FINAL CA – MAY 2018

ADVANCED MANAGEMENT ACCOUNTING

Test Code – F82

Branch: Date : 01.03.2018

(50 Marks)

Note: All questions are compulsory.

Question 1(4 Marks)

Selling Price to Yield 20% Return on Investment (2 marks)

Investment (`)	3,00,000
Required ROI (after tax) 20% [(20% of `3,00,000)](`)	60,000
Tax Rate	30%
After Tax Profit	70%
Pre Tax Profit [(`60,000 ÷ 70) × 100] (`)	85,714.29
Sales (Total Cost + Required Profit) {(`1,00,000 + `1,20,000) + `80,000 + `85,714.29}	3,85,714.29
Number of Units Produced	40,000
Selling Price *per unit*(`3,85,714.29 ÷ 40,000 units) (`)	9.64

(c) Selling Price to Yield 6% Profit on List Price, When Trade Discount is 40%- (2 marks)

Let 'K' be the List Sales

{List Sales (1 – Trade Discount) – Total Cost} × (1 – Tax Rate) = 0.06K

{K (1 – 0.40) – 3,00,000} × (1– 0.30) = 0.06K

{0.60 K – 3,00,000} × 0.7 = 0.06K

0.36 K = 2,10,000

K = `5,83,333.33

List Sales Price *per unit* is `14.58 $\frac{\text{` 5,83,333.33}}{\text{40,000 units}}$

Net Selling Price *per unit* is `8.75 (`14.58 – 40% of `14.58).

Question 2(8 Marks)

The Initial basic solution worked out by the shipping clerk is as follows-

Warehouse	Market I	II	III	IV	Supply
A	5	2 [12]	4 [1]	3 [9]	22
B	4	8	1 [15]	6	15

C	4 7	6	7 1	5	8
Req.	7	12	17	9	45

The initial solution is tested for optimality. The total number of independent allocations is 6 which is equal to the desired (m +n –1) allocations. We introduce u_i's (i = 1, 2, 3) and v_j's (j = 1, 2, 3, 4). Let us assume $u_1 = 0$, remaining u_i's and v_j's are calculated as below-

($u_i + v_j$) Matrix for Allocated / Unallocated Cells

					u_i
	1	2	4	3	0
	-2	-1	1	0	-3
	4	5	7	6	3
v_j	1	2	4	3	

Now we calculate $\Delta ij = Cij – (ui + vj)$ for non-basic cells which are given in the table below-

Δ_{ij} Matrix

4			
6	9		6
	1		-1

Since one of the Δ_{ij} 's is negative, the schedule worked out by the clerk is not the optimal solution.

(1 mark)

(ii) Introduce in the cell with negative $_{ij}$ [R_3C_4], an assignment. The reallocation is done as follows-

	12	1 +1	9 -1
		15	
7		1 -1	+1

Revised Allocation Table

	12	2	8
		15	
7			1

Now we test the above improved initial solution for optimality-

(u_i + v_j) Matrix for Allocated / Unallocated Cells

					u_i
	2	2	4	3	0
	-1	-1	1	0	-3
	4	4	6	5	2
v_j	2	2	4	3	

Now we calculate $\Delta ij = Cij – (ui +vj)$ for non-basic cells which are given in the table below-

Δ_{ij} Matrix

3			
5	9		6
	2	1	

Since all $_{ij}$ for non -basic cells are positive, the solution as calculated in the above table is the optimal solution. (2 Marks)

The supply of units from each warehouse to markets, along with the transportation cost is given below- (1 Mark)

Warehouse	Market	Units	Cost per unit (`)	Total Cost (`)
A	II	12	2	24
A	III	2	4	8
A	IV	8	3	24
B	III	15	1	15
C	I	7	4	28
C	IV	1	5	5
		Minimum Total Shipping Cost		104

(iii) If the clerk wants to consider the carrier of route C to II only, instead of 7 units to I and 1 unit to IV, it will involve shifting of 7 units from (A, II) to (A, I) and 1 unit to (A, IV) which results in the following table- (2 marks)

Warehouse	Market				Supply
	I	II	III	IV	
A	5 [7]	2 [4]	4 [2]	3 [9]	22
B	4	8	1 [15]	6	15

(iv)

C	4	6 8	7	5	8
Req.	7	12	17	9	45

The transportation cost will become- (1 mark)

Warehouse	Market	Units	Cost per unit (`)	Total Cost (`)
A	I	7	5	35
A	II	4	2	8
A	III	2	4	8
A	IV	9	3	27
B	III	15	1	15
C	II	8	6	48
		Minimum Total Shipping Cost		141

The total shipping cost will be `141. Additional

Transportation Cost `37.

The carrier of C to II must reduce the cost by `4.63 (`37/8) so that the total cost of transportation remains the same and clerk can give him business. (1 mark)

Question 3(12 Marks)

Workings Statement Showing "Cost Driver Rate" (4 Marks)

Overhead	Cost(`) - Lacs	Cost Driver	Cost Driver Rate (`)
Production Line Cost	2,310	60,000 Machine Hrs.	3,850 *per hr.* $\frac{2,310\text{lacs}}{60,000\text{hrs.}}$
Transportation Cost			
Delivery Related (60%)	540	640 Deliveries	84,375 *per delivery* $\frac{540\text{lacs}}{640\text{delivery}}$
Distance Related (40%)	360	2,25,000 Kms.	160 *per km* $\frac{360\text{lacs}}{2,25,000\text{kms.}}$

(i) Forecast Total Cost using Activity Based Costing Principles (4 Marks)

Elements of Cost	`
Material	4,75,000.00
Labour	2,50,000.00
Overhead	
Production Line Cost (`3,850 × 6 hrs.)	23,100.00
Transportation Cost -	
Delivery Related $\frac{\text{`84,375}}{\text{10 cars}}$	8,437.50

Distance Related	$\frac{\text{`}160 \times 50{,}000 \text{ kms}}{1{,}000 \text{ cars}}$	8,000.00
	Total	7,64,537.50

(ii) Calculation of Cost Gap Between Forecast Total Cost and the Target Total Cost (4 Marks)

Particulars	Amount (`)
Target Selling Price	9,75,000.00
Less: Operating Profit Margin (25%)	2,43,750.00
Target Cost (Target Selling Price – Operating Profit)	7,31,250.00
Forecast Total Cost	7,64,537.50
Cost Gap (`7,64,537.50 – `7,31,250)	33,287.50

Question 4(8 Marks)

(i) When the problem is of the minimization nature, we assign in the objective function a coefficient of +M to each of artificial variables. It is attempted to prohibit the appearance of artificial variables in the solution by assigning these coefficients: an extremely large value when objective is to minimize. (4 marks)

(ii) s1, s2will NOT be part of the initial solution.

If Surplus Variables are included in the basis, the elements of the Surplus Variables will be –1. This is contrary to the non-negativity restriction. This problem is solved by adding Artificial Variable to the equations, that is, a variable that has a positive value.

Artificial Variables do not represent any quantity relating to the decision problem and must not be present in the final solution (if at all they do, it represents a situation of infeasibility).

Accordingly, in the initial tableau we will place Artificial Variables only to eliminate the impact of them first. (4 marks)

Question5 (6 Marks)

Cumulative Average Time for 256 parts	=	48.43 hrs.*
		[112.50 × (0.90^8)]
Total Time for 256 parts	=	12,398.08 hrs.
		[48.43 hrs.× 256 parts]
Total Labour Cost of 256 parts	=	` 2,47,961.60
		[12,398.08 hrs.× ` 20]
Revised Labour Cost for *zero profit*	=	` 3,22,961.60
		[` 2,47,961.60 + ` 75,000]
Total Time for 256 parts (Revised)	=	16,148.08 hrs.
		[` 3,22,961.60/` 20]
Cumulative Average Time for 256 parts (Rev.)	=	63.08 hrs.
		[16,148.08/256]

The usual learning curve model is

$$y = ax^b$$

Where

y = Cumulative Average Time per part for x parts

a = Time required for first part

⇒ x = Cumulative number of parts

⇒ b = Learning coefficient (log r/log 2)

⇒ *Accordingly*

⇒ $63.08 = 112.50 \times (256)^{b}$

⇒ $0.5607 = 2^{8b}$

$\log 0.5607 = \log 2^{8b}$

⇒ $\log 0.5607 = 8 \times b \times \log 2$

⇒ $\log 0.5607 = 8 \times \dfrac{\log r}{\log 2} \times \log 2$

⇒ $\log 0.5607 = 8 \log r$

⇒ $\log 0.5607 = \log r^{8}$

$0.5607 = r^{8}$

$r = \sqrt[8]{0.5607}$

$r = 0.9302$

Learning Rate (r) = 93.02%.

Therefore

Sensitivity = 3.02/90

= 3.36%

Students may also take 48.38 hrs. (112.50 0.43)

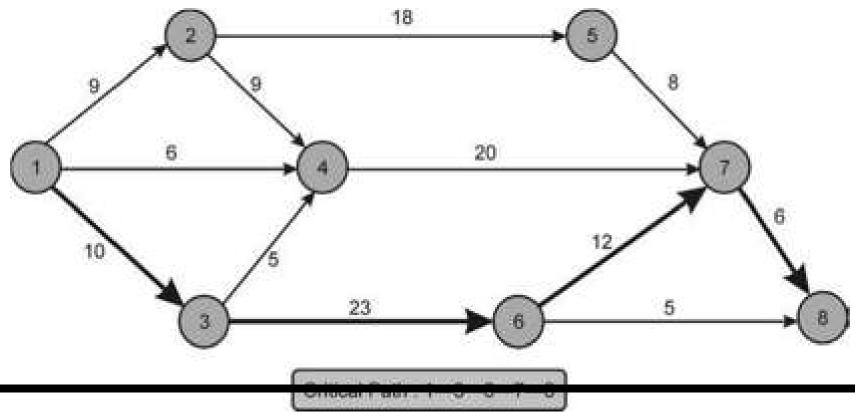
Question 6 (8 Marks)

) The new formulation of the problem is as follows: (3 marks)

7. Activities 1–2, 1–3 and 14– completed in 9 Days, 10 Days and 6 Days respectively as per Original Schedule.
8. Activity 2–4 needs 9 Days (15 + 3 – 9) instead of Original Schedule of 7 Days.
9. Activity 3–6 needs 23 Days (15 + 18 – 10) instead of Original Schedule of 12 Days.
10. Activity 6–7 needs higher duration of 12 Days instead of Original Planned 7 Days.
11. Activity 6–8 needs lesser duration of 5 Days instead of Original Planned 7 Days.

- Activities 2–5, 3–4, 4–7, 5–7, 7–8 need 18 Days, 5 Days, 20 Days, 8 Days, 6 Days respectively as per Original Schedule.

The updated network based on the above listed activities will be as follows: (3 marks)



(ii) Various Paths with Duration of *updated network* are as follows: (2marks)

Path	Duration (Days)
1–2–5–7–8	41 (9 + 18 + 8 + 6)
1–2–4–7–8	44 (9 + 9 + 20 + 6)
1–4–7–8	32 (6 + 20 + 6)
1–3–4–7–8	41 (10 + 5 + 20 + 6)
1–3–6–7–8	51 (10 + 23 + 12 + 6)
1–3–6–8	38 (10 + 23 + 5)

Critical Path is 1–3–6–7–8 with Duration of 51 Days.

Question 7 (4 Marks)

The condition for degeneracy is that the number of allocations in a solution is less than m+n-1.
(1 mark)

The given problem is an unbalanced situation and hence a dummy row is to be added, since the column quantity is greater than that of the row quantity. The total number of rows and columns will be 9 i.e. (5 rows and 4 columns). Therefore, m+n-1 = 8, i.e. if the number of allocations is less than 8, then degeneracy would occur. (3 marks)

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