



R20 Regulation

Subject code: 3P4FE

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

## B.Tech IV Semester Supplementary Examinations, February 2024

### DESIGN AND ANALYSIS OF ALGORITHMS (INFORMATION TECHNOLOGY)

Maximum Marks: 70

Date: 23.02.2024 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

#### Part-A

| All the following questions carry equal marks (10X2M=20 Marks) |                                                                        | CO  | Bloom Tx |
|----------------------------------------------------------------|------------------------------------------------------------------------|-----|----------|
| 1                                                              | Define an algorithm                                                    | CO1 | L1       |
| 2                                                              | Write down the importance of space complexity.                         | CO1 | L1       |
| 3                                                              | Explain graph coloring problem.                                        | CO2 | L1       |
| 4                                                              | Define Backtracking? List the applications of Backtracking             | CO2 | L1       |
| 5                                                              | What is the importance of knapsack algorithm in our daily life?        | CO3 | L1       |
| 6                                                              | State the Job – Sequencing Deadline Problem.                           | CO3 | L1       |
| 7                                                              | Write the difference between the Greedy method and Dynamic programming | CO4 | L1       |
| 8                                                              | Define optimal binary search tree with an example.                     | CO4 | L1       |
| 9                                                              | Define NP-Complete.                                                    | CO5 | L1       |
| 10                                                             | State the difference between FIFO and LC Branch and Bound algorithms.  | CO5 | L1       |

#### Part-B

| Answer All the following questions. (5X10M=50Marks) |                                                                                                                                                                                                              |     |          |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|
| 11                                                  | a) Apply and explain merge sort to sort the following list: 8, 3, 2, 9, 7, 1, 5, 4.<br>b) How efficient is merge sort, Explain its best and worst case. [5+5]                                                | CO1 | L3<br>L2 |
| OR                                                  |                                                                                                                                                                                                              |     |          |
| 12                                                  | a) What are the different mathematical notations used for algorithm analysis.<br>b) Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity. [5+5] | CO1 | L1<br>L4 |
| 13                                                  | a) Explain the algorithm of Bi connected components with an example.<br>b) Explain the concept Graph Traversals with example. [5+5]                                                                          | CO2 | L2<br>L2 |
| OR                                                  |                                                                                                                                                                                                              |     |          |
| 14                                                  | a) Define strongly connected components. Explain the properties of strongly connected components.<br>b) Explain and write the algorithm for Hamiltonian cycles with suitable                                 | CO2 | L1<br>L2 |

|    |                                                                                                                                                                                                                                                                                                                                        |     |                |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------|
|    | example. [5+5]                                                                                                                                                                                                                                                                                                                         |     |                |
| 15 | <p>Given the jobs(J1...J6), their deadlines (5,3,3,2,4,2 } and associated profits as {200,180,190,300,120,100}.</p> <p>a) Write the optimal schedule that gives maximum profit.</p> <p>b) Are all the jobs completed in the optimal schedule?</p> <p>c) What is the maximum earned profit?</p> <p>[4+4+2]</p>                          | CO3 | L3<br>L1<br>L1 |
|    | OR                                                                                                                                                                                                                                                                                                                                     |     |                |
| 16 | <p>What is Minimum cost spanning tree? Explain an algorithm for generating minimum cost Spanning tree and list some applications of it.</p> <p>[10]</p>                                                                                                                                                                                | CO3 | L2             |
| 17 | <p>Develop an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4) = (do, if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1).</p> <p>[10]</p>                                                                                                                                                                            | CO4 | L3             |
|    | OR                                                                                                                                                                                                                                                                                                                                     |     |                |
| 18 | <p>Explain the time and space complexity of Dynamic Programming traveling sales person Algorithm with suitable example.</p> <p>[10]</p>                                                                                                                                                                                                | CO4 | L2             |
| 19 | <p>a) Explain the 0/1 Knapsack LCBB algorithm.</p> <p>b) Differentiate between deterministic and non deterministic algorithm. [5+5]</p>                                                                                                                                                                                                | CO5 | L2<br>L2       |
|    | OR                                                                                                                                                                                                                                                                                                                                     |     |                |
| 20 | <p>Solve the Travelling Salesman Problem for the given graph by using the Branch and Bound Algorithm. [10]</p> <div> <pre> graph TD     A((A)) --- 5  B((B))     A --- 12  C((C))     A --- 7  D((D))     B --- 11  C     B --- 18  D     C --- 6  D     A --- 10  A </pre> </div> | CO5 | L3             |