

**R18**

**Code No: 155EV**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech III Year I Semester Examinations, March - 2024**

**DESIGN AND ANALYSIS OF ALGORITHMS**

**(Common to CSIT, CE(SE), CSE(CS), CSE(DS), CSE(IOT), CSE(N), AI&DS, AI&ML, CSD)**

**Time: 3 Hours**

**Max. Marks: 75**

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART - A**

**(25 Marks)**

- |      |  |     |
|------|--|-----|
| 1.a) | Define an algorithm and write its properties.          | [2] |
| b)   | Derive the time complexity of Binary Search algorithm. | [3] |
| c)   | What is chromatic number?                              | [2] |
| d)   | Define disjoint set and list its operations.           | [3] |
| e)   | What is OBST?  | [2] |
| f)   | List out applications of dynamic programming.          | [3] |
| g)   | What is minimum spanning tree?                         | [2] |
| h)   | Write applications of greedy algorithm.                | [3] |
| i)   | Define live and dead node.                             | [2] |
| j)   | What is NP Hard problem?                               | [3] |

**PART - B**

**(50 Marks)**

- |           |   |       |
|-----------|---|-------|
| 2.a)      | Analyze the asymptotic notation of time complexity.                 |       |
| b)        | Give an algorithm for Strassen's Matrix multiplication algorithm.   | [5+5] |
| <b>OR</b> |   |       |
| 3.a)      | Write and explain quick sort algorithm.                             |       |
| b)        | Trace quick sort algorithm for 12 45 11 34 89 9 99 6.               | [5+5] |
| 4.a)      | Write Find algorithm on Disjoint set.                               |       |
| b)        | State back tracking algorithm and its principle.                    | [5+5] |
| <b>OR</b> |   |       |
| 5.a)      | Describe graph colouring problem and illustrate with an example.    |       |
| b)        | Write back tracking algorithm for Graph Colouring.                  | [5+5] |
| 6.a)      | Explain reliability designing problem.                              |       |
| b)        | Give dynamic algorithm for constructing optimal binary search tree. | [5+5] |
| <b>OR</b> |   |       |
| 7.a)      | Explain dynamic programming generalized algorithm.                  |       |
| b)        | Solve 0/1 knap sack problem using dynamic programming.              | [5+5] |

QA QA QA QA QA QA QA G

QA 8. Explain Single Source Shortest Path algorithm with example. [10] QA G

- 9.a) Explain Kruskal's algorithm.  
b) Give Greedy algorithm for knapsack problem.

[5+5]

- 10.a) Explain LC search problem.  
b) Write an algorithm for branch and bound problem for knap sack problem.

[5+5]

QA 11.a) Describe FIFO branch and bound problem. OR QA QA QA G

- b) Explain techniques for NP- Complete problem.

[5+5]

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QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G