



# PRESIDENCY UNIVERSITY

BENGALURU

|          |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Roll No. |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|

## End - Term Examinations – May/June 2026

Date: 15- 05-2026

Time: 09:30am – 12:30pm

|                      |                                     |                |
|----------------------|-------------------------------------|----------------|
| School: SOCSE        | Program: B.Tech                     |                |
| Course Code: CSE2262 | Course Name: Analysis of Algorithms |                |
| Semester: IV         | Max Marks: 100                      | Weightage: 50% |

| CO - Levels | C01 | C02 | C03 | C04 | C05 |
|-------------|-----|-----|-----|-----|-----|
| Marks       | 24  | 24  | 44  | 44  | 44  |

### Instructions:

- Read all questions carefully and answer accordingly.
- Do not write anything on the question paper other than roll number.

### Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

|     |                                                                                                          |         |    |     |
|-----|----------------------------------------------------------------------------------------------------------|---------|----|-----|
| 1.  | List the fourth and fifth step in analyzing any recursive algorithm mathematically.                      | 2 Marks | L1 | C01 |
| 2.  | Let $t(n) = 10n^3 + 8$ . Express it in $\theta(n)$                                                       | 2 Marks | L2 | C01 |
| 3.  | Define Master's theorem.                                                                                 | 2 Marks | L1 | C02 |
| 4.  | Justify your answer for how decrease by half is efficient when compared to divide and conquer technique. | 2 Marks | L4 | C02 |
| 5.  | Differentiate between Prim's and Kruskal algorithm                                                       | 2 Marks | L4 | C03 |
| 6.  | State any two algorithmic design techniques used to obtain optimal solution.                             | 2 Marks | L1 | C03 |
| 7.  | List the name of two tables used by Boyer-Moore algorithm                                                | 2 Marks | L1 | C04 |
| 8.  | List any two pattern matching algorithms which uses input enhancement technique.                         | 2 Marks | L1 | C04 |
| 9.  | Define sub-set-sum problem.                                                                              | 2 Marks | L1 | C05 |
| 10. | Explain how backtracking will solves any problem in general.                                             | 2 Marks | L2 | C05 |

## Part B

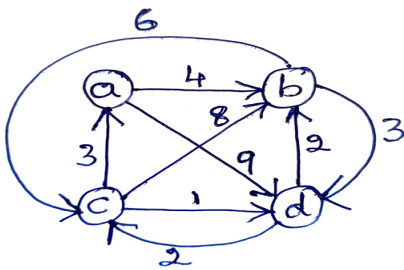
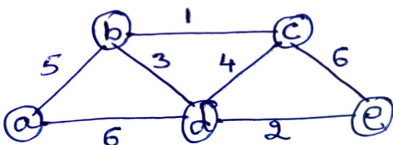
**Answer the Questions.**

**Total Marks 80M**

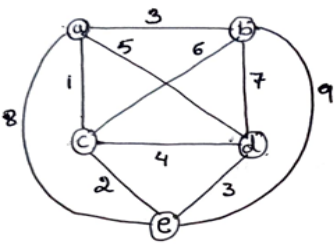
|           |    |                                                                                                                                                          |          |    |     |
|-----------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 11.       | a. | Write bubble sort and selection sort algorithm separately.                                                                                               | 10 Marks | L1 | C01 |
|           | b. | Design a non-recursive algorithm to find the number of bits (in binary) required to represent the given decimal integer number and also do its analysis. | 10 Marks | L1 | C01 |
| <b>Or</b> |    |                                                                                                                                                          |          |    |     |
| 12.       | a. | Apply quick sort algorithm to K,A,R,N,A,T,A,K,A and also write its recurrence tree                                                                       | 10 Marks | L3 | C02 |
|           | b. | Write merge sort algorithm (both divide and merging) and also do its analysis.                                                                           | 10 Marks | L4 | C02 |

|     |    |                                                                                                                                                                                                                                   |          |    |     |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 13. | a. | Construct Huffman tree for six characters {A, B, C, D, E, _} assuming their occurrences of probabilities 0.5, 0.35, 0.5, 0.1, 0.4, and 0.2 respectively. Decode the text whose encoding is 1100110110                             | 10 Marks | L3 | C03 |
|     | b. | Apply dynamic programming technique to solve knapsack problem for the following data. $N=4$ , $M=5$ , $W=\{2,1,2,3\}$ and $P=\{15, 25, 20, 35\}$ . Find out maximum profit and also the items selected to get the maximum profit. | 10 Marks | L2 | C03 |

**Or**

|     |    |                                                                                                                                                                                                         |          |    |     |
|-----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 14. | a. | Apply dynamic programming technique to find shortest distance between every pair of vertices for the given graph<br> | 10 Marks | L3 | C03 |
|     | b. | Write Kruskal algorithm and apply the same to the graph.<br>                                                         | 10 Marks | L2 | C03 |

|           |    |                                                                                                                                                                          |          |    |     |
|-----------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 15.       | a. | Write Horspool algorithm. Apply the same to search the pattern "NOT" in the text, "NOBODY_NOTICED_HIM" and mention the number of shift's and number of comparisons done. | 10 Marks | L3 | C04 |
|           | b. | Define lower bound of an algorithm. Explain the four ways of finding the lower bound of an algorithm.                                                                    | 10 Marks | L3 | C04 |
| <b>Or</b> |    |                                                                                                                                                                          |          |    |     |
| 16.       | a. | State the disadvantages of Horspool algorithm and explain with an example, how it can be overcome by Boyer-Moore algorithm.                                              | 10 Marks | L3 | C04 |
|           | b. | Define the following. 1) Class-P problems 2) Class-NP problems 3) Deterministic algorithm 4) Non-deterministic algorithm 5) NP-Complete problems 6) NP-hard problems.    | 10 Marks | L1 | C04 |

|           |    |                                                                                                                                                                                               |          |    |     |
|-----------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 17.       | a. | Apply backtracking method to solve subset sum problem for the instance $n=5$ , $d=30$ and $S = \{5, 10, 12, 13, 15\}$ .                                                                       | 10 Marks | L3 | C05 |
|           | b. | For the given instance, obtain the optimal solution for knapsack problem by applying branch and bound method. $N=4$ . $W = \{4, 7, 5, 3\}$ , $P = \{40, 42, 25, 12\}$ and $M=10$ .            | 10 Marks | L3 | C05 |
| <b>Or</b> |    |                                                                                                                                                                                               |          |    |     |
| 18.       | a. | Write complete state space tree for the 4-Queen problem.                                                                                                                                      | 10 Marks | L3 | C05 |
|           | b. | For the given graph, apply branch and bound technique to solve the travelling salesperson problem.<br><br> | 10 Marks | L3 | C05 |