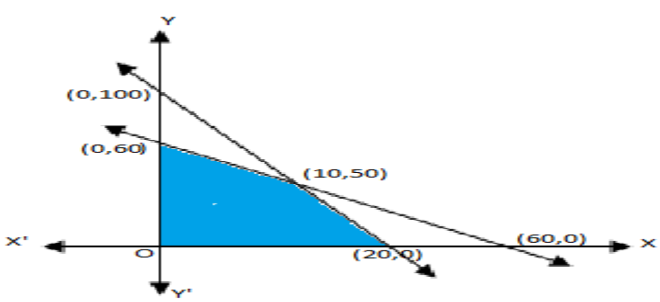
CHAPTER 12

LPP

ASSERTION REASONING QUESTIONS

Q No	Questions
	In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choice as A) Assertion and reason both are correct statements and reason is correct explanation for assertion. B) Assertion and reason both are correct statements but reason is not correct explanation for assertion. C) Assertion is correct statement but reason is wrong statement. D) Assertion is wrong statement but reason is correct statement.
1	Assertion (A): Feasible region is the set of points which satisfy all of the given constraints. Reason (R): The optimal value of the objective function is attained at the points on X-axis only.
2	Assertion (A): It is necessary to find objective function value at every point in the feasible region to find optimum value of the objective function. Reason(R):For the constrains $2x+3y\leq 6$, $5x+3y\leq 15$, $x\geq 0$ and $y\geq 0$ corner points of the feasible region are (0,2), (0,0) and (3,0).
3	Assertion (A):If an LPP attains its maximum value at two corner points of the feasible region then it attains maximum value at infinitely many points. Reason (R): if the value of the objective function of a LPP is same at two corners then it is same at every point on the line joining two corner points
4	Assertion (A): The region represented by the set $\{(x,y): 4\leq x^2+y^2\leq 9\}$ is a convex set. Reason (R): The set $\{(x,y): 4\leq x^2+y^2\leq 9\}$ represents the region between two concentric circles of radii 2 and 3.
5	Assertion: Bounded region of constraint lies in the first quadrant of $x+y\leq 20, 3x+2y\leq 48, x\geq 0, y\geq 0$ Reason: $x\geq 0, y\geq 0$ are non-negative constraints.
6	Assertion: Objective function is the linear function. Reason: it can be maximized or minimized.
7	Assertion: Linear Programming Problems help to solve the problem of manufacturing and diet problems Reason: LPP may use in traffic signal problems
8	Assertion: The set of all feasible solution of a LPP is a convex set. Reason: Bounded region form a polygon whose each interior angle would be less than 180^0.
9	Assertion: A LPP admits unique optimal solution. Reason: The solution set of the inequation $2x+y>5$ is open half plane not containing the origin.
10	Assertion (A) Maximum value of $Z = 11x + 7y$, subject to constraints $2x + y\leq 6$, $x\leq 2$, $x\geq 0$, $y\geq 0$ will be obtained at (0,6) . Reason (R)In a bounded feasible region, it always exist a maximum and minimum value.
11	

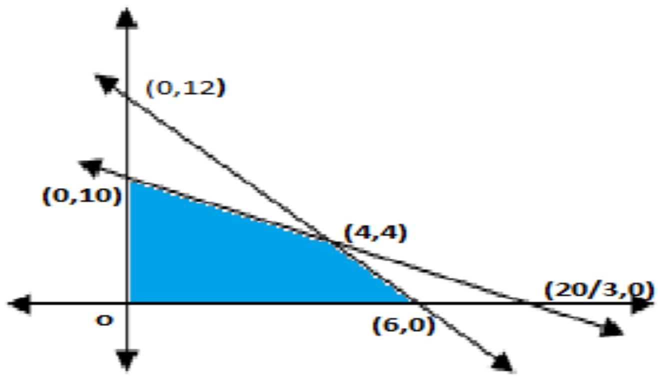
	Assertion (A)The linear programming problem, maximize $Z = 2x + 3y$ subject to constraints $x + y \leq 4$, $x \geq 0$, $y \geq 0$ It gives the maximum value of Z as 8. Reason (R)To obtain maximum value of Z, we need to compare value of Z at all the corner points of the feasible region .
12	Assertion (A) For an objective function $= 4x + 3y$, corner points are (0,0), (25,0) , (16,16) and (0,24) . Then optimal values are 112 and 0 respectively. Reason (R) The maximum or minimum values of an objective function is known as optimal value of LPP. These values are obtained at corner points .
13	Assertion (A) Objective function $Z = 13x - 15y$, is minimized subject to constraints $x + y \leq 7$, $2x - 3y + 6 \geq 0$, $x \geq 0$, $y \geq 0$ occur at corner point (0,2) . Reason (R) If the feasible region of the given LPP is bounded , then the maximum or minimum values of an objective function occur at corner points .
14	Assertion (A) Maximize $Z = 3x + 4y$, subject to constraints : $x + y \leq 1$,, $x \geq 0$, $y \geq 0$. Then maximum value of Z is 4. Reason (R) If the shaded region is not bounded then maximum value cannot be determined.
15	Consider the graph of the constraints stated by linear inequations $5x + y \leq 100$, $y + x \leq 60$, and x, y $\geq$ 0.  Assertion: (25,40) is infeasible solution of the problem Reason: Any point which lies in feasible region is infeasible solution
16	Assertion: Maximum value of Z = 11x + 5y subject to constraints $3x + 2y \leq 25$, $x + y \leq 10$, x, y $\geq$ 0, occurs at corner point $(\frac{25}{3}, 0)$ Reason: If the feasible region of given LPP is bounded then the maximum and minimum value occurs at the corner points
17	

Assertion: The maximum value of $Z = 4x + y$ subject to the constraints $x + y \leq 50$, $3x + y \leq 90$, $x, y \geq 0$ is 120

Reason: If the feasible region of given LPP is bounded then the maximum and minimum value occurs in infeasible region

18 Assertion: The maximum value of $Z = 5x + 3y$ subject to the constraints stated by linear inequations $2x + y \leq 12$, $2y + 3x \leq 20$, and $x, y \geq 0$ is at (4,4)

Reason: If the feasible region of given LPP is bounded then the maximum and minimum value occurs at the corner points



19 Assertion: The Maximum value of $Z = 11x + 7y$, subject to the constraints $2x + y \leq 6$, $x \leq 2$, $x, y \geq 0$, occurs at corner point (0,6)

Reason: If the feasible region of given LPP is bounded then the maximum and minimum value occurs at the corner points.

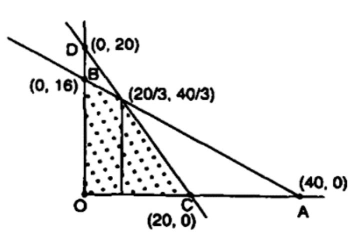
20 Assertion: Graphical method is not suitable for solving all linear programming problem

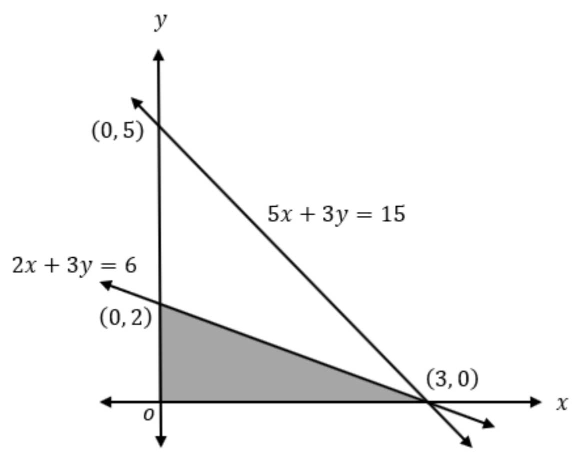
Reason: Graphical method is applicable only in case of linear programming problems of two variables.

22 Assertion: The maximum value of $Z = 5x + 3y$, satisfying the conditions $x \geq 0, y \geq 0$ and $5x + 2y \leq 10$ is 15.

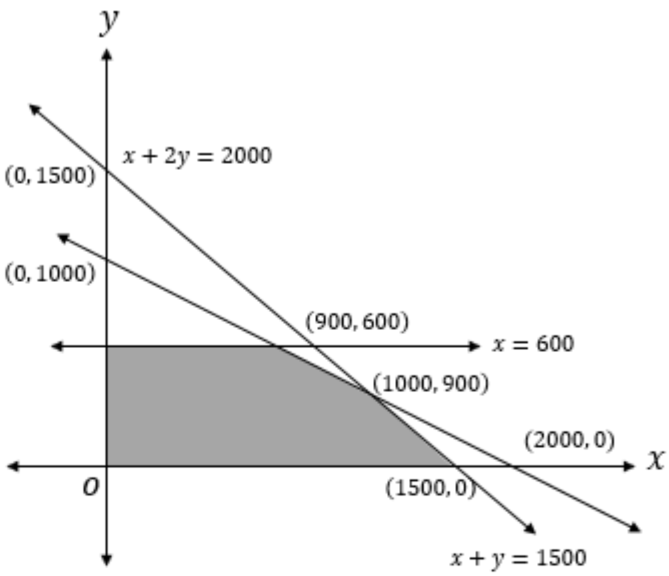
Reason: A feasible region may be bounded or unbounded .

23 Assertion: Shaded region represented by $2x + 5y \geq 80$, $x + y \leq 20$, $x \geq 0$, $y \geq 0$ is



	Reason: A region or a set of points is said to be convex if the line joining any two of its points lies completely in the region.
24	Assertion: The objective function describes the purpose of formulating linear programming problem. Reason: The constraint functions can be maximized or minimized.
25	Assertion : The region represented by the set $\{ (x, y) : 3x^2 + 2y^2 \le 6\}$ *is a* Convex set. Reason: The solution set of $3x + 2y \le 6$ *is* half plane containing the points lying on the line $3x + 2y = 6$ and the origin.
26	**Assertion(A):** The solutions of constraints must be checked by substituting them back into objective function. **Reason(R):**  Here, $(0, 2)$, $(0, 0)$ and $(3, 0)$ all are vertices of feasible region.
27	**Assertion(A):** For the constraints of linear optimizing function $Z = x_1 + x_2$ given by $x_1 + x_2 \le 1$, $3x_1 + x_2 \ge 1$, $x_1 \ge 0$, $x_2 \ge 0$ there is no feasible region. **Reason(R):** $Z = 7x + y$, subject to $5x + y \le 5$, $x + y \ge 3$, $x \ge 0$, $y \ge 0$. Out of corner points of feasible region $(3, 0)$, $(\frac{1}{2}, \frac{5}{2})$, $(7, 0)$ and $(0, 5)$, the maximum value of Z occurs at $(7, 0)$.
28	**Assertion(A):** $Z = 20x_1 + 20x_2$, subject to $x_1 \ge 0$, $x_2 \ge 2$, $x_1 + 2x_2 \ge 8$, $3x_1 + 2x_2 \ge 15$, $5x_1 + 2x_2 \ge 20$. Out of the corner points. Out of the corner points of feasible region $(8, 0)$, $(\frac{5}{2}, \frac{15}{2})$, $(\frac{7}{2}, \frac{9}{4})$ $(7, 0)$ and $(0, 10)$, the minimum value of Z occurs

	at $(\frac{7}{2},\frac{9}{4})$. **Reason(R):** <table><tr><th>Corner Points</th><th>$Z = 20x_1 + 20x_2$</th></tr><tr><td>$(8, 0)$</td><td>160</td></tr><tr><td>$(\frac{5}{2},\frac{15}{4})$</td><td>125</td></tr><tr><td>$(\frac{7}{2},\frac{9}{4})$</td><td>115 minimum</td></tr><tr><td>$(0, 10)$</td><td>200</td></tr></table>
29	1. **Assertion(A):** For the constraints of an LPP given by $x + 2y \le 2000$, $x + y \le 1500$, $y \le 600$, and $x, y \ge 0$, the points $(1000, 0)$, $(0, 500)$, $(2, 0)$ lie in the positive bounded region, but point $(2000, 0)$ does not lie in the positive bounded region. **Reason(R):**



From the graph, it is clear that the point (2000, 0) is outside of the feasible region.

ANSWERS

Q No	Answer
1	C
2	D
3	A
4	D
5	A
6	B
7	C
8	A
9	A
10	B
11	D
12	A
13	A
14	C
15	C
16	A
17	C
18	A
19	A

21	A
22	A
23	D
24	C
25	B
26	D
27	B
28	A
29	A

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