LINEAR PROGRAMMING ASSIGNMENT

1. Mohan wants to invest the total amount of Rs. 15,000 in saving certificates and national saving bonds. According to rules, he has to invest at least Rs. 2000 in saving certificates and Rs. 2500 in national saving bonds. The interest rate is 8% on saving certificate and 10% on national saving bonds per annum. He invests Rs. x in saving certificates and Rs. y in national saving bonds. Then the objective function for this problem is

(a) $0.08x + 0.10y$ (b) $\frac{x}{2000} + \frac{y}{2500}$ (c) $2000x + 2500y$ (d) $\frac{x}{8} + \frac{y}{10}$

2. Two tailors A and B earn Rs. 15 and Rs. 20 per day respectively A can make 6 shirts and 4 pants in a day while B can make10 shirts and 3 pants. To spend minimum on 60 shirts and 40 pants, A and B work x and y days respectively. Then linear constraints except $x \geq 0, y \geq 0$, are

(a) $15x + 20y \geq 0, 60x + 40y \geq 0$ (b) $15x + 20y \geq 0, 6x + 10y = 10$

(c) $6x + 10y \geq 60, 4x + 3y \geq 40$ (d) $6x + 10y \leq 60, 4x + 3y \leq 40$

3. In the examination of P.E.T. the total marks of mathematics are 300. If the answer is right, marks provided is 3 and if the answer is wrong, marks provided is –1. A student knows the correct answer of 67 questions and remaining questions are doubtful for him. He takes the time $1\frac{1}{2}$ minute to give the correct answer and 3 minute that for doubtful. Total time is 3 hour. In the question paper after every two simple questions, one question is doubtful. He solves the questions one by one, then the number of questions solved by him, is

(a) 67 (b) 90 (c) 79 (d) 80

4. A shopkeeper wants to purchase two articles A and B of cost price Rs. 4 and Rs. 3 respectively. He thought that he may earn 30 paise by selling article A and 10 paise by selling article B He has not to purchase total articles of more than Rs. 24. If he purchases the number of articles of A and B, x and y respectively, then linear constraints are

(a) $x \geq 0, y \geq 0, 4x + 3y \leq 24$ (b) $x \geq 0, y \geq 0, 30x + 10y \leq 24$ (c) $x \geq 0, y \geq 0, 4x + 3y \geq 24$ (d) $x \geq 0, y \geq 0, 30x + 40y \geq 24$

5. A company manufacturers two types of products A and B. The storage capacity of its godown is 100 units. Total investment amount is Rs. 30,000. The cost prices of A and B are Rs. 400 and Rs. 900 respectively. All the products are sold and per unit profit is Rs. 100 and Rs. 120 through A and B respectively. If x units of A and y units of B be produced, then two linear constraints and iso-profit line are respectively

(a) $x + y = 100; 4x + 9y = 300, 100x + 120y = c$ (b) $x + y \leq 100; 4x + 9y \leq 300$, $x + 2y = c$

(c) $x + y \leq 100; 4x + 9y \leq 300, 100x + 120y = c$ (d) $x + y \geq 100; 9x + 4y \geq 300, 5x + 6y = c$

6. We have to purchase two articles A and B of cost Rs. 45 and Rs. 25 respectively. I can purchase total article maximum of Rs. 1000. After selling the articles A and B, the profit per unit is Rs. 5 and 3 respectively. If I purchase x and y numbers of articles A and B respectively, then the mathematical formulation of problem is

(a) $x \geq 0, y \geq 0, 45x + 25y \geq 1000, 5x + 3y = c$ (b) $x \geq 0, y \geq 0, 45x + 25y \leq 1000, 5x + 3y = c$

(c) $x \geq 0, y \geq 0, 45x + 25y \leq 1000$, $3x + 5y = c$ (d) None of these

7. To maximize the objective function $z = 2x + 3y$ under the constraints $x + y \leq 30, x - y \geq 0, y \leq 12, x \leq 20, y \geq 3$ and $x, y \geq 0$, is at

(a) $x = 12, y = 18$ (b) $x = 18, y = 12$ (c) $x = 12, y = 12$ (d) $x = 20, y = 10$

8. The point at which the maximum value of $x + y$ subject to the constraints $2x + 5y \leq 100, \frac{x}{25} + \frac{y}{49} \leq 1, x, y \geq 0$ is obtained, is

(a) (10, 20) (b) (20, 10) (c) (15, 15) (d) $\left(\frac{50}{3}, \frac{40}{3}\right)$

9. The maximum value of $Z = 4x + 3y$ subject to the constraints $3x + 2y \geq 160, 5x + 2y \geq 200, x + 2y \geq 80; x, y \geq 0$ is

(a) 320 (b) 300 (c) 230 (d) None of these

10. By graphical method, the solution of linear programming problem

maximize $z = 3x_1 + 5x_2$

subject to $3x_1 + 2x_2 \leq 18$,

$x_1 \leq 4$,

$x_2 \leq 6$

$x_1 \geq 0, x_2 \geq 0$ is

(a) $x_1 = 2, x_2 = 0, z = 6$ (b) $x_1 = 2, x_2 = 6, z = 36$ (c) $x_1 = 4, x_2 = 3, z = 27$ (d) $x_1 = 4, x_2 = 6, z = 42$

11. For the L.P. problem *Max* $z = 3x_1 + 2x_2$, such that $2x_1 - x_2 \geq 2, x_1 + 2x_2 \leq 8$ and $x_1, x_2 \geq 0$, $z =$

(a) 12 (b) 24 (c) 36 (d) 40

12. The maximum value of $P = 2x + 5y$ subject to the constraints

$x + 4y \le 24$, $3x + y \le 21$, $x + y \le 9$ and $x \ge 0, y \ge 0$ is

(a) 33 (b) 35 (c) 20 (d) 105

13. The maximum value of $P = 5x + 7y$ subject to the constraints

$x + y \le 4$, $3x + 8y \le 24$, $10x + 7y \le 35$ and $x \ge 0, y \ge 0$ is

(a) 14.8 (b) 24.8 (c) 34.8 (d) None of these

14. The point which provides the solution to the linear programming problem , Max. $(2x + 3y)$, subject to constraints :

$x \ge 0, y \ge 0, \quad 2x + 2y \le 9, \quad 2x + y \le 7, \quad x + 2y \le 8$ is

(a) (3, 2.5) (b) (2, 3.5) (c) (2, 2.5) (d) (1, 3.5)

15. For maximum value of $Z = 5x + 2y$, subject to the constraints

$2x + 3y \ge 6$, $x - 2y \le 2$, $6x + 4y \le 24$, $-3x + 2y \le 3$ and $x \ge 0, y \ge 0$ the values of *x* and *y* are

(a) 18/7, 2/7 (b) 7/2, 3/4 (c) 3/2, 15/4 (d) None of these

16. For the following linear programming problem :

'Minimize $Z = 4x + 6y$ ', subject to the constraints $2x + 3y \ge 6,\ x + y \le 8,\ y \ge 1, x \ge 0$, the solution is

(a) (0, 2) and (1, 1) (b) (0, 2) and $\left(\frac{3}{2}, 1\right)$ (c) (0, 2) and (1, 6) (d) (0, 2) and (1, 5)

17. The minimum value of $Z = 2x_1 + 3x_2$ subject to the constraints $2x_1 + 7x_2 \ge 22,\ x_1 + x_2 \ge 6,\ 5x_1 + x_2 \ge 10$ and $x_1, x_2 \ge 0$ is

(a) 14 (b) 20 (c) 10 (d) 16

18. For the L.P. problem Min. $z = x_1 + x_2$, such that $5x_1 + 10x_2 \le 0, x_1 + x_2 \ge 1, x_2 \le 4$ and $x_1, x_2 \ge 0$

(a) There is a bounded solution (b) There is no solution

(c) There are infinite solution s (d) None of these

19. The L.P. problem *Max* $z = x_1 + x_2$, such that $-2x_1 + x_2 \le 1, x_1 \le 2, x_1 + x_2 \le 3$ and $x_1, x_2 \ge 0$ has

(a) One solution (b) Three solution

(c) An infinite number of solutions (d) None of these

20. On maximizing $z = 4x + 9y$ subject to $x + 5y \le 200, 2x + 3y \le 134$ and $x, y \ge 0$, *z* =

(a) 380 (b) 382 (c) 384 (d) None of these

21. The point at which the maximum value of $(3x + 2y)$ subject to the constraints $x + y \le 2, x \ge 0, y \ge 0$ is obtained, is

(a) (0, 0) (b) (1.5, 1.5) (c) (2, 0) (d) (0, 2)

22. The solution of a problem to maximize the objective function $z = x + 2y$ under the constraints $x - y \le 2, x + y \le 4$ and $x, y \ge 0$, is

(a) $x = 0, y = 4, z = 8$ (b) $x = 1, y = 2, z = 5$ (c) $x = 1, y = 4, z = 9$ (d) $x = 0, y = 3, z = 6$

23. The maximum value of $P = 6x + 8y$ subject to constraints $2x + y \le 30, x + 2y \le 24$ and $x \ge 0, y \ge 0$ is

(a) 90 (b) 120 (c) 96 (d) 240

24. The maximum value of $P = x + 3y$ such that $2x + y \le 20, x + 2y \le 20, x \ge 0, y \ge 0$, is

(a) 10 (b) 60 (c) 30 (d) None of these

25. The point at which the maximum value of $x + y$, subject to the constraints $x + 2y \le 70, 2x + y \le 95, x, y \ge 0$ is obtained, is

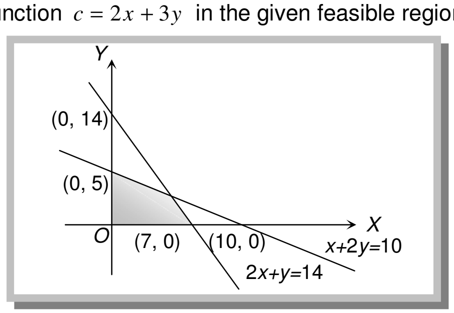
(a) (30, 25) (b) (20, 35) (c) (35, 20) (d) (40, 15)

26. If $3x_1 + 5x_2 \le 15$; $5x_1 + 2x_2 \le 10$; $x_1, x_2 \ge 0$

then the maximum value of $5x_1 + 3x_2$ by graphical method is

(a) $12\frac{7}{19}$ (b) $12\frac{1}{7}$ (c) $12\frac{3}{5}$ (d) 12

27. The maximum value of objective function $c = 2x + 3y$ in the given feasible region, is



(a) 29 (b) 18 (c) 14 (d) 15

28. The maximum value of the objective function $P = 5x + 3y$, subject to the constraints $x \ge 0, y \ge 0$ and $5x + 2y \le 10$ is

(a) 6 (b) 10 (c) 15 (d) 25

29. The maximum value of $P = 8x + 3y$, subject to the constraints $x + y \le 3, 4x + y \le 6, x \ge 0, y \ge 0$ is

(a) 9 (b) 12 (c) 14 (d) 16

30. The maximum value of $P = 6x + 11y$ subject to the constraints

$2x + y \le 104$

$x + 2y \le 76$ and $x \ge 0, y \ge 0$ is

(a) 240 (b) 540 (c) 440 (d) None of these

31. For the L.P. problem, Min $z = -x_1 + 2x_2$, such that $-x_1 + 3x_2 \le 0, x_1 + x_2 \le 6, x_1 - x_2 \le 2$ and $x_1, x_2 \ge 0$, then $x_1 =$

(a) 2 (b) 8 (c) 10 (d) 12

32. For the L.P. problem Min $z = 2x_1 + 3x_2$, such that $-x_1 + 2x_2 \le 4, x_1 + x_2 \le 6, x_1 + 3x_2 \ge 9$ and $x_1, x_2 \ge 0$

(a) $x_1 = 1.2$ (b) $x_2 = 2.6$ (c) $z = 10.2$ (d) All of these

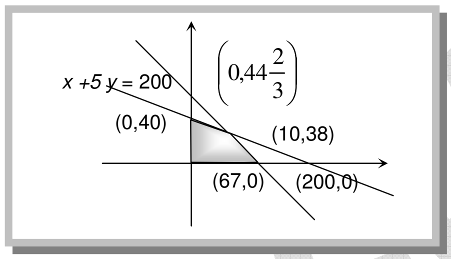
33. For the L.P. problem Min $z = 2x + y$ subject to $5x + 10y \le 50, x + y \ge 1, y \le 4$ and $x, y \ge 0$, $z =$

(a) 0 (b) 1 (c) 2 (d) 1/2

34. For the L.P. problem Min. $z = 2x - 10y$ subject to $x - y \ge 0, x - 5y \ge -5$ and $x, y \ge 0$, $z =$

(a) – 10 (b) – 20 (c) 0 (d) 10

35. The maximum value of objective function $c = 2x + 2y$ in the given feasible region, is



(a) 134 (b) 40 (c) 38 (d) 80

36. The Minimum value of $P = x + 3y$ subject to constraints $2x + y \le 20, x + 2y \le 20, x \ge 0, y \ge 0$ is

(a) 10 (b) 60 (c) 30 (d) None of these

37. Min. $Z = -x_1 + 2x_2$

Subjected to $x_1 + 3x_2 \le 10,$

$x_1 + x_2 \le 6,\ x_1 - x_2 \le 2$ and $x_1, x_2 \ge 0$ is :

(a) – 4 (b) – 2 (c) 2 (d) None of these

38. If the number of available constraints is 3 and the number of parameters to be optimized is 4, then

(a) The objective function can be optimized (b) The constraints are short in number
(c) The solution is problem oriented (d) None of these

39. The intermediate solutions of constraints must be checked by substituting them back into

(a) Object function (b) Constraint equations (c) Not required (d) None of these

40. A basic solution is called non-degenerate, if

(a) All these basic variables are zero (b) None of the basic variables is zero
(c) At least one of the basic variable is zero (d) None of these

41. Objective function of a *L.P.P.* is

(a) A constraint (b) A function to be optimized
(c) A relation between the variables (d) None of these

42. "*The maximum or the minimum of the objecitve function occurs only at the corner points of the feasible region".* This theorem is known as Fundamental Theorem of

(a) Algebra (b) Arithmetic (c) Calculus (d) Extreme points

43. Which of the terms is not used in a linear programming problem

(a) Slack variable (b) Objective function (c) Concave region (d) Feasible region

44. Which of the following is not true for linear programming problems

(a) A slack variable is a variable added to the left hand side of a less than or equal to constraint to convert it into an equality
(b) A surplus variable is a variable subtracted from the left hand side of a greater than or equal to constraint to convert it into an
equality
(c) A basic solution which is also in the feasible region is called a basic feasible solution
(d) A column in the simplex tableau that contains all of the variables in the solution is called pivot or key column

45. The value of objective function is maximum under linear constraints

(a) At the centre of feasible region (b) At (0, 0)

(c) At any vertex of feasible region (d) The vertex which is at maximum distance from (0, 0)

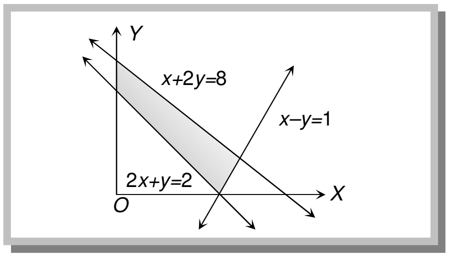
46. Which of the following sets are not convex

(a) $\{(x, y) | 3 \le x^2 + y^2 \le 5\}$ (b) $\{(x, y) | 3x^2 + 2y^2 \le 6\}$ (c) $\{(x, y) | y^2 \le x\}$ (d) $\{(x, y | x \ge 2, x \le 3\}$

47. Which of the following sets are convex

(a) $\{(x, y) | x^2 + y^2 \ge 1\}$ (b) $\{(x, y) | y^2 \ge x\}$ (c) $\{(x, y) | 3x^2 + 4y^2 \ge 5\}$ (d) $\{(x, y) | y \ge 2, y \le 4\}$

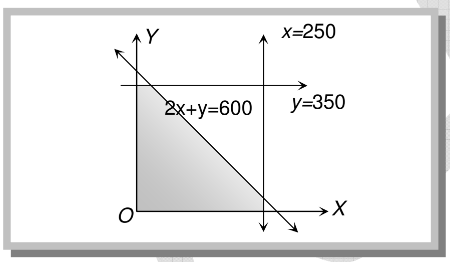
48. For the following shaded area, the linear constraints except $x \ge 0$ and $y \ge 0$, are



(a) $2x + y \le 2, x - y \le 1, x + 2y \le 8$ (b) $2x + y \ge 2, x - y \le 1, x + 2y \le 8$

(c) $2x + y \ge 2, x - y \ge 1, x + 2y \le 8$ (d) $2x + y \ge 2, x - y \ge 1, x + 2y \ge 8$

49. For the following feasible region, the linear constraints except $x \ge 0$ and $y \ge 0$, are



(a) $x \ge 250, y \le 350, 2x + y = 600$ (b) $x \le 250, y \le 350, 2x + y = 600$

(c) $x \le 250, y \le 350, 2x + y \ge 600$ (d) $x \le 250, y \le 350, 2x + y \le 600$

50. Which of the following is not a vertex of the positive region bounded by the inequalities $2x + 3y \le 6, 5x + 3y \le 15$ and $x, y \ge 0$

(a) (0, 2) (b) (0, 0) (c) (3, 0) (d) None of these