Institute for Excellence in Higher Education (IEHE), Bhopal

(CPE Status conferred by UGC)

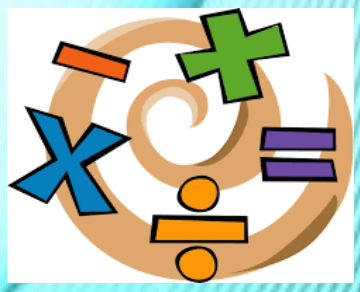
DEPARTMENT OF MATHEMATICS

Optimization Technique

(Skill Enhancement Course: SEC for IV SEM)

Question Bank

The goal of Optimization Technique is to formulate the mathematical models for quantitative analysis of managerial problems in industry.



The course aim is to providing the student with the proper knowledge, cognitive skills, interpersonal skills, responsibility, communication skills, use of information technology skills and self-kinetics skills.

Eligibility
B.Sc. Mathematics
First Year
(Completed)

Course Outcomes

- Formulate real life problems into linear programming problem.
- Apply the simplex method to find an optimal vector for the standard linear programming problem and the corresponding dual problem.
- Solve the system of linear equations using Simplex method and Big-M method.
- Find optimal solution of transportation.
- Formulate and solve linear programming model of two-person zero sum game.

Dr. Pragyesh Kumar Agrawal
Director

Dr. Manoj Kumar Shukla
Head of the Department

Institute for Excellence in Higher Education, Bhopal (M.P.)
Department of Mathematics
B.Sc. II Year (SEM-IV)
Questions Bank
on
Optimization Technique
(SEC/Vocational)
Multiple Choice Type Questions

1. Objective function of an LP problem is
(a) a constant
(b) a function to be optimized
(c) an inequality
(d) a quadratic equation

2. The optimal value of the objective function is attained at the points
(a) given by intersection of lines representing inequations with axes only
(b) given by intersection of lines representing inequations with X-axis only
(c) given by corner points of the feasible region
(d) at the origin

3. Which of the following statements is correct?
(a) Every LP problem has at least one optimal solution.
(b) Every LP problem has a unique solution.
(c) If a LP problem has two optimal solutions, then it has infinitely many solutions.
(d) If a feasible region is unbounded then LP problem has no solution

4. A feasible solution to an LP problem,
(a) must satisfy all of the problem's constraints simultaneously.
(b) need not satisfy all of the constraints, only some of them.
(c) must be a corner point of the feasible region.
(d) must optimize the value of the objective function.

5. The linear inequalities or equations or restrictions on the variables of a linear programming problem are called:
(a) a constraint
(b) Decision variables
(c) Objective function
(d) None of the above

6. A set of values of decision variables that satisfies the linear constraints and non-negativity conditions of an L.P.P. is called its:
(a) Unbounded solution
(b) Optimum solution
(c) Feasible solution
(d) None of these

7. The optimal value of the objective function is attained at the points:
(a) on X-axis
(b) on Y-axis
(c) corner points of the feasible region
(d) none of these

8. Which of the following is a type of Linear programming problem?
(a) Manufacturing problem
(b) Diet problem
(c) Transportation problems
(d) All of the above

9. Mathematical model of Linear Programming is important because
(a) It helps in converting the verbal description and numerical data into mathematical expression
(b) decision makers prefer to work with formal models.
(c) it captures the relevant relationship among decision factors.
(d) it enables the use of algebraic techniques.

10. Mathematical model of Linear Programming is important because
(a) It helps in converting the verbal description and numerical data into mathematical expression
(b) decision makers prefer to work with formal models.
(c) it captures the relevant relationship among decision factors.
(d) it enables the use of algebraic techniques.

11. A constraint in an LP model restricts
(a) value of the objective function
(b) value of the decision variable
(c) use of the available resources
(d) all of the above

12. In graphical method of linear programming problem if the ios-cost line coincide with a side of region of basic feasible solutions we get
(a) Unique optimum solution
(b) unbounded optimum solution
(c) no feasible solution
(d) Infinite number of optimum solutions

13. Maximization of objective function in LPP means
(a) Value occurs at allowable set decision
(b) highest value is chosen among allowable decision
(c) none of the above
(d) all of the above

14. Alternative solution exist in a linear programming problem when
(a) one of the constraint is redundant
(b) objective function is parallel to one of the constraints
(c) two constraints are parallel
(d) all of the above

15. The linear function of the variables which is to be maximize or minimize is called
(a) Constraints
(b) Objective function
(c) Decision variable
(d) None of the above

16. The first step in formulating a linear programming problem is
(a) Identify any upper or lower bound on the decision variables
(b) State the constraints as linear combinations of the decision variables
(c) Understand the problem
(d) Identify the decision variables

17. The simplex method is carried out by performing elementary row operations on a matrix that we call the …….
(a) Complex Tableau
(b) Simplex Tableau
(c) Feasible Solutions
(d) Feasible Region

18. To improve the current solution, we bring a new basic variable into the solution—we call this variable the …….
(a) Departing Variable
(b) Constant
(c) Entering Variable
(d) Pivot Variable

19. The entry in the simplex tableau in the entering variable's column and the departing variable's row is called the ……..
(a) Entering
(b) Departing
(c) Imaginary
(d) Pivot

20. Use elementary row operations so that the pivot is 1, and all other entries in the entering column are 0. This process is called ……...
(a) Pivoting
(b) Big M Method
(c) Dualiy
(d) None of these

21. In an optimization problem, a …… is a variable that is added to an inequality constraint to transform it into an equality.
(a) Slack Variable
(b) Pivot Variable
(c) Entering Variable
(d) Surplus Variable

22. In an optimization problem, a …… or negative slack variable is a variable that is subtracted to an inequality constraint to transform it into an equality.
(a) Slack Variable
(b) Surplus Variable
(c) Entering Variable
(d) Pivot Variable

23. ……. are added to constraints with greater than or equal to sign to generate an initial solution to an LP problem.
(a) Surplus Variable
(b) Pivot Variable
(c) Artificial variables
(d) None of these

24. For a maximization problem the objective function coefficient for an artificial variable is
(a) +M
(b) -M
(c) Zero
(d) None of the options

25. If for a given solution a slack variable is equal to zero then
(a) the solution is optimal.
(b) the solution is infeasible.
(c) the entire amount of resource with the constraint in which the slack variable appears has been consumed.
(d) All the options

26. The dual of the primal maximization LP problem having m constraints and n non negative variables should
(a) have n constraints and m non negative variables.
(b) be a minimization LP problem
(c) **Both the options**
(d) None of the options

27. One disadvantage of using North-West corner rule to find initial solution to the transportation problem is that
(a) It is complicated to use.
(b) It does not take into account cost of transportation.
(c) It leads to a degenerate initial solution
(d) All the options.

28. Which of the following method is used to verify the optimality of the current solution of the transportation problem
(a) Least cost method
(b) Vogel approximation method
(c) Modified distribution method
(d) All the options

29. The method used to solve Linear Programming Problem without use of the artificial variable is called _____.
(a) Simplex Method
(b) Big-M Method
(c) Dual Simplex Method
(d) Graphical Mehtod

30. _____ method is an alternative method of solving a Linear Programming Problem involving artificial variables
(a) Simplex Method
(b) Big-M Method
(c) Dual Simplex Method
(d) Graphical Mehtod

31. If an artificial variable is present in the basic variable column of optimal simplex table, then the problem has _____ solution.
(a) alternative
(b) no solution
(c) bounded
(d) infeasible

32. Charnes method of penalty is called _____
(a) Simplex Method
(b) Dual Simplex Method
(c) Big-M Method
(d) Graphical Method

33. In the optimal simplex table, Zj-Cj=0 value indicates _____.
(a) alternative solution
(b) bounded solution
(c) infeasible solution
(d) unbounded solution

34. The role of artificial variables in the simplex method is
(a) to aid in finding an initial solution
(b) to find optimal dual prices in the final simplex table
(c) to start with Big M method
(d) all of these

35. To convert ≥ inequality constraints into equality constraints, we must `
(a) add a surplus variable
(b) subtract an artificial variable
(c) subtract a surplus variable and an add artificial variable
(d) add a surplus variable and subtract an artificial variable

36. A variable which does not appear in the basis variable (B) column of simplex table is
(a) never equal to zero
(b) called basic variable
(c) always equal to zero
(d) None of these

37. ……. is another method to solve a given LPP involving some artificial variable?
(a) Big M method
(b) Method of penalties
(c) Two-phase simplex method
(d) None of the above

38. When the total demand is equal to supply then the transportation problem is said to be ……..
(a) balanced
(b) unbalanced
(c) maximization
(d) minimization

39. Which of the following statements about the northwest corner rule is false?
(a) One must exhaust the supply for each row before moving down to the next row
(b) One must exhaust the demand requirements of each column before moving to the next column
(c) When moving to a new row or column, one must select the cell with the lowest cost
(d) One must check that all supply and demand constraints are met

40. In North West corner rule the allocation is done in _____

(a) upper right corner.
(b) middle cell in the transportation table.
(c) cell with the lowest cost.
(d) Upper left corner.

41. The basic feasible solution to a transportation problem is said to be optimal if it _____.
(a) maximizes or minimizes the transportation cost.
(b) maximizes the transportation cost.
(c) minimizes the transportation cost.
(d) has degenerate solution.

42. In transportation problem if total supply > total demand we add _____
(a) dummy row with cost 0.
(b) dummy column with cost 0.
(c) dummy row with cost 1.
(d) dummy column with cost 1.

43. In North West corner rule if the demand in the column is satisfied one must move to the _____.
(a) left cell in the next column.
(b) right cell in the next row.
(c) right cell in the next column.
(d) left cell in the next row.

44. Vogel's approximation method is also known as_____.
(a) Penalty method
(b) North west method.
(c) Least cost method
(d) None of the above.

45. Which of the following is a method for improving an initial solution in a transportation problem?
(a) northwest-corner
(b) intuitive lowest-cost
(c) southeast-corner rule
(d) stepping-stone

46. When the sum of gains of one player is equal to the sum of losses to another player in a game, this situation is known as _____.
a) two-person game
b) two-person zero-sum game
c) zero-sum game
d) non-zero-sum game

47. A game is said to be strictly determinable if_____.
(a) maximin value equal to minimax value
(b) maximin value is less than or equal to minimax value
(c) maximin value is greater than or equal to minimax value
(d) maximin value is not equal to minimax value

48. Two person zero-sum game means that the
(a) Sum of losses to one player is equal to the sum of gains to other
(b) Sum of losses to one player is not equal to the sum of gains to other
(c) Both (a) and (b)
(d) None of the above

49. A game is said to be strictly determinable if_____.
(a) maximin value equal to minimax value
(b) maximin value is less than or equal to minimax value
(c) maximin value is greater than or equal to minimax value
(d) maximin value is not equal to minimax value

50. In game theory, the outcome or consequence of a strategy is referred to as the
(a) payoff.
(b) penalty.
(c) reward.
(d) end-game strategy.

51. Game theory is concerned with:
(a) predicting the results of bets placed on games like roulette.
(b) the choice of an optimal strategy in confliict situations.
(c) utility maximization by firms in perfectly competitive markets.
(d) the way in which a player can win every game.

52. In game theory, a situation in which one firm can gain only what another firm loses is called a:
(a) nonzero-sum game.
(b) prisoners' dilemma.
(c) zero-sum game.
(d) Predation game.

Answer Key

1. (b)	2. (c)	3. (c)	4. (a)	5. (a)
6. (c)	7. (c)	8. (d)	9. (a)	10. (a)
11. (d)	12. (d)	13. (b)	14. (d)	15. (b)
16. (a)	17. (b)	18. (c)	19. (d)	20. (a)
21. (a)	22. (b)	23. (c)	24. (b)	25. (c)
26. (c)	27. (b)	28. (c)	29. (c)	30. (b)
31. (d)	32. (c)	33. (a)	34. (d)	35. (c)
36. (c)	37. (c)	38. (a)	39. (c)	40. (d)
41. (c)	42. (b)	43. (c)	44. (a)	45. (d)
46. (c)	47. (a)	48. (c)	49. (a)	50. (a)
51. (b)	52. (c)			