Examination: May, 2017
Year: 2017
Course No. PGAMT2C004T
Max Marks: 100

Semester: 2nd
Subject: Applied Mathematics
Course Title: Optimization Techniques
Time Allowed: 3 hours

Section-A

Q1. Attempt all parts. Each part carries 1.5 marks.

1) The graphical method of LP problem uses
(a) objective function equation. (b) constraints equations.
(c) linear equations. (d) all of the above.

2) Each constraint in an LP model is expressed as an
(a) inequality with $\geq$ sign. (b) inequality with $\leq$ sign.
(c) equation with = sign. (d) none of the above.

3) The number of non-negative variables in a basic feasible solution to a $m \times n$ transportation problem is:

(a) mn. (b) $m+n$. (c) $m+n+1$. (d) $m+n-1$.

4) The method used for solving an assignment problem is called

(a) reduced matrix method. (b) MODI method. (c) Hungarian method.
(d) none of the above.

5) For a salesman who has to visit n cities, which of the following are the ways of his tour plan
(a) $n!$ (b) $(n+1)!$ (c) $(n-1)!$ (d) n.

6) Define sequencing problem.

7) Game theory models are classified by the
(a) number of players. (b) sum of all payoffs. (c) number of strategies. (d) all of the above.

8) A mixed strategy game can be solved by
(a) algebraic method. (b) matrix method. (c) graphical method. (d) all of the above.

9) The part of the feasible solution space eliminated by plotting a cut contains
(a) only one integer solution. (b) only integer solutions. (c) both (a) &(b). (d) none.

10) In a branch and bound minimization tree, the lower bounds on objective function value
(a) do not decrease in value. (b) do not increase in value. (c) remain constant. (d) none

Section-B

Note: Attempt any five questions selecting one from each unit, each carries 08 marks.

Unit-1

Q.No.1. Solve the problem: Minimize $z = x_1 + x_2$, subject to

$$2x_1 + x_2 \geq 4, \quad x_1 + 7x_2 \geq 7, \quad and\ x_1, x_2 \geq 0$$

Q.No.2. Solve the linear programming problem by using (Big-M method) Penality method Minimize $z = 5x_1 + x_2$, subjective constant $2x_1 + 4x_2 \leq 12$, $2x_1 + 2x_2 = 10$, $5x_1 + 2x_2 \leq 10$, $and\ x_1, x_2 \geq 0$

Unit-2

Q.No.3. Give the mathematical formulation of an assignment problem.

Q.No.4. Define general transportation problem and find the optimum solution of the following problem

11	13	17	14	250
16	18	14	10	300
21	24	13	10	400
200	225	275	250	

By least-cost method.

Unit-3

Q.No.5. Discuss the algorithm for processing N jobs through 3 machines.

Q.No.6. Write a brief note on replacement policy of items which deteriorate with time.

Unit-4

Q.No.7. Write short note on concept of dominance.

Q.No.8. Briefly explain the matrix method for solving a rectangular game.

Unit-5

Q.No.9. Sketch the branch and bound method in integer programming.

Q.No.10. Solve the non-linear programming problem graphically

Maximize $z = 2x_1 + 3x_2$, subject to $x_1{}^2 + x_2{}^2 \leq 20$, $x_1x_2 \leq 8$, & $x_1, x_2 \geq 0$.

Section-C

Note: Attempt any three, each carries 15 marks.

Q.No.11. Solve the following LPP by using Simplex method

Maximize $= 3x_1 + 5x_2 + 4x_3$, subject to the constraints

$2x_1 + 3x_2 \leq 8$, $2x_2 + 5x_3 \leq 10$, $3x_1 + 2x_2 + 4x_3 \leq 15$, & $x_1, x_2, x_3 \geq 0$.

Q.No.12. A manufacturer wants to ship 22 loads of his product as shown below: The matrix gives the kilometers from source of supply to the destinations

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	5	8	6	6	3	8
S_2	4	7	7	6	5	5
S_3	8	4	6	6	4	9
Demand	4	4	5	4	8	25\22

Where, D_i and S_i stands for destinations and sources respectively.

Shipping cost is Rs 10 per load per km. what shipping schedule should be used to minimize total transportation cost.

Q.No.13. Find the sequence that minimizes the total required in performing the following jobson three machines in the order ABC. Processing times (in hours) are given in the following table:

jobs	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

Q.No.14. Use matrix method to solve a game whose payoff matrix is: $\begin{pmatrix} 3 & 6 \\ 5 & 5 \\ 9 & 3 \end{pmatrix}$.

Q.No.15. Find the optimum integer solution to the following LPP.

Maximize $= x_1 + 4x_2$, subject to $2x_1 + 4x_2 \leq 7$; $5x_1 + 3x_2 \leq 15$; where x_1, x_2 are integers.