

Topics for Exam on *Mathematical Models in Logistics*

1. Three levels of logistical decisions. Single-echelon single-commodity location models. Comparison of reformulations.
2. Basic facility location models: the simple plant location problem; the p -median problem; the p -center problem; the set covering problem.
3. Pseudo-Boolean reformulations for the simple plant location problem.
4. Lower and upper bounds for the global optimum. Lagrangian relaxation and Lagrangian dual. Lagrangian relaxation for the SPLP.
5. Lagrangian heuristics for the capacitated facility location problem.
6. Two-echelon capacitated facility location problem. Totally unimodular matrixes.
7. The dynamic facility location model and its modifications.
8. Facility location with client preferences. Single-level reformulations.
9. Leader-follower facility location games. Discrete bilevel models. Well-posed and ill-posed problems. Large scale reformulation.
10. The order batching problem. Return policy and traversal policy. Mathematical models for the general case.
11. Order batching and batch scheduling problem.
12. The bin packing problem. Compact and large scale reformulations. LP-based heuristic.
13. The column generation method for the one-dimensional bin packing problem.
14. Mathematical models for the two-dimensional strip packing problem.
15. Mathematical models for the two-dimensional knapsack problem.
16. Mathematical models for the two-dimensional bin packing problem.
17. The capacitated vehicle routing problems. Mathematical models and its variants.
18. A well-solved case of the CVRP.
19. Dynamic programming for the CVRP.
20. Set covering reformulation for the CVRP.
21. Heterogeneous fixed fleet CVRP.
22. Vehicle routing problems in supply chain management.

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