Gurukripa's Guideline Answers to Nov 2015 Exam Questions
CA Final – Advanced Management Accounting

Question No.1 is compulsory **(4 × 5 = 20 Marks).**

Answer **any five** questions from the **remaining six** questions **(16 × 5 = 80 Marks).** [Answer any 4 out of 5 in Q.7]

Working Notes should form part of the answers.

Note: Page Number References are from **"Padhuka's A Ready Referencer on Advanced Management Accounting"**

Question 1(a): Marginal Costing – Indifference Point – Interpretation **5 Marks**

The following are the cost data for three alternative ways of processing Work Cases in an Office System –

Particulars	A (Manual)	B (Semi – Automatic)	C (Fully– Automatic)
Total Fixed Cost per month	₹ 3,000	₹ 9,000	₹ 25,000
Variable Cost per Case	₹ 48	₹ 28	₹ 8

Calculate Cost Indifference Points. Interpret your result. State for what volumes of cases will you prefer each of A, B and C.

Solution: **Similar to Page No.2.31, Illus.2.3 [N 00, M 02, M 13 Modified Qn]**

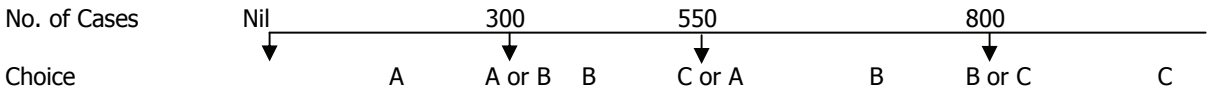
Indifference Point = $\frac{\text{Difference in Fixed Costs}}{\text{Difference in Variable Cost per Unit}}$

Between A and B = $\frac{9,000-3,000}{48-28}$ = **300 cases.**

Between B and C = $\frac{25,000-9,000}{28-8}$ = **800 cases.**

Between C and A = $\frac{25,000-3,000}{48-8}$ = **550 cases.**

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



Number of Cases	Choice of Method	Reason
Less than 300 units	A	Due to Lower Fixed Cost.
Exactly 300 units	Either A or B	Indifference Point between A and B
Above 300 but less than 800 units	B	Next Range of Lower Fixed Costs.
Exactly 800 units	Either B or C	Indifference Point between B and C
Above 800 units	C	Lower Variable Costs per unit.

Note: Indifference Point between C & A (550 units) is not relevant for decision–making since B is profitable in the range 300 units to 800 units. This Indifference Point will be relevant only if the choice lies between B and C.

Question 1(b): TQM – COQ Classification **5 Marks**

Classify the following items under appropriate categories of Quality Costs, viz. Prevention Costs (PC), Appraisal Costs (AC), Internal Failure Costs (IFC), and External Failure Costs (EFC)

(i) Unplanned Replacement to Customers	(vi) Re–processing of a Loan Operation
(ii) Correction of a Bank Statement	(vii) Product Liability Warranty
(iii) Design Review	(viii) Product Acceptance
(iv) Equipment Accuracy Check	(ix) Wastage of Material
(v) Staff Training	(x) Planned Maintenance of Equipment

(Candidates may opt for the following format and fill in the appropriate Roman numerals under each column)

Costs →	PC	AC	IFC	EFC
Q.Nos. →				

Solution: **Refer Principles and Examples in Page No.11.4, Q.No.8, COQ Classification**

Costs →	PC	AC	IFC	EFC
Q.Nos. →	(iii), (v), (x)	(iv), (viii)	(ii), (vi), (ix)	(i), (vii)

Question 1(c): Transportation – IBFS using VAM – Maximisation Objective **5 Marks**

The Unit Profit Matrix based on 4 Factories and 3 Sales Depots of a Company and unbalanced quantities of demand and supply are tabulated below. The main object of the Company is to maximize profit. Assume no profit in case of surplus production.

Factories / Sales Depots	S1	S2	S3	Supply (Nos.)
F1	6	6	1	10
F2	–2	–2	–4	150
F3	3	2	2	50
F4	8	5	3	100
Demand (Nos.)	80	120	150	

Formulate the above as a usual Transportation Minimisation Problem, and find the Initial Solution using Vogel's Method (VAM).

Solution: **Same as Page No.17.8, Illus No.3 [RTP, N 00, N 03 Qn]**

- In the above matrix, the objective is maximization of profit. This is converted into a opportunity cost minimization objective by subtracting each element from the highest element, i.e. 8.
- Also, the above matrix is Unbalanced Data, since Total Supply is 310 units and Total Demand is 350 units. This is converted into Balanced Data by introducing the Dummy Factory F–5 with zero as its entries.
- The Revised Matrix (Balanced Minimization) is given below.

Place	F – 1	F – 2	F – 3	F – 4	F – 5	Demand
S – 1	2	10	5	0	0	80
S – 2	2	10	6	3	0	120
S – 3	7	12	6	5	0	150
Supply	10	150	50	100	40	350

The above matrix is now amenable for applying VAM. [**Note:** Row / Column interposing at this stage does not affect VAM.]

Initial Basic Feasible Solution (IBFS) is determined as under:

Place	F – 1	F – 2	F – 3	F – 4	F – 5	Requirement	Cost Differences I II III IV V VI
S – 1	2	10	5	0 **80**	0	80 / 0	0 2 – – – –
S – 2	2 **10**	10 **90**	6	3 **20**	0	120/110/90/0	2 1 1 **3** 4 10
S – 3	7	12 **60**	6 **50**	5	0 **40**	150 / 110 / 60	**5** 1 1 1 **6** 12
Capacity	10 / 0	150/60/0	50 / 0	100/20/0	40 / 0	350	

Cost Diff:					
I	0	0	1	3	0
II	0	0	1	**3**	–
III	**5**	2	0	2	–
IV	–	2	0	2	–
V	–	2	0	–	–
VI	–	2	–	–	–

In the above IBFS,
Number of allocated cells is 7.
m + n – 1 (i.e. Rows + Columns – 1)
= 3 + 5 – 1 = 7.
Hence, there is no degeneracy. This can be tested for optimality.

Question 1(d): Pricing – Evaluation of Discount Policy **5 Marks**

A and B are two customers of XYZ Electronics Ltd, a manufacturer of Audio Players.

Selling Price per unit is ₹ 5,400. Its Cost of Production per unit is ₹ 4,420.

Additional Costs are – (a) Order Processing Cost ₹ 2,000 per Order, (b) Delivery Costs ₹ 3,500 per Delivery

Details of Customers A and B for the period are given below –	Customer A	Customer B
Audio Players purchased	350 nos.	500 nos.
Number of Orders	5 (each of 70 units)	10 (each of 50 units)
Number of Deliveries	5	0

The Company's policy is to give a discount of 5% on the Selling Price on orders for 50 units or more, and to further give 8% discount on the Undiscounted Selling Price if a customer uses his own transport to collect the order. Assume that the production levels are not altered by these orders. You are required to –

(i) Determine the profitability by comparing the Profit per unit for each customer.

(ii) Comment on the Discount Policy on delivery.

Solution:

Particulars	Customer A	Customer B
1. Nature	Order 50 or more, Delivery by Seller	Order 50 or more, Delivery at Buyer's Cost
2. Discount	**5% on Price**	5 + 8 = **13% on Price**
3. Net Sale Price per unit	₹ 5,400 – 5% = ₹ 5,130	₹ 5,400 – 13% = ₹ 4,698
4. Cost of Production per unit	₹ 4,420	₹ 4,420
5. Contribution per unit (3 – 4)	₹ 710	₹ 278
6. Total Contribution	350 units × ₹ 710 = ₹ 2,48,500	500 units × ₹ 278 = ₹ 1,39,000
7. Order Processing Costs	5 Orders × ₹ 2,000 = ₹ 10,000	10 Orders × ₹ 2,000 = ₹ 20,000
8. Delivery Costs	5 Deliveries × ₹ 3,500 = ₹ 17,500	(Delivery arranged by Customer) Nil
9. Profit (6 – 7 – 8)	₹ 2,21,000	₹ 1,19,000
10.Profit per unit	$\frac{2,21,000}{350 \text{ units}}$ = **₹ 631.43**	$\frac{1,19,000}{500 \text{ units}}$ = **₹ 238.00**

Comments on the Discount Policy on Delivery:

- Assuming that each order is satisfied by 1 delivery, for Customer B, 10 deliveries may be required (if Seller were to organise delivery at his own cost), and the Delivery Costs will be 10 Deliveries × ₹ 3,500 = ₹ 35,000, for 500 units.
- Hence, Average Delivery Cost per unit would be = $\frac{35,000}{500 \text{ units}}$ = **₹ 70** per unit.
- But, Discount Offered at 8% on Price of ₹ 5,400 = **₹ 432** per unit, which is very high, if compared to Delivery Costs.
- The Company has to reduce the % of Discount to $\frac{₹ 70}{₹ 5,400}$ = **1.30%,** if the customer uses his own transport.

Question 2(a): JIT – Uniform Production vs JIT Production **8 Marks**

Innovation Ltd has entered into a contract to supply a component to a Company which manufactures electronic equipments. Expected demand for the component will be 70,000 units totally for all the periods. Expected Sales and Production Cost will be–

Period	1	2	3	4
Sales (units)	9,500	17,000	18,500	25,000
Variable Cost per unit	₹ 30	₹ 30	₹ 32.50	₹ 35

Total Fixed Overheads are expected to be ₹ 14 Lakhs for all the periods. The Production Manager has to decide about the production plan. The choices are –

Plan 1: Produce at a constant rate of 17,500 units per period. Inventory Holding Costs will be ₹ 6.50 per unit of Average Inventory per period.

Plan 2: Use a Just–in–Time (JIT) System

Maximum Capacity per period normally 18,000 units

It can produce further upto 10,000 units per period in Overtime.

Each Unit produced in Overtime would incur additional cost equal to 30% of the expected Variable Cost per unit of that period.

Assume Zero Opening Inventory.

(i) Calculate the Incremental Production Cost and the Savings in Inventory Holding Cost by JIT Production System.

(ii) Advise the Company on the choice of a plan.

Solution: Computation of Production Costs / Inventory Holding Costs

Particulars	Period 1	Period 2	Period 3	Period 4
1. Opening Inventory (units)	Nil	8,000	8,500	7,500
2. Plan I Production (units)	17,500	17,500	17,500	17,500
3. Sales Quantity (units)	9,500	17,000	18,500	25,000
4. Closing Inventory (units)= (1 + 2 – 3)	8,000	8,500	7,500	Nil
5. Average Inventory (units) = ½ of (1+4)	4,000	8,250	8,000	3,750

Particulars	Period 1	Period 2	Period 3	Period 4
6. Inventory Holding Cost [₹ 6.50 pu × (5)]	₹ 26,000	₹ 53,625	₹ 52,000	₹ 24,375
7. Production Cost p.u.	₹ 30	₹ 30	₹ 32.50	₹ 35
8. Total Production Cost under Plan I [2 × 7]	₹ 5,25,000	₹ 5,25,000	₹ 5,68,750	₹ 6,12,500
9. Plan II Production (units)	9,500	17,000	18,500	25,000
10.Normal Production Cost upto 18,000 units [7 × 9]	9,500×30 = ₹ 2,85,000	17,000×30 = ₹ 5,10,000	18,000×32.5 = ₹ 5,85,000	18,000×35 = ₹ 6,30,000
11.OT Cost for additional production	Nil	Nil	500×(32.5+30%) = ₹ 21,125	7000×(35+30%) = ₹ 3,18,500
12. Total Prodn Cost under Plan II [10+11]	₹ 2,85,000	₹ 5,10,000	₹ 6,06,125	₹ 9,48,500

Computations / Observations:

(a) Total Production Cost under Plan I = Total of Line No.8 above = **₹ 22,31,250**

(b) Total Production Cost under Plan II = Total of Line No.12 above = **₹ 23,49,625**

(c) Hence, **Incremental Production Cost under JIT System** (Plan II) = 23,49,625 – 22,31,250 = **₹ 1,18,375.**

(d) **Inventory Holding Cost** under Plan I = Total of Line No.6 above = **₹ 1,56,000**, which is fully eliminated by Plan II JIT System.

(e) **Net Cost Savings** under JIT System = ₹ 1,56,000 – ₹ 1,18,375 = **₹ 37,625.** Hence, Plan II is preferable.

Note: Fixed Costs ₹ 14 Lakhs is not relevant for the above decision / computation.

Question 2(b): Assignment – Optimal Solution **8 Marks**

R_3C_2 denotes the element at the intersection of the 3rd Row and the 2nd Column. Under this notation, R_1C_1, R_2C_1, R_3C_1, R_3C_2, R_3C_3, R_4C_3, R_4C_4, were the only zero elements in a 4X4 Minimisation Assignment Problem, after the Row Minimum and Column Minimum Operations.

(i) In the next step to draw lines to cover zeroes, a Student drew 4 horizontal lines covering Rows R_1, R_2, R_3, and R_4. Will he arrive at the Optimal Assignment at the next step? Why? Explain the concept.

(ii) Independent of (i) above, if you are given the additional information that R_2C_2 element is lesser than the Row 1 and Row 2 non–zero values, how will you arrive at the Optimal Solution?

Solution: **Refer Principles of Assignment Procedure in Page No.16.1**

The Matrix explained in the Question will look as under –

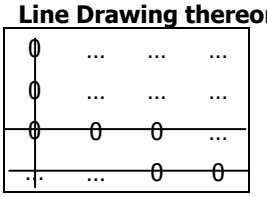
	C_1	C_2	C_3	C_4
R_1	0			
R_2	0			
R_3	0	0	0	
R_4			0	0

Effect of Wrong Line Drawing:

1. We have to draw **Minimum Number** of Lines to cover all the Zeroes. In the above, 3 lines through C_1, R_3, and R_4 are sufficient to cover all the Zeroes. Optimal Assignment is possible only if Number of Lines = Order of the Matrix. [**Concept:** This ensures that there are **adequate number of independent zeroes** spread across the Matrix to comply with one–to–one assignment condition.]
2. If 4 Horizontal Lines are wrongly drawn through R_1, R_2, R_3, and R_4, Optimal Assignment is not possible in the next step. This is explained as under –
   (a) R_1 C_1 being a unique zero, will be marked as an assignment in the first stage.
   (b) Consequently to R_1 C_1 selection, all other Zeroes in Column C_1 will be cancelled, as being irrelevant.
   (c) So, R_2 will not have any Zero for assignment purpose, and hence Optimal Assignment is not possible.

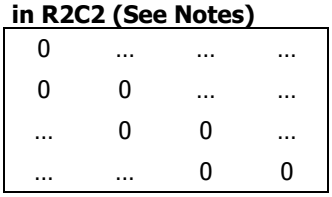
Effect of Revised Matrix: To ensure that Number of Lines = Order of the Matrix, we have to increase the number of Zeroes in the above given Table, by identifying the Least Open Element (LOE), and performing the following procedures – (a) Subtract LOE from all Open Elements, (b) Add LOE to all Junction Elements, (c) No change to Covered Elements.

Given Matrix & Correct Line Drawing thereon

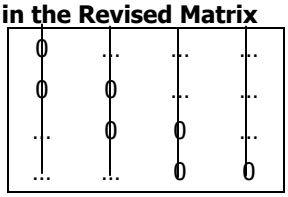


Lines (3) < Order (4)

After Revising using LOE in R2C2 (See Notes)

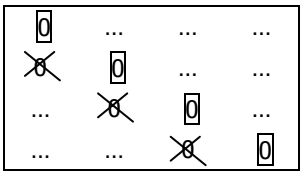


Line Drawing in the Revised Matrix



Lines (4) = Order (4)

Optimal Assignment



Notes:

- R_2C_2 will obtain a Zero Value upon Revision using LOE.
- R_3C_1 is a Junction Element, and will lose its Zero Value upon Revision using LOE.
- All other Zeroes in the Given Table will retain their Zero Value, since they are Covered Elements.
- It is assumed that R_3 and R_4 entries have higher values, and hence even after R_2C_2 LOE Operations, they will have non–zero values.

Answer:

$R_1 – C_1$
$R_2 – C_2$
$R_3 – C_3$
$R_4 – C_4$

Question 3(a): Standard Costing – Labour and Sales Variances **8 Marks**

Alpha Ltd uses Standard Costing System for manufacturing its single product "APS". Standard Cost Card is as follows –

Particulars		₹ per unit
	Selling Price	120
Less:	Direct Material (1 kg per unit)	(20)
	Direct Labour (6 hours at ₹ 8 per hour)	(48)
	Variable Overheads	(24)
	Contribution	28

Actual and Budgeted activity levels in units for the month of September are –

	Budget	Actual
Sales (units)	50,000	51,200
Production (units)	50,000	52,000

Actual Sales Revenue and Variable Costs for the month of September are given as under –
Sales ₹ 61,33,760, Direct Materials ₹ 10,65,600, Direct Labour (3,00,000 hrs) ₹ 24,42,000, Variable OH ₹ 12,28,000

Calculate – (i) Direct Labour Rate Variance, (ii) Direct Labour Efficiency Variance, (iii) Sales Volume Variance, (iv) Sales Price Variance, (v) Comment on your findings in (i) and (ii) above.

Solution: **Refer Computation Principles in various Illustrations of Chapter 1**

Item	Computation
(i) Direct Labour Rate Variance	= Actual Hours × [Standard Rate ph (–) Actual Rate ph] = AH × [SR (–) AR] = AH × SR (–) AH × AR = (3,00,000 hrs × ₹ 8 per hour) (–) ₹ 24,42,000 = **₹ 42,000 Adverse**
(ii) Direct Labour Efficiency Variance	= [Standard Hours (–) Actual Hours] × Standard Rate per hour = [SH (–) AH] × SR **Note:** SH is for Actual Output 52,000 uts. = [(52,000 units × 6 hrs pu) (–) 3,00,000] × ₹ 8 = **₹ 96,000 Favourable**
(iii) Sales Volume Variance	= [Budgeted Qtty (–) Actual Qtty] × Budgeted Price p.u. = [50,000 units (–) 51,200 units] × ₹ 120 = **₹ 1,44,000 Favourable**
(iv) Sales Price Variance	= Actual Qtty × [Budgeted Price pu (–) Actual Price pu] = AQ × [BP (–) AP] = AQ × BP (–) AQ × AP = (51,200 units × ₹ 120) (–) ₹ 61,33,760 = **₹ 10,240 Adverse**

(v) **Comments on (i) and (ii):**

(a) Labour Efficiency Variance of **₹ 96,000 Fav** represents Cost Savings due to **Time Savings**, while Labour Rate Variance of **₹ 42,000 Adv** represents Extra Cost due to **Higher Wage Rate**. Some reasons for this combination of Favourable Efficiency Variance with Adverse Rate Variance are –

- Use of Higher Grade Skilled Workers who demand pay at a higher rate, but complete the work faster.

- There is a savings in time, i.e. [52,000 × 6 hrs – 3,00,000] = 12,000 hours, which may have been **rewarded** by the Company by way of Incentive to Workers by means of a higher pay, viz. Standard Wage Rate ₹ 8 ph vs Actual Wage Rate is [24,42,000 ÷ 3,00,000 hrs] = ₹ 8.14 ph.

(b) Time Savings will also lead to savings in VOH, thereby increasing the **Contribution** earned by the Company.

Question 3(b): Network Analysis – Project Crashing, Time Delay Savings, etc. **8 Marks**

The following information is given for a certain project.

Activity	Normal Duration (days)	Crash Duration (days)	Difference (days)	Normal Cost (₹)	Crash Cost (₹)	Difference in Cost (₹)	Activity Slope (₹ per day)
	I	II	III = I – II	IV	V	VI = V – IV	VII = VI÷III
1 – 2	9	6	3	640	700	60	20
1 – 3	8	5	3	500	575	75	25
1 – 4	15	10	5	400	550	150	30
2 – 4	5	3	2	100	120	20	10
3 – 4	10	6	4	200	260	60	15
4 – 5	2	1	1	100	140	40	40

(i) What is the Normal Project Duration?

(ii) Perform step–by–step Crashing to reduce the Project Duration by 5 days. What is the cost incurred for the optimal crashing exercise?

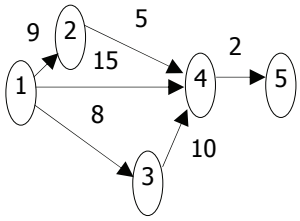
(iii) Independent of (ii) above, if the Project Manager is able to save as per Rates in Column VII of above Table for every day relaxed for the activities, compute the number of days and associated savings for 5 days of relaxation, in the order of optimality, without extending the Project Duration as per (i) above. The Project Manager is interested in this exercise to schedule resources.

Solution: **Refer Page No.19.31, Q.No.21 [M 13 Qn Modified]**

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	16	16–1 = 15	15
Path Y: 1–4–5	15+2 = 17	10+1 = 11	17	17	17	17–1 = 16	16–1 = 15
Path Z: 1–3–4–5	8+10+2 = 20 (Initial **CP**)	5+6+1 = 12 (**Min. Duration**)	20 – 1 = 19	19–1 = 18	18–1 = 17	17–1 = 16	16–1 = 15

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 (by 5 days only)

Stage	Decision on Crashing	Crash Costs
Stage **I**	Initial CP is Path Z. Activities for Crashing are 1–3 (Slope 25), 3–4 (Slope 15) and 4–5 (Slope 40). Activity with least slope is 3–4. Hence, crashed by 1 day. [**See Note**]	₹ 15 × 1 day = ₹ 15
Stage **II**	Same as above.	₹ 15 × 1 day = ₹ 15
Stage **III**	Same as above.	₹ 15 × 1 day = ₹ 15
Stage **IV**	Paths Y and Z are the CPs (17 days). Activities available for crashing are – (1) Common Activity 4–5 (with Slope 40) or (2) Separate Activities (with higher slope). So, Common Activity 4–5 is crashed for 1 day (being maximum time reduction possible).	₹ 40 × 1 day = ₹ 40
Stage **V**	Paths Y and Z are the CPs (16 days). Activity Combinations available for crashing are – (1) 3–4 & 1–4 (Slope 15 + 30= 45) and (2) 1–3 & 1–4 (Slope 25 + 30 = 55). The first combination is chosen due to lower slope, and crashed for 1 day.	₹ 45 × 1 day = ₹ 45

Note: In Stage I, Activity 3–4 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 can crashed for the permissible period of 3 days. (least of 3 & 4). However, in tune with step–by–step crashing requirement, it is crashed at 1 day each in Stages I, II and III.

4. Time and Cost Computations:

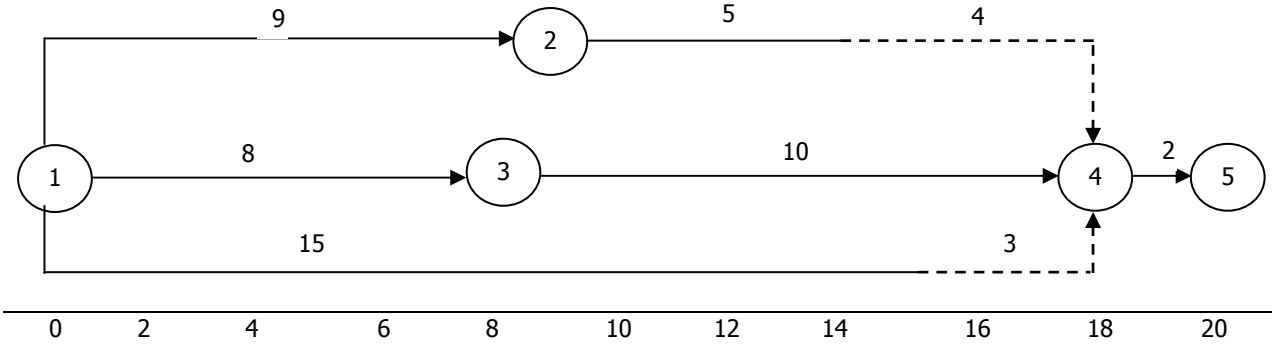
(a) **Normal Project Duration** = Initial CP as per WN 1 = **20 days.**

(b) **Cost of Normal Duration** = Total Normal Costs = 640 + 500 + 400 + 100 +200 + 100 = **₹ 1,940**

(c) **Cost of 15 days Duration** = Normal Cost + Crash Costs as per WN 3 = 1,940 + 15+15+15+40+45 = **₹ 2,070**

5. Effect of Time Savings:

Time Scale Diagram for this Project is drawn first to ascertain the time relaxation available for various Activities.



Time Relaxation is available as under –

Activities	Available Days for Relaxation	Savings per Day	Ranking
1 – 2	Together for 4 days (Day 14 to 18)	₹ 20	II
2 – 4		₹ 10	III
1 – 4	3 days (Day 15 to 18)	₹ 30	**I**

Assuming that the Resources required for 1–4 are also not used for 1–2 or 2–4, the 5 days of relaxation will be –

(a) Activity 1–4 for 3 days: ₹ 30 × 3 days = ₹ 90

(b) Activity 1–2 for 2 days: ₹ 20 × 2 days = ₹ 40

So, Total Cost Savings = 90 + 40 = **₹ 130.**

Question 4(a): Budgeting – Production, Material Purchase and Labour **8 Marks**

JCL Corporation manufactures and sells two products RB and RD. Three types of materials, A, B and C are required for producing these products. Projected information for 2015–2016 is given below –

Product	Projected Sales for 2015–2016	Inventory (in units)		Direct Labour Requirement
	Units	on 01.04.2015	on 31.03.2016	Hours / Unit
RB	75,000	25,000	31,250	4
RD	50,000	10,000	11,250	6

Raw Material Stock and Usage are as follows –

Direct Material	Required per unit		Inventory on 01.04.2015	Inventory on 31.03.2016
	RB	RD		
A	5 kg	5 kg	40,000 kg	45,000 kg
B	2.50 kg	3 kg	36,250 kg	40,000 kg
C	0	1 kg	7,500 kg	8,750 kg

You are required to prepare the following for 2015–2016.

(i) Production Budget (in units)

(ii) Direct Material Purchase Budget in quantities for A, B and C.

(iii) After (i) and (ii), you are told that only 6,00,000 Labour Hours will be available for production. If there is no requirement to hold the stated level of Finished Goods Closing Inventory, what would be the Principal Budget Factor? Substantiate your view with appropriate figures.

Solution: **Similar to Page No.7.11, Illus.No.1,2,3,4 for Production & Material Usage Budget**

1.Production Budget (in units)

Particulars		RB	RD
	Budgeted Sales Quantity	75,000	50,000
Add:	Estimated Closing Stock of FG	31,250	11,250
	Sub–Total	1,06,250	61,250
Less:	Available Opening Stock of FG	25,000	10,000
	Budgeted Production Quantity	**81,250**	**51,250**

2.Material Purchase Budget (in kgs)

Particulars	A	B	C
(a) Budgeted Material Usage for			
Product RB (81,250 units)	81,250 × 5 = 4,06,250	81,250 × 2.5= 2,03,125	Nil
Product RD (51,250 units)	51,250 × 5 = 2,56,250	51,250 × 3 = 1,53,750	51,250 × 1 = 51,250
Sub–Total RM Usage	**6,62,500**	**3,56,875**	**51,250**
(b) Estimated Closing Stock of RM	45,000	40,000	8,750
(c) Available Opening Stock of RM	40,000	36,250	7,500
(d) Budgeted Purchase Qtty (a+b–c)	**6,67,500**	**3,60,625**	**52,500**

3. Effect of DLH Requirement

Particulars	RB	RD	Total
(a) Time required per unit	4 hrs	6 hrs	
(b) Time required for Budgeted Production (hrs)	81,250 × 4 = 3,25,000	51,250 × 6 = 3,07,500	**6,32,500**
(c) Budgeted Sales Quantity (units)	75,000	50,000	
(d) Available Opening Stock of FG (units)	25,000	10,000	
(e) Minimum Production Quantity (units), if there is no requirement to hold Closing FG (c – d)	50,000	40,000	
(f) Time required for above (e×a) (hrs)	50,000 × 4 = 2,00,000	40,000 × 6 = 2,40,000	**4,40,000**

Observations: Hours available = 6,00,000. As such, DLH is the Principal Budget Factor, since DLH Requirement 6,32,500 > DLH Availability 6,00,000. However, if there is no requirement to hold the stated level of Finished Goods Closing Inventory, the DLH requirement is only 4,40,000. In such cases, the Sale Quantity will be the Principal Budget Factor.

Question 4(b): LPP Formulation **8 Marks**

Mr. X has ₹ 10 Lakhs which he wants to invest in the Share Market in anticipation of having good returns. He wants to invest only in two Stocks and one Mutual Fund with an Investment allowed in each Stock or Mutual Fund not being more than ₹ 7 Lakhs.

	Expected Rate of Return	Risk Rating (on a scale of 0 to 10)
Stock L	**15%**	**5**
Stock M	**18%**	**8**
Mutual Fund	**13%**	**4**

He does not want to accept an Average Rate of Return below 12% or a Risk Factor above 6.

How much money he should invest in each alternative so as to obtain the highest Annual Total Return?

Formulate the above as a Linear Program and present the inequalities with coefficients in their simplest integer forms.

Solution: **Similar to Page No.18.33, Illus.No.25 [N 12 Qn]**

Let the Investments in Stock L, Stock M, and Mutual Fund be denoted by A, B and C respectively.

Objective Function: Maximise Expected Return Z = 0.15A + 0.18B + 0.13C

Subject to Constraints: $A + B + C \leq 10,00,000$..... Funds Availability.....Constraint No.1

$\frac{0.15A + 0.18B + 0.13C}{A + B + C} \geq 0.12$. On cross multiplication, we have $0.15A + 0.18B + 0.13C \geq 0.12 (A+B+C)$

On transposing and simplifying, $0.03A + 0.06B + 0.01C \geq 0$..... Minimum Avg Return 12%...Constraint No.2

$\frac{5A+8B+4C}{A+B+C} \le 6$. On cross multiplication, we have 5A + 8B + 4C ≤ 6 (A+B+C)

On transposing and simplifying, –A + 2B –2C ≤ 0…… Maximum Risk Factor...Constraint No.3

0 ≤ A,B,C ≤ 7,00,000……Max. Investment, and Non–Negativity Assumption….Constraint No.4

Question 5(a): Transfer Pricing – Effect of Key Factor **12 Marks**

Four products P, Q, R and S are produced by Profit Centre Division A. Each product is sold in the external market also. Data for the period are as follows:

Particulars	P	Q	R	S
Market Price per unit (₹)	70	69	56	46
Variable Cost of Production per unit (₹)	66	59	36	37
Labour hours per unit	3	2	2	3
Specific Fixed Costs (₹) per 10,000 units of Product	2,500	12,600	15,000	18,000

Product S can be transferred to Division B but the Maximum Quantity that might be required for transfer is 20,000 units of S. The specific Fixed Costs given above are avoidable if a product is not made. They are incurred for every 10,000 units.
The maximum sales (units) in the external market are:

P	30,000
Q	31,000
R	28,000
S	18,000

Division B can purchase the same product at a slightly cheaper price of ₹ 45 per unit instead of receiving transfer of Product S from Division A without any extra transport / inspection costs. B can also take partial supplies from A.

The Total Labour Hours available in Division A is 1,92,000 hours.

(i) What is A's Optimal Product Mix and the corresponding Contribution net of Specific Fixed Costs?

(ii) How many units should A transfer to B and at what Price?

(iii) Is it in the Company's interest to transfer 20,000 units of S to B?

Solution: **Similar to Page No.5.26, Illus No.15 [RTP, M 00, N 03, N 06 Qn]**

1. Optimal Production Mix in Division A

Particulars	P	Q	R	S	Total
(a) Maximum External Sales	30,000 units	31,000 units	28,000 units	18,000 units	
(b) DLH required pu	3 hours	2 hours	2 hours	3 hours	
(c) Total DLH required (a×b)	90,000 hours	62,000 hours	56,000 hours	54,000 hours	2,62,000
(d) Sale Price p.u.	70	69	56	46	
(e) Variable Cost p.u.	66	59	36	37	
(f) Gross Contribution pu (d – e)	4	10	20	9	
(g) Avg Specific Fixed Cost pu	0.40	1.26	1.50	1.80	
(h) Avg Net Contribution pu (f–g)	3.60	8.74	18.50	7.20	
(i) Avg Net Contribution ph (h÷b)	1.20	4.37	9.25	2.40	
(j) Avg Gross Contribution ph (f÷b)	1.33	5.00	10.00	3.00	
(k) Rank (based on j) (same for i)	**IV**	**II**	**I**	**III**	
(l) DLH Resource Allocation based on Rank (hours)	b/f 20,000	62,000	56,000	54,000	1,92,000
(m) Output Quantity (l÷b)	6,666 units	31,000 units	28,000 units	18,000 units	
(n) Gross Contribution (m×f)	₹ 26,664	₹ 3,10,000	₹ 5,60,000	₹ 1,62,000	10,58,664
(o) Specific Fixed Costs (for every 10,000 units as given)	₹ 2,500 × 1 = ₹ 2,500	₹ 12,600 × 4 = ₹ 50,400	₹ 15,000 × 3 = ₹ 45,000	₹ 18,000 × 2 = ₹ 36,000	1,33,900
(p) Net Contribution (n – o)	₹ 24,164	₹ 2,59,600	₹ 5,15,000	₹ 1,26,000	**9,24,764**

Note: Average Net Contribution per hour is computed to confirm possible change in Ranking Priority due to the impact of Specific Fixed Costs. In this case, the Ranking is the same for both Gross and Net Contribution per hour.

2. Opportunity Costs for Internal Transfer of 20,000 units of S

Particulars	Result
(a) Time required for 20,000 units Internal Transfer of S	20,000 × 3 = 60,000 hours
(b) The above time will be diverted – (i) First from P for 20,000 hours, and (ii) Balance from External Sale of S, for 40,000 hours	(as per Line 'l' above)
(c) Opportunity Costs of first 20,000 hours = Contribution lost on P (from Line p above)	₹ 24,164
(d) Opportunity Costs of next 40,000 hours = Contribution lost on S Gross Contribution lost = [40,000 × ₹ 3 = ₹ 1,20,000] less Fixed Cost saved ₹ 18,000 **Note:** Fixed Cost will come down by ₹ 18,000, since output of S reduces from 18,000 units level to (54,000 – 40,000)÷3 = 4,666 units.	₹ 1,02,000

3. Transfer Prices and Decision from Company viewpoint

Particulars	First 20,000 hours	Next 40,000 hours	Total 60,000 hours
(a) Internal Transfer Quantity of S	$\frac{20,000}{3}$ = 6,667 units	$\frac{40,000}{3}$ = 13,333 units	20,000 units
(b) Opportunity Costs for above	₹ 24,164	₹ 1,02,000	₹ 1,26,164
(c) Specific Fixed Costs	₹ 18,000 × 1 = ₹ 18,000	₹ 18,000 × 1 **(Note)** = ₹ 18,000	₹ 36,000
(d) Variable Costs at ₹ 37 p.u.	₹ 2,46,679	₹ 4,93,321	₹ 7,40,000
(e) Total Costs (b+c+d)	₹ 2,88,843	₹ 6,13,321	₹ 9,02,164
(f) Average Relevant Costs = Minimum Transfer Price (e÷a)	**₹ 43.32**	**₹ 46.00**	**₹ 45.11**
(g) External Price of Product S	₹ 45.00	₹ 45.00	₹ 45.00
(h) Is Internal Transfer worthwhile?	**Yes**	**No**	**No**

Note: Even though Output Quantity is 13,333 units, Specific Fixed Costs is taken only for one lot of 10,000 units, by assuming continuous production after 20,000 hours, i.e. carry over effect from the previous lot of production. Alternatively, such Fixed Costs can be taken for 2 lots also.

Question 5(b): Marginal Costing – Incremental Contribution **4 Marks**

The budgeted cost data of a product Manufactured by XYZ Co. Ltd. is furnished as below:

Budgeted units to be produced	**2,00,000**
Variable Costs	**₹ 32 per unit**
Fixed Costs	**₹ 16 Lakhs**

It is proposed to adopt Cost plus Pricing approach with a mark–up of 25% on full budgeted cost basis.

However, research by the Marketing Department indicates that demand of the product in the market is price sensitive. The likely market responses are as follows:

Selling Price (₹ per unit)	**44**	**48**	**50**	**56**	**60**
Annual Demand (units)	**1,68,000**	**1,52,000**	**1,40,000**	**1,28,000**	**1,08,000**

Analyse the above situation and determine the best course of action.

Solution: **Similar to Page No.2.62, Q.No.5.1 [RTP, N 99 Qn]**

Since Sale Price and Sale Quantity are inversely related, Incremental Contribution Approach is used as under –

Quantity	Sale Price pu	Variable Cost pu	Contribution pu	Total Contribution	Incremental Cn.
1,68,000	₹ 44	₹ 32	₹ 12	₹ 20,16,000	NA
1,52,000	₹ 48	₹ 32	₹ 16	₹ 24,32,000	₹ 4,16,000
1,40,000	₹ 50	₹ 32	₹ 18	₹ 25,20,000	₹ 88,000
1,28,000	₹ 56	₹ 32	₹ 24	₹ 30,72,000	₹ 5,52,000
1,08,000	₹ 60	₹ 32	₹ 28	₹ 30,24,000	(₹ 48,000)

From the Table, it is observed that the Maximum Total Contribution is ₹ 30,72,000, when Sale Price is ₹ 56 p.u. and Quantity Sold is 1,28,000 units. This is the best course of action for the Company.

Note: (a) Fixed Cost ₹ 16 Lakhs remains constant at all output levels, and not relevant for decision.

(b) Budgeted Sale Price = Cost + 25% Profit = ₹ 32 + ₹ $\frac{16,00,000}{2,00,000 \text{ units}}$ + 25% thereon = **₹ 50 p.u.** However, at that price, the Total Contribution possible is **only** ₹ 25,20,000.

Question 6(a): Activity Based Costing – BEP, etc. **8 Marks**

X Ltd makes a single product with the following details:

Description	Current Situation	Proposed Change
Selling Price (₹ /unit)	10	
Direct Costs (₹ / unit)	5	
Present Number of Set–Ups per Production Period, (before each Production Run, Set–Up is done)	42	
Cost per Set–Up (₹)	450	Decrease by ₹ 90
Production Units per Run	960	1008
Engineering Hours for Production Period	500	422
Cost per Engineering Hour (₹)	10	

The Company has begun Activity Based Costing of Fixed Costs and has presently identified two Cost Drivers, viz. Production Runs and Engineering Hours. Of the total Fixed Costs presently at ₹ 96,000, after the above, ₹ 72, 100 remains to be analysed. There are changes as proposed above for the next production period for the same volume of output.

(i) How many units and in how many Production Runs should X Ltd produce in the changed scenario in order to break–even?

(ii) Should X Ltd continue to break up the remaining Fixed Cost into Activity Based Costs? Why?

Solution: **1. Computation of BEQ**

Let Proposed Number of Runs = "N". Total Output = "N" Runs at 1,008 Units per Run = 1,008 N.

Contribution p.u. = Sale Price – Variable Cost = 10 – 5 = 5 p.u. Total Contribution = 5 × 1,008 N = **5,040 N**

Particulars		Present	Proposed
Fixed Costs:	(i) Set Up:	42 × ₹ 450 = ₹ 18,900	"N" × (₹ 450 – ₹ 90) = 360 N
	(ii) Engineering:	500 × ₹ 10 = ₹ 5,000	422 × (Same Rate) ₹ 10 = ₹ 4,220
	(iii) Others to be analysed	₹ 72,100	(Same as Present) = ₹ 72,100
Total		₹ 96,000	₹ 76,320 + 360 N

To achieve BEP, Required Contribution = Fixed Cost.

Hence, 5,040 N = 76,320 + 360 N On solving, N = $\frac{76,320}{4,680}$ = 16.31 Runs.

So, BEQ = 16.31 Runs at 1,008 Units per Run = **16,440 units.**

2. Need for Further Analysis of Fixed Costs: Present BEQ before analyzing Fixed Costs = $\frac{96,000}{5}$ = 19,200 units.

An analysis of the Fixed Costs into Activity–based Costs (Set Up, Engineering, etc.) may help identify more specific nature of the Fixed Costs, and reveals the true BEQ of the Company, since some of the Fixed Costs may actually be driven by the number of production units / production runs.

Question 6(b): Simulation **8 Marks**

A Dietician wants to simulate arrivals of her patients and her consultation time with the following Random Numbers. Her Assistant has already prepared the Random Number Allocation Tables.

The Dietician wants to have an idea of her Idle Time and Patients' Waiting Time. She starts her consultation at 10:00 a.m and wants to give an appointment an interval of 20 minutes. The Random Number Table is as follows:

Arrival of Patient	15	4	35	67	75	86	25
Consultation Time	17	15	12	58	60	72	30

Random Number Allocation Table: 1

Patient Punctuality	Probability	Cumulative Probability	Random No.
Minutes Early 3	0.05	0.05	00–04
2	0.18	0.23	05–22
1	0.45	0.63	23–62
On Time	0.25	0.88	63–87
Minutes Late 2	0.08	0.96	88–95
4	0.04	1.00	96–99

Random Number Allocation Table: 2

Consultation Time	Probability	Cumulative probability	Random no.
15	0.13	0.13	00–12
18	0.15	0.28	13–27
20	0.28	0.56	28–55
25	0.34	0.90	56–89
30	0.10	1.00	90–99

(i) Simulate the arrival and consultation times and find out the Dietician's Idle Time and Patients'waiting Times.

(ii) If Clients are sensitive to waiting, how would you advise the Dietician as a Management Accountant, based on the results of your exercise?

Solution: **Similar to Page No. 21.14, 21.15, Illus No.14, 15 [N 90, M 03, M 10 Qn]**

Col.(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patient	Appoint–ment	Arrival R.No.	Arrival Time	Consult. R.No.	Consul–tation Time	Consult. Start	Consult. End	Waiting Time	Idle Time
1	10.00	15	2 min early = 9.58	17	18	10.00	10.18	2	–
2	10.20	4	3 min early = 10.17	15	18	10.18	10.36	1	3
3	10.40	35	1 min early = 10.39	12	15	10.39	10.54	–	6
4	11.00	67	On Time = 11.00	58	25	11.00	11.25	–	–
5	11.20	75	On Time = 11.20	60	25	11.25	11.50	5	–
6	11.40	86	On Time = 11.40	72	25	11.50	12.15	10	–
7	12.00	25	1 min early = 11.59	30	20	12.15	12.35	16	–
Total								34	

Notes:

Col.(2) = Standard Appointment Time at 20 minutes interval each, starting from 10.00 AM

Col.(4) = Arrival Time based on Random Number in Col.(3) and Col.(2) Standard Time.

Col.(6) = Consultation Time based on Random Number in Col.(5).

Col.(7) Consultation Start Time is computed as – (a) Consultation End Time of Previous Patient, or (b) Arrival Time of that Patient, whichever is **later**.

Col.(8) Consultation End Time = Consultation Start Time + Duration of Consultation = Col.(7) + Col.(6).

Col.(9) Waiting Time of Patient = Difference between Col.(7) and Col.(4).

Col.(10) Idle Time of Dietician = Difference between Col.(8) of this Patient and Col.(7) of Next Patient.

Observations: Average Waiting Time = 34÷7 = 5 min (approx.).

If the Clients are sensitive to waiting, the Dietician may schedule the appointments in 25 min intervals instead of 20 min intervals. This is also reflected by the Service Rates in Random Number Table (2), where 25 min Consultation Time has the maximum probability of 34%.

Question 7(a): Life Cycle Costing – New Product Launch Decision **4 Marks**

A Company is planning a new product. Market Research information suggests that 40,000 units of the product can be sold at a maximum of ₹ 25 per unit. The Company seeks as minimum mark–up of 25% on Product Cost. It is estimated that the lifetime costs of the product will be as follows –

- **Research and Development, Design Costs ₹ 1,50,000**
- **Manufacturing Costs ₹ 16 per unit**
- **End of Life Costs ₹ 70,000**
- **Promotion and Capacity Costs ₹ 20,000**

Should the product be manufactured?

Solution: **Refer Principles in Chapter 10 and Chapter 2 & 3**

Particulars	Result
(a) Total Costs = ₹ 1,50,000 + (40,000 units × ₹ 16) + ₹ 70,000 + ₹ 20,000	₹ 8,80,000
(b) Minimum Sale Value, with 25% Markup on Cost = ₹ 8,80,000 + 25% thereon	₹ 11,10,000
(c) Target Sale Revenue = (40,000 units × ₹ 25)	₹ 10,00,000
(d) Hence, the proposal to manufacture the product is **not worthwhile**, in the above scenario.	

Question 7(b): Pricing – Theory **4 Marks**

State the most appropriate Pricing Policy to be adopted in the following independent situations.
[Situations need not be copied. Only the Roman numeral and policy need to be mentioned in the Answer Books.]

Situation	Policy / Answer
(i) **Modern Patented Drug entering the market.**	Skimming Pricing, subject to Price Control Regulations imposed by Regulatory Agencies, if any.
(ii) **The latest version of a Mobile Phone is being launched by an established, financially strong Company.**	Cost Plus Pricing / **Price Discrimination** by Product Version.
(iii) **An established Company has recently entered the Stationery Market segment, and launched good quality paper for printing at home and office.**	Penetration Pricing
(iv) **A Car Manufacturer is launching an innovative, technologically advanced car in the highly priced segment.**	Skimming Pricing / Going Rate Pricing / Price Discrimination by Product Version.

[**Note:** Refer Principles in **Chapter 3** for the above]

Question 7(c): Zero Based Budgeting – Theory **4 Marks**

What are the steps involved in Zero Based Budgeting?

Solution: **Refer Page No. 7.5, Q.No.15 [M 93, M 07, N 10 Qn]**

Question 7(d): Relevant Costing – Theory **4 Marks**

Proposal A is being evaluated against Proposal B. Fill up Column IV of the following Table.

I	II	III	IV
Sl.No.	Type of Cost	Classification	Condition under which the classification happens
(i)	Variable Cost per unit	Irrelevant	
(ii)	Unavoidable Fixed Costs	Relevant	
(iii)	Out of Pocket Costs in future	Relevant	
(iv)	Sunk Cost	Irrelevant	

Only Columns I and IV are required to be presented in the Answers.

Solution: **Refer Principles in Chapter 4, Page No. 4.1 to 4.7, Q.No.1 to 20.**

Col.I (Sl.No.)	Col. IV (Condition under which the classification happens)
(i)	Variable Costs per unit is a **past–cost / sunk cost**, i.e. Historical, or Committed.
(ii)	These Fixed Costs are in the nature of **Incremental / Differential / Step** Costs.
(iii)	Exclusively to be incurred under each of the proposals A and B.
(iv)	Sunk Costs are irrelevant, is a **General Rule** for short–run relevant–cost based decision–making.

Question 7(e): Target Costing – State whether and why the following statements are valid or not valid. 4 Marks

Statement	Answer / Reason
(i) Target Costing is not applicable to a Monopoly Market.	**Refer Page 9.4, Q.No.8, Point 1** **Valid.** Target Costing seeks to provide competitive advantage over other Firms, which is not applicable in case of a Monopoly Market. [See below Table for alternative]
(ii) Target Costing ignores Non Value Added Activities.	**Refer Page 9.9, Q.No.20** **Invalid.** Target Costing seeks to ensure that only Value Added Activities are performed, in an effective manner. Hence, it seeks to study Non–Value Added Activities, and suggest measures to eliminate them.

Note: **For (i) above, Alternative View is as under:** Given Statement is **Invalid**. Even in a Monopoly Market, Target Costing seeks to manage costs effectively, and increase the profitability of the Entity.

STUDENTS' NOTES

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