

Exam 2: Suggested Reading and Practice Problems

Topic	CLRS	KT
Graph Representation and Traversal	<u>Reading:</u> Chapter 22 <u>Practice problems:</u> - Exercises: <ul style="list-style-type: none"> • 22.1— (1, 2, 3, 4, 6) • 22.2— (1, 2, 4, 5, 7) • 22.3— (2, 3, 7, 9, 12) • 22.4— (1, 5) • 22.5— (2, 3, 5, 7) - Problems: 22-4	<u>Reading:</u> Chapter 3 <u>Practice problems:</u> - Exercise: 1, 2, 6, 9, 10
Minimum Spanning Tree	<u>Reading:</u> Chapter 23 <u>Practice problems:</u> - Exercise: <ul style="list-style-type: none"> • 23.1— (1, 2, 5, 7, 8) • 23.2— (1, 2) - Problems: 23-3	<u>Reading:</u> Chapter 4 <u>Practice problems:</u> - Exercise: 2, 8, 9, 10, 20, 21, 22

Notes:

1. **Readings:** You do not need to cover topics which have not been covered in the lectures.
2. **Preparation:**
 - Start with lecture slides, comprehend step-by-step solutions. (Also, check Exam-2 review slides)
 - Textbook suggested readings
 - Run the demo codes and print step-by-step computations/results
 - Homework assignments
 - Practice problems

3. Possible Type of Questions:

- Short answers, definition, True/False
- Perform algorithms, such as BFS/DFS, MST (Kruskal's, Prim's), etc., on a given graph.
- Complete an incomplete solution or perform the next iteration of a given algorithm (e.g., BFS/DFS, Topology ordering, SCC, Kruskal, Prim)
- Design an algorithm to accomplish something on a graph $G = (V, E)$. For this design, you can use any of the discussed algorithms, such as BFS, DFS, Kruskal, Prim, SCC, Topology ordering, ..., as block-box without proof or anything. A complete solution includes the following steps:
 - Detecting that the problem is a graph-related problem (Explain how we can formulate the given problem as a graph problem, and how the given information can be represented as a graph, i.e., adjacency list, adjacency matrix, etc.
 - Which one of the discussed algorithms (DFS, BFS, testing bipartiteness, SCC, topology ordering) can be employed to solve the given problem and justify (explain) the correctness of your approach.
 - Discuss the overall time complexity. (The running time takes to create the corresponding graph (if necessary) and the running time takes to solve the problem)

4. Further practice problems: DPV

5. Closed-book exam; no calculator; one page of notes

- Letter size, both side
- Algorithms, examples, tables, figures, etc.
- Typed or hand-written