**OM 305**

**Quiz 4 (Optional)**

**Notes**

**Concepts and Definitions:**

**1. Constraint:** An equation or inequality that restricts the values of the decision variables. In LP we are interested in concurrently satisfying all constraints. Restrictive conditions that may affect the optimal value for an objective function.

**2. Problem formulation:** The process of translating a verbal statement of a problem into a mathematical statement called a mathematical model.

**3. Constraint function:** the left-hand side of a constraint (the portion of the constraint containing the variable.)

**4. Objective function:** All linear programs have a linear objective function that is either maximized or minimized.

**5. Linear program:** A mathematical model with a linear objective function, a set of linear constraints, and nonnegative variables.

**6. Non-negativity constraints:** a set of constraints that require all variables to be non-negative.

**7. Linear function:** mathematical expression in which the variables appear in separate terms.

**8. Solution:** Any set of values for the variables.

**9. Feasible solution:** A solution that satisfies all constraints.

**10. Optimal solution:** A feasible solution that maximizes or minimizes the value of the objective function.

**11. Standard form:** A linear program in which all constraints are written as equalities.

**12. Infeasibility:** A situation in which no solution to the linear programming problem satisfies all constraints. Most likely, the problem was formulated improperly.

**13. Infeasible Linear Program:** A LP programming model that has no feasible solution.

**14. First LP Property:** Problems seek to maximize or minimize an objective.

**15. Second LP Property:** Constraints limit the degree to which the objective can be achieved.

**16. Third LP Property:** There must be alternatives available.

**17. Fourth LP Property:** Mathematical relationships are linear.

**18. Linear Programming:** Is a technique that helps in resource allocation decisions.

**19. An inequality:** has a ≤ or ≥ sign.

**20. Five technical requirements of LP are:** certainty,

proportionality, additivity, divisibility, non-negativity.

**21. Product mix problems:** use LP to decide how much of each product to make, given a series of resource restrictions.

**22. Modeling Process:** Define the problem, develop a model, acquire data, develop a solution, test the solution, analyze the results, implement the recommendation, verify the actual-real-world results.

**23. Lack of feasible solution:** occurs when constraints conflict with each other.

**24. Unbounded problem:** when the profit (for example) in a maximization problem is shown to be infinitely large, the problem is unbounded, and it is missing one or more constraints.

**25. A Redundant Constraint (Redundancy):** This constraint is one that does not affect the feasible solution.

**26. Multiple Optimal Solutions:** are possible in LP problems.

**27. Sensitivity Analysis:** An important function of sensitivity analysis is to allow managers to experiment with values of the input parameters.

**28. The Shadow Price:** The increase in the objective function that result from a one-unit increase in the right-hand side of that constraint.

**29. Media Selection Problem:**  Can be approached with LP from two perspectives. The objective can be to maximize audience exposure or to minimize advertising costs.

**30. A Transportation Problem:** In this problem, there will be one constraint for each demand source and one constraint for each supply destination.

**31. Constrained Mathematical Model:**  A model with an objective function and one or more constraints.

**32. A Slack Variable:** These variables are added to each less than equal-or-equal to constraint. Each slack variable represents an unused resource.

**33. A Simplex Method:** This is a matrix algebra method for solving LP problems.

**34. A Surplus Variable:** A variable inserted in a greater-than or equal to constraint to create an equality. It represents the amount of resource usage above the minimum required usage.

**35. Integer LP:** The parameter values are known with certainty, the applicable functions and constraints’ returns are constant and to scale, there is no interaction between decision variables, a model for which some or all of the decision variables are restricted to integer values.

**36. Binary Integer LP:** A model in which all decision variables must assume values of 0 or 1.

**37. A Binding Constraint:** A constraint that is satisfied with equality at the optimum point.