MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

LINEAR PROGRAMMING

Question Bank

1. A merchant sells two models X and Y of TV with cost price ₹ 25000 and ₹ 50000 Per set respectively. He gets a profit of ₹ 1500 on

model X and ₹ 2000 on model Y . The sales connot exceed 20 sets in a month. If he cannot invest more than 6 lakh rupees, formulate the problem of determining the number of sets of each type he must keep in stock for maximum profit.

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2. A company manufactures and sells two models of lamps L_1 and L_2, the profit being ₹ 15 and ₹ 10 respectively. The process involves

two workers W_1 and W_2 who are available for this kind of work 100 hours and 80 hours per month respectively, W_1 assembles,L_1 in 20 and L_2 in 30 minutes.W_2 [aomts L_1 in 20 and L-2 in 10 minutes. Assuming that all lamps made can be sold, formulate the LPP for determining the productions figures for maximum proft.

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3. A factory uses three different respurce for the manufacture of two different products, 20 units of the resource A, 12 units of B and 16 unit of C being available. One unit of the first product requires 2,2 and 4 units of the resources and one unit of the second product requires 4,2 and 0 units of the resources taken in order. It is known that the first product gives a profit of ₹20 per unit and the second ₹ 30 prt uniy. Formulate the LPP so as to earn maximum profit.

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4. A man plans to start a poultry farm by investing at most ₹ 3000. He can buy old hens for ₹80 each and young ones for ₹ 140 each, but he cannot house more than 30 hens. Old hens lay 4 eggs per week ,each ell bing sold at ₹5. It costs ₹ 5 to feed an old hen and ₹8 to feed a young hen per week. Formulate his problem determining the number of hens of each type he should buy so as to earn a proft of more than ₹ 300 per week.

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5. (Allocation Problem.)A farmer has 5 acres of land on which he wishes to grow two crops X and Y. He has to use 4 cart loads and 2cart loads of manure per acre for crops X and Y respectively. But not more than 18 cart loads of manure is available. Other expenses are ₹200 and ₹500 per acre for the crops X and Y respectively . He estimates profit from crops X and Y at the rates ₹1000 and ₹800 per acre respectively. Formulate the LPP as to how

much land he should allocate to each crop for maximum profit.

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6. Special purpose coins each weighing 10gms are to be manufactured using two basic metals $M_1$and $M_2$and a mix of other metals M_3. $M_1, M_2 \text{and} M_3$ cost₹500,₹800 and ₹800 and ₹50 per gram respectively. The strength of a coin demands that not more than 7 gm. of M_1 and a minimum of 3 gm of M_2should be

used. The amount of M_3 in each coin is maintained at $25\,\%$ of that of M_1.Since the demand for that coin is related to its price,formulate the LPP to find the minimum cost of a coin.

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7. A company produces three types of cloth A,B and C. Three kinds of wool, say red, green and blue are required for the cloth needs 2 metres of red and 3 etres of blue wool, one unit

length of type B cloth needs 3 metres of red, 2 metres of green and 2 metres of blue wool and one unit length of type C cloth needs 5 metres of green and 4 metres of blue wool. The firm has a stock of only 80 metres of red, 100 metres of green and 150 metres of blue wool. Assuming that income obtained from one unit length of cloth is ₹30, ₹50 and ₹ 40 of types . A, B and C respectively, formulate the LPP so as to maximize income.

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8. Maximize $Z = 5x_1 + 6x_2$

Subject to: $2x_1 + 3x_2 \leq 6$

$x_1, x_2 \geq 0$

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9. Minimize: $Z = 6x_1 + 7x_2$

Subject to: $x_1 + 2x_2 \geq 4$

$x_1, x_2 \geq 0$

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10. Maximize : $Z = 20x_1 + 40x_2$

Subject to: $x_1 + x_2 \leq 1$

$x_1, x_2 \geq 0.$

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11. Solve the following LPP graphically.

Minimize $z = 30x_1 + 45x_2$ subject to

$2x_1 + 6x_2 \geq 4,$ $5x_1 + 2x_2 \geq 5$ and

$x_1, x_2 \geq 0$

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12. Optimize : $Z = 5x_1 + 25x_2$

Subject to: $-0.5x_1 + x_2 \leq 2$

$-x_1 + 5x_2 \geq 5$

$x_1, x_2 \geq 0$

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13. Maximize: $Z = 14x_1 + 4x_2$

Subject to: $x_1 + 12x_2 \leq 65$

$7x_1 - 2x_2 \leq 25$

$2x_1 + 3x_2 \geq 10$

$x_1, x_2 \geq 0$

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14. Maximize: $Z = 10x_1 + 12x_2 + 8x_3$

Subject to: $x_1 + 2x_2 \leq 30$

$5x_1 - 7x_3 \geq 12$

$x_1 + x_2 + x_3 = 20$

$x_1, x_2 \geq 0$

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15. Minimize: $Z = 20x_1 + 10x_2$

Subject to: $x_1 + 2x_2 \leq 40$

$3x_1 - x_2 \geq 30$

$4x_1 + 3x_2 \geq \ = 60$

$x_1, x_2 \geq 0$

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16. Maximize $Z = 4x_1 + 3x_2$

Subject to: $x_1 + x_2 \leq 50$

$x_1 + 2x_2 \leq 80$

$2x_1 + x_2 \geq 20, x_1, x_2 \geq 0$

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17. Maximize : $Z = 20x_1 + 40x_2$

Subject to: $x_1 + x_2 \leq 1$

$x_1, x_2 \geq 0.$

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18. Minimize: $Z = 6x_1 + 7x_2$

Subject to: $x_1 + 2x_2 \geq 4$

$x_1, x_2 \geq 0$

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19. Maximize : $Z = 1500x + 2000y$

Subject to: $x + y < 20$

$x + 2y < 24$

$x, y \geq 0$

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20. Maximize : $Z = 15x + 10y$

Subject to: $2x + 3y \leq 600$

$2x + y \leq 480$

$x, y \geq 0$

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21. Maximize : $Z = 20x + 30y$

Subject to: $x + 2y \leq 10$

$x + y \leq 6$

$x \leq 4$

$x, y \geq 0$

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22. Maximize : $Z = 2x + 4y$

Subject to$3x + 2y \leq 10$

$2x + 5y \leq 15$

$5x + 6y \leq 21$

$x, y \geq 0$

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23. Maximize : $Z = 1000x + 800y$

Subject to$x + y \leq 5$

$2x + y \leq 9$

$x + y \leq 0$

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24. Minimize : $Z = 4960 - 70x - 130y$

Subject to: $x + y \leq 12$

$x + y \geq 6$

$x \leq 8$

$y \leq 8$

$x, y \geq 0$

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25. Minimize : $Z = 16x + 20y$

Subject to $: x + 2y \geq 10$

$x + y \leq 6\, x_1, x_2 \geq 0$

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