
- The Assessment consists of 2 sections
  - Part A contains 10 questions of 2 marks each and all questions are compulsory.
  - Part B consists of 4 questions of 10 marks each, out of which 3 questions to be attempted.
- Hand written responses to be submitted/uploaded as scanned pages of answer sheets (max. 5 pages) within the mentioned duration. 6th page and onwards won't be evaluated

PART – A
2 * 10 =20 Marks (Each answer- Word Limit- 50 Words)
1. Why 0-1 Knapsack problem cannot be solved using Divide and Conquer method?
2. Difference between backtracking and branch and bound algorithms.
3. Devise one solution for 4-Queen's problem and also discuss the rules that needs to be followed while solving it.
4. Solve given recurrence relation using Back substitution method:
$$T(n)= n + T(n-1) ; n>1$$
$$T(n)= 1 \qquad ; n=1$$
5. Illustrate visually the relation between P, NP, NP-Hard and NP complete problem.
6. Draw the binary tree for the following algebraic expressions:
$$a + b / c - d * e + f$$
7. Suppose a binary tree T is in memory. Write a recursive procedure which find the depth DEP of T.
8. Assume that there are two algorithms A and B for a given problem P. The time complexity functions of algorithms A and B are, respectively, $5n$ and $\log_2 n$. Which algorithm should be selected assuming that all other conditions remain the same for both the problem?
9. Devise an algorithm to find the maximum and minimum element in an array using divide and conquer technique.
10. Difference between non-deterministic and deterministic algorithms.

PART B
10 * 3 = 30 Mark (Each answer- Word limit- 250 words)

11. Design an algorithm for solving Graph-coloring problem using Backtracking algorithm. Illustrate it with the help of an example.   *[6+4]*
12. Design an algorithm to find the shortest distance between all-pair in a graph. Also, calculate its time complexity. Using the designed algorithm , solve the following to find all-pair shortest path.
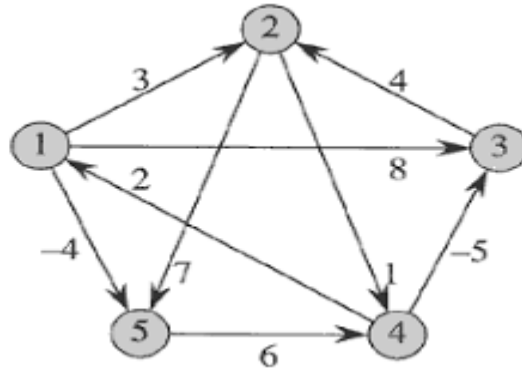
[4+2+4]

13. Write an algorithm to search an element in an array using binary search. Devise a recurrence relation and solve it using Master's Theorem to find its time complexity.   *[4+3+3]*

14. What do you mean by asymptotic notation? Explain different types of asymptotic notation along with suitable example.   *[2+8]*