
# SUGGESTED SOLUTION

# CA FINAL NOVEMBER 2016 EXAM

## ADVANCED MANAGEMENT ACCOUNTING

## Test Code - F N J 6 0 0 3

**BRANCH - (MUMBAI) (Date :19.06.2016)**

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**Answer-1 :** **(8 Marks)**

**(i) Calculation of 'Total Labour Hours' over the Life Time of the Product 'Kitchen Care'**

The average time per unit for 250 units is

$Y_x = ax^b$

$Y_{250} = 30 \times 250^{-0.3219}$

$Y_{250} = 30 \times 0.1691$

$Y_{250} = 5.073$ hours

Total time for 250 units = 5.073 hours × 250 units

= 1,268.25 hours

The average time per unit for 249 units is

$Y_{249} = 30 \times 249^{-0.3219}$

$Y_{249} = 30 \times 0.1693$

$Y_{249} = 5.079$ hours

Total time for 249 units = 5.079 hours × 249 units

= 1,264.67 hours

Time for 250th unit = 1,268.25 hours – 1,264.67 hours

= 3.58 hours

Total Time for 1,000 units = (750 units × 3.58 hours) + 1,268.25 hours

= 3,953.25 hours

**(ii) Profitability of the Product 'Kitchen Care'**

| **Particulars** | **Amount (Rs.)** | **Amount (Rs.)** |
|---|---|---|
| Sales (1,000 units) | | 50,00,000 |
| Less: Direct Material | 18,50,000 | |
| Direct Labour (3,953.25 hours × Rs. 80) | 3,16,260 | |
| Variable Overheads (1,000 units× Rs.1,000) | 10,00,000 | 31,66,260 |
| Contribution | | 18,33,740 |
| Less: Packing Machine Cost | | 5,00,000 |
| Profit | | 13,33,740 |

**(iii) Average 'Target Labour Cost' per unit**

| **Particulars** | **Amount (Rs.)** |
|---|---|
| Expected Sales Value | 50,00,000 |
| Less: Desired Profit (1,000 units × Rs. 800) | 8,00,000 |
| Target Cost | 42,00,000 |
| Less: Direct Material (1,000 units × Rs. 1,850) | 18,50,000 |
| Variable Cost (1,000 units × Rs. 1,000) | 10,00,000 |
| Packing Machine Cost | 5,00,000 |
| Target Labour Cost | 8,50,000 |
| Average Target Labour Cost per unit (Rs. 8,50,000 ÷ 1,000 units) | 850 |

**Answer–2 :**

**(i) Computation of Sale Price Per Bottle**

**Output: 40,000 Bottles**

| | (Rs.) |
|---|---|
| Variable Cost: | |
| Material | 2,10,000 |
| Labour (Rs.1,50,000 × 80%) | 1,20,000 |
| Factory Overheads (Rs.92,000 × 60%) | 55,200 |
| Administrative Overheads (Rs.40,000 × 35%) | 14,000 |
| Commission (8% on Rs.6,00,000) (W.N.-1) | 48,000 |

| | |
|---|---|
| Fixed Cost: | |
| Labour (Rs.1,50,000 × 20%) | 30,000 |
| Factory Overheads (Rs.92,000 × 40%) | 36,800 |
| Administrative Overheads (Rs.40,000 × 65%) | 26,000 |
| Total Cost | 5,40,000 |
| Profit (W.N.-1) | 60,000 |
| Sales Proceeds (W.N.-1) | 6,00,000 |
| Sales Price per bottle $\left(\frac{\text{Rs.6,00,000}}{\text{40,000 Bottles}}\right)$ | 15 |

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**(ii) Calculation of Break-even Point**

| | | |
|---|---|---|
| Sales Price per Bottle | = | Rs.14 |
| Variable Cost per Bottle | = | $\frac{\text{Rs.4,44,000 (W.N.-2)}}{\text{40,000 Bottles}}$ |
| | = | Rs.11.10 |
| Contribution per Bottle | = | Rs.14 –Rs.11.10 |
| | = | Rs.2.90 |
| Break -even Point | | |
| (in number of Bottles) | = | $\frac{\text{Fixed Costs}}{\text{Contribution per Bottle}}$ |
| | = | $\frac{\text{Rs.92,800}}{\text{Rs.2.90}}$ = 32,000 Bottles |
| Break- even Point | | |
| (in Sales Value) | = | 32,000 Bottles × Rs.14 |
| | = | Rs.4,48,000 |

**Working Note**

**W.N.-1**

Let the Sales Price be 'x'

| | | |
|---|---|---|
| Commission | = | $\frac{8x}{100}$ |
| Profit | = | $\frac{10x}{100}$ |
| x | = | $4,92,000 + \frac{8x}{100} + \frac{10x}{100}$ |
| 100x - 8x - 10x | = | 4,92,00,000 |
| 82x | = | 4,92,00,000 |
| x | = | 4,92,00,000 / 82 |
| | = | Rs.6,00,000 |

**W.N.-2**

**Total Variable Cost**

| | **(Rs.)** |
|---|---|
| Material | 2,10,000 |
| Labour | 1,20,000 |
| Factory Overheads | 55,200 |
| Administrative Overheads | 14,000 |
| Commission [(40,000 Bottles × Rs.14) × 8%] | 44,800 |
| **Total** | **4,44,000** |

**Answer–3 :**

Let $x_1$, $x_2$ and $x_3$ respectively be the amounts in tons of grades A, B & C used. The constraints are:

(i) Phosphorus content must not exceed 0.03%

$$0.02x_1 + 0.04x_2 + 0.03x_3 \leq 0.03 (x_1 + x_2 + x_3)$$

Or $-x_1 + x_2 \leq 0$

(ii) Ash content must not exceed 3%

$3x_1 + 2x_2 + 5x_3 \leq 3(x_1 + x_2 + x_3)$

Or $-x_2 + 2x_3 \leq 0$

(iii) Total quantity of fuel required is not more than 100 tons.

$x_1 + x_2 + x_3 \leq 100$

The Mathematical formulation of the problem is:

Maximize

$Z = 12x_1 + 15x_2 + 14x_3$

Subject to the Constraints:

$$-x_1 + x_2 \leq 0$$
$$-x_2 + 2x_3 \leq 0$$
$$x_1 + x_2 + x_3 \leq 100$$
$$x_1, x_2, x_3 \geq 0$$

Introducing Slack Variables $s_1, s_2, s_3$:

Maximize

$Z = 12x_1 + 15x_2 + 14x_3 + 0s_1 + 0s_2 + 0s_3$

Subject to:

$$-x_1 + x_2 + s_1 \leq 0$$
$$-x_2 + 2x_3 + s_2 \leq 0$$
$$x_1 + x_2 + x_3 + s_3 \leq 100$$
$$x_1, x_2, x_3, s_1, s_2, s_3 \geq 0$$

We shall prepare the simplex tableau as follows:

**0**

## SIMPLEX TABLEAU-I

| $C_j \rightarrow$ | | | 12 | 15 | 14 | 0 | 0 | 0 | Min. Ratio |
|---|---|---|---|---|---|---|---|---|---|
| $C_B$ | Basic Variable (B) | Value of Basic Variables $b(=X_B)$ | $x_1$ | $x_2$ | $x_3$ | $s_1$ | $s_2$ | $s_3$ | |
| 0 | $s_1$ | 0 | −1 | 1 | 0 | 1 | 0 | 0 | ←0 |
| 0 | $s_2$ | 0 | 0 | −1 | 2 | 0 | 1 | 0 | – |
| 0 | $s_3$ | 100 | 1 | 1 | 1 | 0 | 0 | 1 | 100 |
| | | $Z_j = \sum C_{Bi} X_j$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $C_j - Z_j$ | 12 | 15↑ | 14 | 0 | 0 | 0 | |

## SIMPLEX TABLEAU-II

| $C_j \rightarrow$ | | | 12 | 15 | 14 | 0 | 0 | 0 | Min. Ratio |
|---|---|---|---|---|---|---|---|---|---|
| $C_B$ | Basic Variable (B) | Value of Basic Variables $b(=X_B)$ | $x_1$ | $x_2$ | $x_3$ | $s_1$ | $s_2$ | $s_3$ | |
| 15 | $x_2$ | 0 | −1 | 1 | 0 | 1 | 0 | 0 | – |
| 0 | $s_2$ | 0 | −1 | 0 | 2 | 1 | 1 | 0 | – |
| 0 | $s_3$ | 100 | 2 | 0 | 1 | −1 | 0 | 1 | ←50 |
| | | $Z_j = \sum C_{Bi} X_j$ | −15 | 15 | 0 | 15 | 0 | 0 | |
| | | $C_j - Z_j$ | 27↑ | 0 | 14 | −15 | 0 | 0 | |

**SIMPLEX TABLEAU-III**

| $C_j \rightarrow$ | | | 12 | 15 | 14 | 0 | 0 | 0 | Min. Ratio |
|---|---|---|---|---|---|---|---|---|---|
| $C_B$ | Basic Variable (B) | Value of Basic Variables $b(=X_B)$ | $x_1$ | $x_2$ | $x_3$ | $s_1$ | $s_2$ | $s_3$ | |
| 15 | $x_2$ | 50 | 0 | 1 | $\frac{1}{2}$ | $\frac{1}{2}$ | 0 | $\frac{1}{2}$ | 100 |
| 0 | $s_2$ | 50 | 0 | 0 | $\frac{5}{2}$ | $\frac{1}{2}$ | 1 | $\frac{1}{2}$ | ←20 |
| 12 | $x_1$ | 50 | 1 | 0 | $\frac{1}{2}$ | $-\frac{1}{2}$ | 0 | $\frac{1}{2}$ | 100 |
| | | $Z_j = \sum C_{Bi}X_i$ | 12 | 15 | $\frac{27}{2}$ | $\frac{3}{2}$ | 0 | $\frac{27}{2}$ | |
| | | $C_j - Z_j$ | 0 | 0 | $\frac{1}{2}$ ↑ | $-\frac{3}{2}$ | 0 | $-\frac{27}{2}$ | |

**SIMPLEX TABLEAU-IV**

| $C_j \rightarrow$ | | | 12 | 15 | 14 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|
| $C_B$ | Basic Variable (B) | Value of Basic Variables $b(=X_B)$ | $x_1$ | $x_2$ | $x_3$ | $s_1$ | $s_2$ | $s_3$ |
| 15 | $x_2$ | 40 | 0 | 1 | 0 | $\frac{2}{5}$ | $-\frac{1}{5}$ | $\frac{2}{5}$ |
| 14 | $x_3$ | 20 | 0 | 0 | 1 | $\frac{1}{5}$ | $\frac{2}{5}$ | $\frac{1}{5}$ |
| 12 | $x_1$ | 40 | 1 | 0 | 0 | $-\frac{3}{5}$ | $-\frac{1}{5}$ | $\frac{2}{5}$ |
| | | $Z_j = \sum C_{Ri}X_j$ | 12 | 15 | 14 | $\frac{8}{5}$ | $\frac{1}{5}$ | $\frac{68}{5}$ |
| | | $C_j - Z_j$ | 0 | 0 | 0 | $-\frac{8}{5}$ | $-\frac{1}{5}$ | $-\frac{68}{5}$ |

Since all numbers in the $C_j - Z_j$ row are either negative or zero, the optimum solution to thegiven problem has been obtained. The optimum solution is $x_1 = 40$, $x_2 = 40$ and $x_3 = 20$ withmaximum Z = Rs.1,360. Hence, the optimum product mix is 40 tons of grade A, 40 tons of grade B and 20 tons ofgrade C to get maximum profit of Rs. 1,360.

**Answer–4 :**

Since, Demand and Supply for the product is not equal, hence, it should be made equal byintroducing dummy row with a supply of 40 units. The matrix will be as follows-

| | $S_1$ | $S_2$ | $S_3$ | Supply |
|---|---|---|---|---|
| **F1** | 6 | 6 | 1 | 10 |
| **F2** | –2 | –2 | –4 | 150 |
| **F3** | 3 | 2 | 2 | 50 |
| **F4** | 8 | 5 | 3 | 100 |
| **Dummy** | 0 | 0 | 0 | 40 |
| Demand | 80 | 120 | 150 | 350 |

To make the above matrix into a minimization matrix, all the cell value shall be deducted thehighest cell value i.e. 8. The minimized transportation matrix will be as follows-

| | $S_1$ | $S_2$ | $S_3$ | Supply |
|---|---|---|---|---|
| **F1** | 2 | 2 | 7 | 10 |
| **F2** | 10 | 10 | 12 | 150 |
| **F3** | 5 | 6 | 6 | 50 |
| **F4** | 0 | 3 | 5 | 100 |
| **Dummy** | 8 | 8 | 8 | 40 |
| Demand | 80 | 120 | 150 | 350 |

The Initial solution by Vogel's Approximation Method (VAM)-

| | $S_1$ | $S_2$ | $S_3$ | Supply | Diff. |
|---|---|---|---|---|---|
| **F1** | 2 | 2 [10] | 7 | 10/0 | 0 5 - - - |
| **F2** | 10 | 10 [90] | 12 [60] | 150/60/0 | 0 2 2 2 2 |
| **F3** | 5 | 6 | 6 [50] | 50/0 | 1 0 0 0 - |
| **F4** | 0 [80] | 3 [20] | 5 | 100/20/0 | 3 2 2 - - |
| **Dummy** | 8 | 8 | 8 [40] | 40/0 | 0 0 0 0 0 |

| Demand | 80/0 | 120/110/90/0 | 150/100/60/0 | 350 |
|---|---|---|---|---|
| Diff. | 2 | 1 | 1 | |
| | - | 1 | 1 | |
| | - | 3 | 1 | |
| | - | 2 | 2 | |
| | - | 2 | 4 | |

**Alternative Solution** to Initial Solution by VAM

| | $S_1$ | $S_2$ | $S_3$ | Supply | Diff. |
|---|---|---|---|---|---|
| **F1** | 2 | 2 [10] | 7 | 10/0 | 0 5 - - - |
| **F2** | 10 | 10 [40] | 12 [110] | 150/110/0 | 0 2 2 2 |
| **F3** | 5 | 6 [50] | 6 | 50/0 | 1 0 0 0 - |
| **F4** | 0 [80] | 3 [20] | 5 | 100/20/0 | 3 2 2 - - |
| **Dummy** | 8 | 8 | 8 [40] | 40/0 | 0 0 0 0 |
| Demand | 80/0 | 120/110/90/40/0 | 150/110/0 | 350 | |
| Diff. | 2 | 1 | 1 | | |
| | - | 1 | 1 | | |
| | - | 3 | 1 | | |
| | - | 2 | 2 | | |
| | - | 2 | 4 | | |

The above solution can also be solved by making the profit matrix into loss in first step andthen introduction of dummy row, the initial solution under VAM will be same.

**Answer–4 :**

Product H & T are joint products and produced in the ratio of 1:2 from the same directmaterial- M.
Production of 40,000 additional units of T results in production of 20,000 units of H.

**Statement Showing "Contribution under Existing Situation"**

| **Particulars** | **Amount (Rs.)** | **Amount (Rs.)** |
|---|---|---|
| Sales Value: | | |
| H – 2,00,000 units @ Rs. 25 per unit | 50,00,000 | |
| T – 4,00,000 units @ Rs. 20 per unit | 80,00,000 | 1,30,00,000 |
| Less: Material- M (12,00,000 units @ Rs. 5 per unit) | | 60,00,000 |
| Less: Other Variable Costs | | 42,00,000 |
| Contribution | | 28,00,000 |

Let Minimum Average Selling Price per unit of H is Rs. X

**Statement Showing "Contribution after Acceptance of Additional Order of 'T'"**

| **Particulars** | **Amount (Rs.)** | **Amount (Rs.)** |
|---|---|---|
| Sales Value: | | |
| H – 2,20,000 units @ Rs. X per unit | 2,20,000 X | |
| T – 4,00,000 units @ Rs.20 per unit | 80,00,000 | |
| 40,000 units @ Rs.15 per unit | 6,00,000 | 2,20,000 X + 86,00,000 |
| Less: Material- M (12,00,000 units × 110%) @ Rs.5 per unit | | 66,00,000 |
| Less: Other Variable Costs (Rs.42,00,000 × 110%) | | 46,20,000 |
| Contribution | | 2,20,000 X – 26,20,000 |

**Minimum Average Selling Price per unit of H**

| | | |
|---|---|---|
| Contribution after additional order of T | = | Contribution under existing production |
| 2,20,000 X – 26,20,000 | = | 28,00,000 |
| 2,20,000 X | = | 54,20,000 |
| X | = | Rs.24.64 |

Minimum Average Selling Price per unit of H is Rs. 24.64

**Answer–6 :**

**Revised P/V Ratio and Ranking of Products**

| Product | Existing P/V Ratio (%) | Increase in Raw Material Cost as % of Sales Value | Revised P/V Ratio (%) | Revised Raw Material as % of Sale Value | Contribution Per Rs.100 of Raw Material (%) | Rank |
|---|---|---|---|---|---|---|
| A | 20 | 3.5 | 16.5 | 38.50 | 42.86% | III |
| B | 30 | 4 | 26 | 44.00 | 59.09% | II |
| C | 40 | 5 | 35 | 55.00 | 63.64% | I |
| D | 10 | 6 | 4 | 66.00 | 6.06% | IV |

Maximum Sales Potential (Rs. in lakhs)

| | | |
|---|---|---|
| A | 900 | (30 % of Rs.3,000) |
| B | 900 | (30 % of Rs.3,000) |
| C | 900 | (30 % of Rs.3,000) |
| D | 1,200 | (40 % of Rs.3,000) |

**Allocation of Raw Material**

(Supply is Restricted to Rs. 1,535 lacs in Order of Raw Material Profitability)

| **Product** | **Rank** | **Sales (Rs. in lakhs)** | **Raw Material per (Rs. 100 lakhs Sales)** | **Raw Material Required** | **Balance Raw Material** |
|---|---|---|---|---|---|
| C | I | 900 | 55 | 495 | 1,040 |
| B | II | 900 | 44 | 396 | 644 |
| A | III | 900 | 38.5 | 346.5 | 297.5 |
| D | IV | 451** | 66 | 297.5* | 0 |

* Balancing figure, hence sales will be restricted to 451** lakhs [297.5 / 66%]

**Profitability Statement**

| | Existing (2009) (₹ in Lakhs) | | | Proposed (2010) (₹ in Lakhs) | | |
|---|---|---|---|---|---|---|
| Product | Sales | P/V Ratio | Contribution | Sales | P/V Ratio | Contribution |
| A | 900 | 20 | 180 | 900 | 16.5 | 148.5 |
| B | 300 | 30 | 90 | 900 | 26 | 234 |
| C | 600 | 40 | 240 | 900 | 35 | 315 |
| D | 1,200 | 10 | 120 | 451 | 4 | 18.04 |
| *Less:* Fixed Costs* | | | 330 | *Less:* Fixed Costs* | | 330 |
| Profit before Depreciation and Interest | | | 300 | Profit before Depreciation and Interest | | 385.54 |
| *Less:* Depreciation | | | 225 | *Less:* Depreciation | | 225.00 |
| *Less:* Interest | | | 115.5 | *Less:* Depreciation | | 115.50 |
| Profit before Tax | | | (40.5) | Profit before Tax | | 45.04 |

* Balancing Figure (Contribution – Profit before Depreciation & Interest)

The increase of contribution of Rs.85.54 in 2010 will set off loss of Rs.40.50 lakhs and result inprofit of Rs.45.04 lakhs.