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MTECH
(SEM I) THEORY EXAMINATION 2025-26
ADVANCED ALGORITHM

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief.

02 x 7 = 14

Q no.	Question
a.	What is growth of functions?
b.	State Master's Theorem.
c.	Define stable sorting algorithm.
d.	Difference between comparison and non-comparison sort.
e.	Define black height.
f.	What is parallel algorithm?
g.	What is efficiency in parallel algorithms?

SECTION B

2. Attempt any *three* of the following:

07 x 3 = 21

a.	Discuss asymptotic notations with suitable examples.
b.	Explain heap sort with heap construction and sorting steps.
c.	Explain Red-Black Trees and their properties with insertion example.
d.	Explain performance measures of parallel algorithms (speedup, efficiency, cost).
e.	Explain NP-Complete problems and their characteristics.

SECTION C

3. Attempt any *one* part of the following:

07 x 1 = 07

a.	Explain algorithm analysis with examples of time and space complexity.
b.	Analyze the complexity of recursive algorithms using Master's Theorem.

4. Attempt any *one* part of the following:

07 x 1 = 07

a.	Compare all sorting algorithms based on time and space complexity.
b.	Explain quick sort algorithm with partitioning method and time complexity.

5. Attempt any *one* part of the following:

07 x 1 = 07

a.	Explain B-Tree structure, properties and operations.
b.	Compare AVL Tree and Red-Black Tree with suitable example.

6. Attempt any *one* part of the following:

07 x 1 = 07

a.	Explain CREW and EREW models with examples.
b.	Compare sequential and parallel algorithms.

7. Attempt any *one* part of the following:

07 x 1 = 07

a.	Explain Backtracking with N-Queen problem.
b.	Explain Greedy Algorithm with examples.