Gurukripa's Guideline Answers to May 2013 FinalExam
Advanced Management Accounting

Question No.1 is compulsory **(4 × 5 = 20 Marks).**
Answer **any 5** questions from the **remaining 6** questions **(16 × 5 = 80 Marks). [**Any 4 out of 5 in Q.7]

1(a): Relevant Cost Analysis – Basic Decision Making M 13 (5 Marks)

A Process Industry Unit manufactures three Joint Products, A, B and C. C has no realizable value unless it undergoes further processing after the point of separation. The cost details of C are as follows –

Particulars	Per Unit
Upto point of separation	
Marginal Cost	30
Fixed Cost	20
After point of separation	
Marginal Cost	15
Fixed Cost	5
Total Cost	70

C can be sold at ₹ 37 per unit and no more.

1. Would you recommend production of C?
2. Would your recommendation be different if A, B and C are not Joint Products?

Solution:
Case 1: If C is a Joint Product – Net Benefit if C is processed and sold (37 – 15) = ₹ 22
Conclusion: Hence, Production of C can be recommended.

Note:
1. Cost upto the point of separation is sunk / irrelevant, if C is a Joint Product.
2. Fixed Cost p.u after separation, being apportioned, is irrelevant.

Case 2: If C is not a Joint Product (i.e. Separate Product) – Net Benefit or (Loss) (37 – 30 – 15) = Loss ₹ 8
Conclusion: Hence, Production of C is not worthwhile.

Note: Fixed Cost p.u (before and after separation), being apportionment, is irrelevant.

1(b): Pricing Decision – Price Reduction to increase Sales Quantity M 13 (5 Marks)

HTM Ltd by using 12,00,000 units of a Material M produces jointly 2,00,000 units of H and 4,00,000 units of T. The Costs and Sales details are –

Particulars	Amount
Direct Material M at ₹ 5 per unit	60,00,000
Other Variable Costs	42,00,000
Total Fixed Costs	18,00,000
Selling Price of H per unit	25
Selling Price of T per unit	20

The Company receives an additional order for 40,000 units of T at the rate of ₹ 15 per unit. If this order has been accepted, the existing Price of T will not be affected. However, the present Price of H should be reduced evenly on the entire Sale of H to market the additional units to be produced.Find the Minimum Average Unit Price to be charged on H to sustain the increased Sales.

Solution: **Similar to Page 3.15, Illustration 3 (N 99)**

1. Computation of Additional Raw Material required

Particulars	Raw Material M ⟵	⟵ Product H	Product T
Given relationship	12,00,000 units	2,00,000 units	4,00,000 units
To produce extra qtty of T	(pro–rata) 1,20,000 units ⟵	(pro–rata) 20,000 units ⟵	(Given) 40,000 units

2. Computation of Revised Selling Price of H

(a) Additional Raw Material Costs = 1,20,000 units × ₹ 5		₹ 6,00,000
(b) Additional Variable Processing Costs = 1,20,000 units × (₹ 42,00,000 ÷ 12,00,000 units)		₹4,20,000
(c) Total Additional Costs (a + b)		₹10,20,000
(d) Additional Sale Revenue obtained from Product T = 40,000 units × ₹ 15		₹6,00,000
(e) Net Recovery required from Product H (c – d)	For 20,000 units	₹4,20,000
(f) Present Sale Revenue from Product H = 2,00,000 units × ₹ 25 per unit	For 2,00,000 units	₹ 50,00,000
(g) Total Desired Sale Revenue from 2,20,000 units of Product H (e + f)	For 2,20,000 units	₹ 54,20,000
(h) Desired Selling Price per kg of Product H = ₹ 54,20,000 ÷ 2,20,000 units		**₹ 24.64 per unit**

1(c): Assignment – Steps (Theory) M 13 (5 Marks)

Prescribe the steps to be followed to solve an assignment problem.

Solution: **Refer Page 16.1, Q.No. 1, Point 4**

1(d): Marginal Costing – Indifference Point Interpretation and Decision Making M 13 (5 Marks)

X Ltd wants to replace one of its old Machines. Three alternative Machines namely M_1, M_2 and M_3 are under its consideration. The Costs associated with these Machines are –

Particulars	M_1	M_2	M_3
Direct Material Cost p.u.	50	100	150
Direct Labour Cost p.u.	40	70	200
Variable Overhead p.u.	10	30	50
Fixed Cost p.a.	2,50,000	1,50,000	70,000

You are required to compute the Cost Indifference Points for these alternatives. Based on these points suggest a most economical alternative Machine to replace the old one when the expected level of Annual Production is 1,200 units.

Solution: **Similar to Page 2.30, Illustration 2.1 (N 00, M 02)**

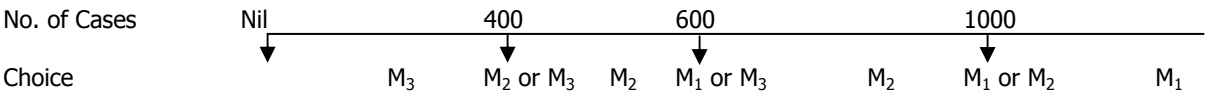
Particulars	M_1	M_2	M_3
Fixed Costs	₹ 2,50,000	₹ 1,50,000	₹ 70,000
Variable Costs per report	₹ 100	₹ 200	₹ 400

$$\text{Indifference Point} = \frac{\text{Difference in Fixed Costs}}{\text{Difference in Variable Cost per Unit}},$$

$$\text{Between } M_1 \text{ and } M_2 = \frac{₹\ 2,50,000 - ₹\ 1,50,000}{₹\ 200 - ₹\ 100} = \textbf{1,000 units.}$$

$$\text{Between } M_2 \text{ and } M_3 = \frac{₹\ 1,50,000 - ₹\ 70,000}{₹\ 400 - ₹\ 200} = \textbf{400 units.} \qquad \text{Between } M_3 \text{ and } M_1 = \frac{₹\ 2,50,000 - ₹\ 70,000}{₹\ 400 - ₹\ 100} = \textbf{600 units.}$$

2. Interpretation of Indifference Points and Decisions: (the numbers indicate the number of reports / cases handled)



Number of Cases / Reports	Choice of Method	Reason
Less than 400 units	M_3	Due to Lower Fixed Cost.
Exactly 400 units	Either M_2 or M_3	Indifference Point.
Above 400 but less than 1,000 units	M_2	Next Range of Lower Fixed Costs.
Exactly 1,000 units	Either M_1 or M_2	Indifference Point.
Above 1,000 units	M_1	Lower Variable Costs per unit.

Expected Production = 1,200 units. This is in the range – above 1,000 units, and hence **M_1** can be purchased.

Note: Indifference Point between M_1 & M_3 (600 units) is not relevant for decision–making since M_2 is profitable in the range 400 units to 1,000 units. This Indifference Point will be relevant only if the choice lies between M_1 and M_3.

3. Cost of various options at 600units:

Particulars	M_1	M_2	M_3
Fixed Costs	₹ 2,50,000	₹ 1,50,000	₹ 70,000
Variable Costs	₹ 100×600 = ₹ 60,000	₹ 200×600 = ₹ 1,20,000	₹ 400×600 = ₹ 2,40,000
Total Costs	**₹ 3,10,000**	**₹ 2,70,000**	**₹ 3,10,000**

At this level, M_2 is more profitable than M_1 and M_3. Hence, this Indifference Point becomes irrelevant in the overall analysis among M_1, M_2 and M_3.

2(a): ABC in Service Sector – Cost of Rendering Services M 13 (8 Marks)

DEF Bank operated for years under the assumption that profitability can be increased by increasing Rupee volumes. But that has not been the case. Cost Analysis has revealed the following –

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity
Providing ATM Service	1,00,000	No. of transactions	2,00,000
Computer Processing	10,00,000	No. of transactions	25,00,000
Issuing Statements	8,00,000	No. of statements	5,00,000
Customer Inquiries	3,60,000	Telephone minutes	6,00,000

The following annual information on three products was also made available –

	Checking Accounts	Personal Loans	Gold Visa
Units of Product	30,000	5,000	10,000
ATM Transactions	1,80,000	0	20,000
Computer Transactions	20,00,000	2,00,000	3,00,000
Number of Statements	3,00,000	50,000	1,50,000
Telephone Minutes	3,50,000	90,000	1,60,000

Required:
1. Calculate rates for each activity.
2. Using the rates computed in requirement (1) above, calculate the Cost of each Product.

Solution: **Similar to Page 8.26, Illustration 12 (N 09)**

Activity	Cost Driver Rates	Checking Accounts	Personal Loans	Gold Visa
Providing ATM Service	$\frac{₹\ 1,00,000}{2,00,000}$ = 0.50 per transaction	1,80,000 × 0.50 = 90,000	–	20,000 × 0.50 = 10,000
Computer Processing	$\frac{₹\ 10,00,000}{25,00,000}$ = 0.40 per transaction	20,00,000 × 0.40 = 8,00,000	2,00,000 × 0.40 = 80,000	3,00,000 × 0.40 = 1,20,000
Issuing Statements	$\frac{₹\ 8,00,000}{5,00,000}$ = 1.60 per statement	3,00,000 × 1.60 = 4,80,000	50,000 × 1.60 = 80,000	1,50,000 × 1.60 = 2,40,000
Customer Services	$\frac{₹\ 3,60,000}{6,00,000}$ = 0.60 per telephone minute	3,50,000 × 0.60 = 2,10,000	90,000 × 0.6 = 54,000	1,60,000 × 0.60 = 96,000
Total Cost		**15,80,000**	**2,14,000**	**4,66,000**
Units of Product		**30,000**	**5,000**	**10,000**
Cost per unit		**52.67**	**42.80**	**46.60**

2(b): Production and Material Usage Budget M 13 (8 Marks)

KG Ltd is engaged in the production of two Products K and G. One unit of Product K requires two units of Material A and four units of Material B. Each unit of Product G needs four units of Material A, two units of Material B and four units of Material C. Material C is locally produced in the factory of the Company, by using two units of Material B for each unit of C.

Materials A and B are purchased in the open market. Production of Products K, G and C is carried out evenly throughout the year. At present the Company has purchased its 3 months requirements of A and B in one purchase. That is four purchases per annum. The other particulars provided by the Company are –

Particulars	K (In Units)	G (In Units)
Budgeted Sales for the next year	40,000	75,000
Desired Stock at the end of the year	5,000	10,000
Expected Stock at the beginning of the year	15,000	25,000

Particulars	A	B
Purchase Price p.u (₹)	15	25
Ordering Cost per Order (₹)	1,000	1,000
Carrying Cost p.a.	10%	10%

You are required to:
1. Prepare a Production Budget and a Material Requirement Budget for the next year.
2. Calculate the number of Material Purchases to be made, if the Company wants to Purchase Materials in optimal quantity.

Solution: **Similar to Page 7.10, Illustration 2 (M 06, M 10)**

1. Computation of Budgeted Production Quantities

	Particulars	**Product K**	**Product G**
	Budgeted Sales	40,000	75,000
Add:	Stock at the end of the year	5,000	10,000
	Sub – Total	45,000	85,000
Less:	Stock at the beginning of the year	15,000	25,000
	Budgeted Production Quantity	**30,000**	**60,000**

2. Computation of Budgeted Component Requirements and EOQ

Particulars	**Material A**	**Material B**	**Material C**
Product K: 30,000 units	2 × 30,000 = 60,000	4 × 30,000 = 1,20,000	NA
Product G: 60,000 units	4 × 60,000 = 2,40,000	2 × 60,000 = 1,20,000 +(for making C) 2,40,000 × 2=4,80,000	4 × 60,000 = 2,40,000 (to be made internally)
Total Requirement p.a.	**3,00,000 units**	**7,20,000 units**	**(already considered in B)**
Buying Cost per Order	₹ 1,000	₹ 1,000	
Carrying Cost p.u. p.a.	10% of ₹ 15 = ₹ 1.50	10% of ₹25 = ₹2.5	
EOQ $= \sqrt{\frac{2AB}{C}}$	**20,000 units**	**24,000 units**	
No. of Purchases p.a.	3,00,000 ÷ 20,000 = 15 times	7,20,000 ÷ 24,000 = 30 times	

3(a): Linear Programming – Maximisation under Simplex Method M 13 (8 Marks)

A Company manufactures two Products A and B, involving three Departments – Machining, Fabrication and Assembly. The process time, profit/unit and total capacity of each department is given in the following table –

Particulars	Machining (Hrs)	Fabrication(Hrs)	Assembly(Hrs)	Profit(₹)
A	1	5	3	80
B	2	4	1	100
Capacity	720	1,800	900	

Required –
1. Set up Linear Programming Problem to maximize Profits.
2. What will be the Product–Mix at Maximum Profit Level?
3. What will be the Profit at that Level?

Solution: **Similar to Page 18.9, Illustration 4 [M 05 (Mod.), M 11]**

Let **x, y** be the number of units of the two products A and B respectively.

Basic Data:

	A	**B**	
Profitp.u.	₹80	₹100	
Hours conditions:			Available
Machining	1 hr	2 hrs	720 hrs
Fabrication	5 hrs	4 hrs	1,800 hrs
Assembly	3 hrs	1 hr	900 hrs

→

The LPP is as under –

Maximise Z = 80 x + 100 y

Subject to:

$x + 2y \le 720$

$5x + 4y \le 1{,}800$

$3x + y \le 900$

$x, y \ge 0$ (non–negativity)

→

Introducing Slack Variables, we have

Maximise $Z = 80x + 100y + 0S_1 + 0S_2 + 0S_3$

Subject to:

$x + 2y + S_1 = 720$

$5x + 4y + S_2 = 1{,}800$

$3x + y + S_3 = 900$

$x, y, S_1, S_2, S_3 \ge 0$

S_1, S_2 and S_3 are the slacks for the 3 Constraints above.

First Simplex Table:

Fixed Ratio	Program	Profit	Quantity	x	y	S_1	S_2	S_3	Repl. Ratio
NA	**S_1**	0	720	1	**2**	1	0	0	**360** Min non–ve
2	**S_2**	0	1800	5	4	0	1	0	450
1/2	**S_3**	0	900	3	1	0	0	1	900
Decision:		Z (Objective Value)		80	100	0	0	0	
In = Key Column = y		C (Computed Value)		0	0	0	0	0	
Out= Key Row = S_1		**Net Evaluation Row**		80	**100** Max +ve	0	0	0	

Note: For Non–Key Rows, A = (Previous Table Corresponding Row Element) **Less**B = (Key Row Element × Fixed Ratio)

Computation for S_2 Row							**Computation for S_3 Row**						
A	1800	5	4	0	1	0	**A**	900	3	1	0	0	1
– B	1440	2	4	2	0	0	**– B**	360	1/2	1	1/2	0	0
A–B	360	3	0	–2	1	0	**A–B**	540	5/2	0	–1/2	0	1

The above A–B values are carried over to the Second Simplex Table in **S_2 and S_3 Rows** (being Non–Key Rows of 1st Table).

Second Simplex Table:

Fixed Ratio	Program	Profit	Quantity	x	y	S_1	S_2	S_3	Repl. Ratio
1/6	**Y**	100	360	1/2	1	1/2	0	0	720
NA	**S_2**	0	360	**3**	0	–2	1	0	**120** Min non–ve
5/6	**S_3**	0	540	5/2	0	–1/2	0	1	216
Decision:		Z (Objective Value)		80	100	0	0	0	
In = Key Column = x		C (Computed Value)		50	100	50	0	0	
Out= Key Row = S_2		**Net Evaluation Row**		**30** Max +ve	0	–50	0	0	

Note: For Non–Key Rows, A = (Previous Table Corresponding Row Element) **Less**B = (Key Row Element × Fixed Ratio)

Computation for y Row							**Computation for S_3 Row**						
A	360	1/2	1	1/2	0	0	**A**	540	5/2	0	–1/2	0	1
– B	60	1/2	0	–1/3	1/6	0	**– B**	300	5/2	0	–5/3	5/6	0
A–B	300	0	1	5/6	–1/6	0	**A–B**	240	0	0	7/6	–5/6	1

The above A–B values are carried over to the Third Simplex Table in **y and S_3 Rows** (being Non–Key Rows of 2nd Table).

Third Simplex Table:

Fixed Ratio	Program	Profit	Quantity	x	y	S_1	S_2	S_3	Repl. Ratio
	Y	100	300	0	1	5/6	–1/6	0	
	x	80	120	1	0	–2/3	1/3	0	
	S_3	0	240	0	0	7/6	–5/6	1	
Decision: Since all NER ≤		Z (Objective Value)		80	100	0	0	0	
0 for max. objective, the		C (Computed Value)		80	100	30	10	0	
Third Table is **optimal.**		**Net Evaluation Row**		0	0	–30	–10	0	

Answer: The Company should produce 120 units of Product A and 300 units of Product B.
Maximum Contribution = 80 x + 100 y = (80 × 120) + (100 × 300) = 9,600 + 30,000 = **₹ 39,600.**

3(b): Reverse Working – Overhead Variance Only M 13 (8 Marks)

The following are the information regarding Overheads of a Company –

1. Overheads Cost Variance –₹ 2,800 (A)
2. Overheads Volume Variance –₹ 2,000 (A)
3. Budgeted Overheads –₹ 12,000
4. Actual Overhead Recovery Rate –₹ 8 per hour
5. Budgeted Hours for the period – 2,400 hours

You are required to compute the following:

1. Overheads Expenditure Variance.
2. Actual Incurred Overheads.
3. Actual Hours for Actual Production.
4. Overheads Capacity Variance.
5. Overheads Efficiency Variance.
6. Standard Hours for Actual Production.

Solution:

1. Expenditure Variance = Cost Variance 2,800 A (–) Volume Variance 2,000A = **₹ 800A**
2. Actual OH = Budgeted Overhead 12,000 + Expenditure Variance 800A = **₹ 12,800**
3. Actual Hours = $\frac{\text{Actual OH}}{\text{Actual Recovery Rate}} = \frac{12800}{8}$ = **1,600 hours**
4. Capacity Variance = (AH – BH) × SR p.h = (1,600 – 2,400) × 5 = **₹ 4,000 A**
5. Efficiency Variance = Volume Variance 2,000A – Capacity Variance 4,000A = **₹ 2,000 F**
6. (SH – AH) × SR = Efficiency Variance 2,000 F
   So, (SH – 1,600) × 5 = 2000
   So, SH = **2,000 hours**

4(a): Transportation Problem – Optimality Test M 13 (8 Marks)

XYZ Company has three Plants and four Warehouses. The Supply and Demand in units and the corresponding Transportation Costs are given. The table below shows the details taken from the solution procedure of the Transportation Problem –

Warehouse	I	II	III	IV	Supply
A	5	10	10 4	5	10
B	20 6	8	7	5 2	25
C	5 4	10 2	5 5	7	20
Demand	25	10	15	5	55

Answer the following questions. Give brief reasons –

1. Is this solution feasible?
2. Is this solution degenerate?
3. Is this solution optimum?

Solution:

1. **Feasible Solution:**
   (a) The Initial Basic Feasible Solution is given in the question. From the allocation of units it can be interpreted that the solution is determined as per Vogel's Approximation Method. **(See Note Below)**
   (b) Since the above IBFS satisfies all the Row and Column Totals, the solution can be said to be a **feasible solution.**

   Note: Least Cost Cell is not used since the Least cost of 5 (A–I, A–IV) remains unallocated. North West Corner Rule is not used since the North West Corner remains unallocated (A–I).

2. **Degeneracy:** If the Number of Allocations < (m + n – 1), the solution is said to be degenerate. Since in this solution the Number of allocations (6) = m + n – 1 (3 + 4 – 1 = 6) the solution is not degenerate, and can be tested for optimality.

3. **Optimality Test: Table 1 = U, V for allocated cells computed as below:**

U & V	0 + 4 = 4	0 + 2 = 2	0 + 5 = 5	2 – 2 = 0
4 – 5 = –1	5	10	**10** 4	5
6 – 4 = 2	**20** 6	8	7	**5** 2
Base = 0	**5** 4	**10** 2	**5** 5	7

Table 2 = U + V for Unallocated Cells

4 – 1 = 3	2 – 1 = 1		0 – 1 = –1
	2 + 2 = 4	5 + 2 = 7	
			0 + 0 = 0

Table 3 = Net Evaluation Table (NET)
= Table 1 – Table 2 for Unallocated Cells

5 – 3 = 2	10 – 1 = 9		5 – (–1) = 6
	8 – 4 = 4	7 – 7 = **0**	
			7 – 0 = 7

Conclusion: Since all the elements in NET are ≥ 0, the IBFS is **optimal but not unique.** Since there is a "0" in the NET, there is an Alternate Solution.

4(b): TOC – Bottleneck Identification using TA Ratio and Resource Allocation M 13 (8 Marks)

Gupta Ltd produces 4 Products P, Q, R and S by using three different Machines X, Y and Z. Each Machine Capacity is limited to 6,000 hours per month. The details given below are for July –

Particulars	P	Q	R	S
Selling Price p.u. (₹)	10,000	8,000	6,000	4,000
Variable Cost p.u (₹)	7,000	5,600	4,000	2,800
Machine Hours required p.u.				
Machine X	20	12	4	2
Machine Y	20	18	6	3
Machine Z	20	6	2	1
Expected Demand (units)	200	200	200	200

Required:
1. Find out the Bottleneck Activity.
2. Allocate the Machine Hours on the basis of the Bottleneck.
3. Ascertain the Profit expected in the month if the monthly Fixed Cost amounts to ₹ 9,50,000.
4. Calculate the unused Spare Hours of each Machine.

Solution: **Similar to Page 12.2, Illustration 1 (M 09)**

1. Identification of Bottleneck Activity

Machine	Time required for Products (Demand × M/c Hr p.u.)				Total Time reqd (Hrs)	Time Available (Hrs)	Machine Utilization
	P	Q	R	S			
	(a)	(b)	(c)	(d)	(e) = (a+b+c+d)	(f) = given	(g) = (e ÷ f)
X	4,000	2,400	800	400	7,600	6000	126.67%
Y	4,000	3,600	1,200	600	9,400	6000	156.67%
Z	4,000	1,200	400	200	5,800	6000	96.67%

Since Machine Y has the highest Machine Utilization (i.e. **TA Ratio**), it represents the **bottleneck activity**. Hence product, ranking & resource allocation should be based on Contribution per Machine Hour of Machine Y.

2. Allocation of Resources and overall Profit

Particulars	P	Q	R	S	Total
(a) Contribution per unit ₹	₹ 3,000	₹ 2,400	₹ 2,000	₹ 1,200	
(b) Time required in Machine Y	20 hours	18 hours	6 hours	3 hours	
(c) Contribution per Machine–hour	₹ 150	₹ 133.33	₹ 333.33	₹ 400	
(d) Rank based on (c) above	III	IV	II	I	
(e) Allocation of Machine Y time	200×20 = 4000	(bal. fig.)**200**	200×6 = 1200	200×3 = 600	6,000.00
(f) Production Quantity (e÷b)	**200 units**	**11.11 units**	**200 units**	**200 units**	
(g) Allocation of Machine X time	200 × 20 = 4,000 hours	11.11 ×12 = 133.32 hours	200 × 4 = 800 hours	200 × 2 = 400 hours	5333.32
(h) Allocation of Machine Z time	200 × 20 = 4,000 hours	11.11×6 = 66.66hours	200 × 2 = 400 hours	200 × 1 = 200 hours	4666.66
(i) Contribution based on allocation	200 × 3,000 = 6,00,000	11.11 × 2,400 = 26,664	200 × 2,000 = 4,00,000	200 × 1,200 = 2,40,000	12,66,664
(j) Fixed Cost for the month	–	–	–	–	(9,50,000)
(k) Profit for the Month	–	–	–	–	**3,16,664**

Note: Spare Capacity –
1. Machine X: (6000 – 5333.32) = **666.68 Hours**
2. Machine Z: (6000 – 4666.66) = **1333.34 Hours**

5(a): Profitability Analysis – Evaluation of Alternatives M 13 (12 Marks)

Better and Best Ltd manufactures only one Product. Production is regular throughout the year and the capacity of the Factory is 1,50,000 units per annum. The summarized Profit and Loss Account for the year ended 31st December is being reviewed by the Board of Directors.

Particulars	₹
Sales at ₹ 10 per unit	10,00,000
Cost of Sales –	
Direct Materials	2,50,000
Direct Labour	1,50,000
Production Overheads –	
Variable	30,000
Fixed	2,30,000
Administrative Overheads (Fixed)	1,00,000
Selling and Distribution Overhead –	
Variable	50,000
Fixed	1,50,000

1. The Production Director proposed to reduce Selling Price to ₹ 9 in order to utilize Full Capacity.
2. The Sales Director proposed to increase Selling Price by 20%. By spending ₹ 2,25,000 on Advertisement, Sales will be increased to 1,20,000 units per annum.
3. The Personnel Director pleaded for a change in the method of Wage payment. For the present Piece Rate of ₹ 1.50 per unit, a Bonus Scheme (for each 2% increase in Production over the target, there would be an increase of 1% in the Basic Wage of each employee) will be implemented. A target of 2,000 units per week for the Company will be set for 50 week year. Selling Price increase by 10%. With an additional Advertisement Cost of ₹ 1,60,000, 20% increase in present Sales will be achieved.
4. The Chairman felt that the packaging of the product required improvement. He wanted to know the Sales required to earn a target Profit of 10% on Turnover with the introduction of an improved packing at an additional cost of 20 paise per unit (no change in Selling Price).

You are required to evaluate individually the proposals of each of the Board Member and give your recommendation.

Solution:

1. Profitability Statement (Present)

	Particulars	Per Unit	Per Unit	Total	Total
	Sales (10,00,000 ÷ 10 per unit = 1,00,000 units)		10		
Less:	Variable Costs				
	Direct Material (2,50,000 ÷ 1,00,000 = 2.50 p.u.)	2.50			
	Direct Labour (1,50,000 ÷ 1,00,000 = 1.50 p.u.)	1.50			
	Variable POH (30,000 ÷ 1,00,000 = 0.30 p.u.)	0.30			
	Variable SOH (50,000 ÷ 1,00,000 = 0.50 p.u.)	0.50	4.80		
	Contribution (5.20 p.u. × 1,00,000 units)		**5.20**		**5,20,000**
Less:	Fixed Costs (only for Total)				
	POH			2,30,000	
	AOH			1,00,000	
	SOH			1,50,000	4,80,000
	Profit				**40,000**

2. Proposal I (Reduction in Selling Price)

	Particulars	Total
	Contribution [(9.00 – 4.80) × 1,50,000 units]	**6,30,000**
Less:	Fixed Costs	4,80,000
	Profit	**1,50,000**

Note: Selling Price is reduced to 9.00 p.u. and also quantity is increased to full capacity 1,50,000 units.

3. Proposal II (Increase in Selling Price and Advertisement Cost)

	Particulars	Total
	Contribution [(12.00 – 4.80) × 1,20,000 units]	**8,64,000**
Less:	Fixed Costs (Existing Fixed Costs + Additional Advertising Costs) (4,80,000 + 2,25,000)	7,05,000
	Profit	**1,61,000**

Note: Increase in Selling Price = 10 + 20% = 12 p.u. The No. of units is increased to 1,20,000 (given).

4. Proposal III (Increase in Sales, Advertisement Costs and Wage Revision)

Alternative 1: It is assumed that 20% increase pertains to **"Sales Value".**
Alternative 2: It is assumed that 20% increase pertains to **"Sales Quantity".**

Particulars		Alternative 1		Alternative 2	
		Per Unit	Total	Per Unit	Total
	Sales	11		11	
Less:	Variable Costs				
	Direct Material	2.50		2.50	
	Direct Labour **(See Note Below)**	1.57		1.65	
	Variable POH	0.30		0.30	
	Variable SOH	0.50		0.50	
	Contribution (6.13 p.u. × 1,09,091 units)	**6.13**	**6,68,728**		
	(6.05 p.u. × 1,20,000 units)			**6.05**	**7,26,000**
Less:	Fixed Costs (only for Total)				
	Fixed POH		2,30,000		2,30,000
	Fixed AOH		1,00,000		1,00,000
	Fixed SOH		1,50,000		1,50,000
	Additional Advertisement Cost		1,60,000		1,60,000
	Profit		**28,728**		**86,000**

Note:

Particulars	Alternative 1	Alternative 2
Revised Selling Price	10 + 10% = 11 p.u.	10 + 10% = 11 p.u.
Present Production	2,000 units per week × 50 weeks = 1,00,000 units	2,000 units per week × 50 weeks = 1,00,000 units
Expected Production	(a) Increase in overall Sales = 10,00,000 + 20% = 12,00,000 (b) Therefore Expected Production = 12,00,000 ÷ 11 p.u. = 1,09,091 Units	1,00,000 + 20% = 1,20,000 Units
Increase in Production (Units)	1,09,091 – 1,00,000 = 9,091 units	1,20,000 – 1,00,000 = 20,000
Increase in Production (%)	9,091 ÷ 1,00,000 = 9.09%	20% (Given)
Increase in Wage Rate due to increase in Production	9.09 ÷ 2 = **4.55%**	20.00 ÷ 2 = **10.00%.**
Increase in Wage Rate	1.50 p.u + 4.55% = **1.57**	1.50 p.u + 10.00% = **1.65**

Note: For every 2% increase in production, 1% Bonus is given. Therefore the ratio is ½.

5. Proposal IV (Sales Quantity to achieve the required Profit)

Let required Quantity be "x".

Particulars		Total
	Sales (X units × 10 p.u.)	10x
Less:	Variable Costs (Existing + Additional Packing Costs) (4.80 + 0.20)	5x
	Contribution	**5x**
Less:	Fixed Costs	4,80,000
	Profit (Given)	**10% × 10x**

Number of Units to be sold and overall Profit:
5x – 4,80,000 = 1x (10% × 10x)
So, 5x – x = 4,80,000
4x = 4,80,000
X = 1,20,000
Therefore, Profit = 10% (1,20,000 × 10 p.u.) = ₹ 1,20,000

Recommendation:

Particulars	Present	Proposal I	Proposal II	Proposal III (Alt 1)	Proposal III (Alt 2)	Proposal IV
Units Produced	1,00,000	1,50,000	1,20,000	1,09,091	1,20,000	1,20,000
Selling Price	10	9	12	11	11	10
Contribution	5,20,000	6,30,000	8,64,000	6,68,728	7,26,000	6,00,000
Profit	40,000	1,50,000	1,61,000	28,728	86,000	1,20,000

Based on the criteria of Profit, the Proposal II made by the Sales Director is more beneficial to the Company.

5(b): Activity Based Costing – Direct Product Profitability (Thoery) M 13 (4 Marks)

What do you mean by DPP? What are its benefits?

Solution: **Refer Page 8.9, Q.No 22**

6(a): Network Analysis – Project Crashing M 13 (7 Marks)

The Noida Nirman Authority intends to install a 4–road traffic regulating signal in a heavy traffic prone area. The total installation work has been broken down into six activities. The Normal Duration, Crash Duration and Crashing Cost of the activities as expected are given in the following table:

Activity	Normal Duration (Days)	Crash Duration (Days)	Crashing Cost per day
1–2	9	6	30,000
1–3	8	5	40,000
1–4	15	10	45,000
2–4	5	3	15,000
3–4	10	6	20,000
4–5	2	1	60,000

You are required to:

1. Draw the Network and find the Normal and Minimum Duration of the work.
2. Compute the Additional Cost involved if the authority wants to complete the work in the shortest duration.

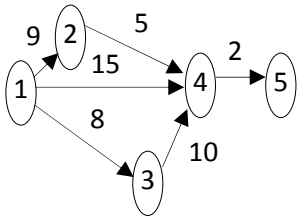
Solution: **Similar to Page 19.28, Illustration 20 (M 02)**

Note: Slope = Crashing Cost per day =given in the question.

1. Paths Table

Path	Normal Duration (Normal Days)	Min. Duration (Crash Days)	Duration after Stage				
			I	II	III	IV	V
Path X: 1–2–4–5	9+5+2 = 16	6+3+1 = 10	16	16–1 = 15	15	15–2 = 13	13–1 = 12
Path Y: 1–4–5	15+2 = 17	10+1 = 11	17	17–1 = 16	16–1 = 15	15–2 = 13	13–1 = 12
Path Z: 1–3–4–5	8+10+2 = 20 (Initial **CP**)	5+6+1 = 12 (**Min. Duration**)	20 – 3 = 17	17–1 = 16	16–1 = 15	15–2 = 13	13–1 = 12

2. Network Diagram



Note: Since Minimum Duration is only 12 days on Path Z, the Project can be crashed and brought to min. 12 days only.

3. Crashing Process

Stage	Decision on Crashing	Crash Costs
Stage **I**	Initial CP is Path Z, and Activity with least slope is 3 – 4. This can be crashed for 10 – 6 = 4 days maximum, but the time gap between Paths Z & Y (i.e. next longest path) is only 3 days. So, Activity 3 – 4 is crashed for the permissible period of 3 days.(least)	₹ 30,000 per day for 3 days = ₹ 90,000
Stage **II**	Paths Y and Z are the CPs (17 days). Activities available for crashing are – (1) Common Activity 4 – 5 (with Slope 60,000) or (2) Separate Activities (with higher slope). So, Common Activity 4 – 5 is crashed for 1 day (being maximum time reduction possible).	₹ 60,000 per day for 1 day = ₹ 60,000
Stage **III**	Paths Y and Z are the CPs (16 days). Activity Combinations available for crashing are – (1) 3–4 & 1–4 (with Slope 20,000 + 45,000 = 65,000) and (2) 1–3 & 1–4 (with Slope 40,000 + 45,000 = 85,000). The first combination is chosen due to lower slope, and crashed for 1 day.	₹ 65,000 per day for 1 day = ₹ 65,000
Stage **IV**	All Paths are critical. Since Common Activity is fully crashed in Stage II, the only possible crashing is to crash 2–4, 1–4 & 1–3 by **2 days** (being the least of the maximum time reduction possible for 2–4). Slope is 15,000 + 45,000 + 40,000 = 1,00,000	₹ 1,00,000 per day for 2 days = ₹ 2,00,000
Stage **V**	All Paths are critical. The only activities available for crashing are 1–2 (3), 1–4 (2) and 1–3 (1) (with maximum time reduction possible in brackets. Each activity is reduced by 1 day (being minimum of the three). Slope is 30,000 + 45,000 + 40,000 = 1,15,000	₹ 1,15,000 per day for 1 day = ₹ 1,15,000

After this, no further Crashing is possible since Minimum Duration of the Project is 12 days as per Note in WN 2 above.

4. Costs Table (on a per day basis)

Stage	Duration	Activities Crashed	Crash Costs	Nature of Costs
Initial	20 days	–	NIL	Normal Duration Cost
I	19 days	(3 – 4)	₹ 30,000	
	18 days	(3 – 4)	₹ 60,000	
	17 days	(3 – 4)	₹ 90,000	
II	16 days	(4 – 5)	₹ 1,50,000	
III	15 days	(3–4 & 1–4)	₹ 2,15,000	Optimal Duration Cost
IV	14 days	(2–4, 1–4 & 1–3)	₹ 3,15,000	
	13 days	(2–4, 1–4 & 1–3)	₹ 4,15,000	
V	12 days	**(1–2, 1–4 & 1–3)**	**₹ 5,30,000**	**Minimum Duration Cost**

6(b): Learning Curve (Theory) M 13 (4 Marks)

Bring out the main applications of Learning Curve.

Solution: **Refer Page 20.1, Q.No. 4 (RTP, M 03, M 04, M 06, M 07, N 07)**

6(c): Inter–Firm Comparison (Theory) M 13 (5 Marks)

State the advantages available in Inter–Firm Comparison.

Solution: **Refer Page 15.4, Q.No. 10.**

7: Theory – Various Topics – Any 4 out of 5 M 13 (4 × 4 = 16 Marks)

Question	Answer Reference
(a) What are the focuses of Theory of Constraints? How it differs with regard to Cost Behaviour?	**Page No.12.1, 12.2 Q.No.3,5,6 (RTP, N 03, M 06, M 08)**
(b) Brief the reasons for using Simulation Technique to solve problems.	**Page No.21.1, Q.No.4 (N 96, M 93, M 04, M 09)**
(c) List out the qualities required for a Good Pricing Policy.	**Page No.3.6, Q.No.15 (N 08)**
(d) Under what circumstance PERT is more relevant? How?	**Page No.19.7, Q.No.19 (RTP, N 87, N 98, N 00, M 11)**
(e) Enumerate the expected disadvantages in taking Divisions as Profit Centers.	**Page No.5.7, Q.No.18 (RTP,N 01, N 08)**

STUDENTS' NOTES