

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE /AI&DS /AI & ML/Cyber Security/DS/ CSE (IOT and Cyber Security including Block chain Technology)) (Sem.-4)

DESIGN & ANALYSIS OF ALGORITHMS

Subject Code : BTCS-403-18

M.Code : 77629

Date of Examination : 19-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION - A

1. Answer briefly :

- a) What is a recurrence relation?
- b) How the worst case behavior of an algorithm is mentioned?
- c) What is brute force technique?
- d) What is bin packing problem?
- e) Compare BFS vs. DFS.
- f) What is transitive closure?
- g) Write about the different computability classes.
- h) Differentiate between tractable and intractable problems.
- i) What is an approximate solution?
- j) What is a random variable?

SECTION - B

2. Look at the following recurrence when n is a power of 2 :

$$T(n) = \begin{cases} T(1) & n = 1 \\ T\left(\frac{n}{2}\right) + c & n > 1 \end{cases}$$

Solve the above recurrence relation for the following choices of a , b and $f(n)$ (c being a constant) $a = 5$, $b = 4$ and $f(n) = cn^2$.

3. What are different elements of greedy strategy?
4. Write the algorithm for breadth first search. Take a suitable example to show its working.
5. What are non deterministic algorithms? Give an example of non-deterministic search algorithm.
6. Explain heuristics and its characteristics.

SECTION - C

7. Consider the traveling salesperson instance defined by the cost matrix :

∞	7	3	12	8
3	∞	6	14	9
5	8	∞	6	18
9	3	5	∞	11
8	14	9	8	∞

Obtain the reduced cost matrix.

8. What is Kruskal's algorithm? Explain its steps. Analyze its time complexity too.
9. Write a short notes on :
 - a) Network Flow Algorithm
 - b) Branch and bound methodology.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.