

Gurukripa's Guideline Answers to Nov 2011 Final Exam Questions Advanced Management Accounting

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

Answer any five questions from the remaining six questions (16 X 5 = 80 Marks).

Question 1(a): Marginal Costing – Basics

N 11 (5 Marks)

New Ltd plans to completely manufacture a single product Z, whose Selling Price and Variable Manufacturing Costs will be ₹ 100 per unit and ₹ 80 per unit respectively. If the complete production is done at its own factory, Fixed Machine Costs will be ₹ 3,62,000 and Fixed Administration and Selling Overheads will be ₹ 30,000 for the production period.

Alternatively, the product can be finished outside by sub-contacting the machining operations at ₹ 10 per unit, but this will entail an increase in the Fixed Administration Overheads by ₹ 1,20,000, while fully avoiding the Machining Cost of ₹ 3,62,000.

Based on the above figures and assuming a production capacity of 30,000 units for the production period, advise with relevant supporting figures, from a financial perspective, for what volumes of market demand will –

1. A manufacture be recommended at all?
2. A fully in-house production be recommended at all?
3. The sub contracting option be recommended?

Solution:

Particulars	Own Production	Sub-Contract
1. Selling Price per unit	₹ 100	₹ 100
2. Variable Costs per unit	Given ₹ 80	80 + 10 = ₹ 90
3. Contribution per unit	₹ 20	₹ 10
4. Specific Fixed Costs	3,62,000 + 30,000 = ₹ 3,92,000	30,000 + 1,20,000 = ₹ 1,50,000
5. $BEQ = \frac{\text{Fixed Costs}}{\text{Contribution per Unit}} = (4) \div (3)$	19,600 units	15,000 units

6. **Indifference Point** = $\frac{\text{Difference in Fixed Costs}}{\text{Difference in Variable Cost per Unit}} = \frac{₹ 3,92,000 - ₹ 1,50,000}{₹ 20 - ₹ 10} = 24,200 \text{ units.}$

Interpretation of BEP and Indifference Points: (the numbers indicate the number of units sold)

No. of Units	Nil	15,000	< 24,200 uts	At 24,200 uts	> 24,200 units	30,000
Choice	↓	↓	Sub-Contract	↓ Either Sub-Cont. or Own Prod'n	Full Own Prod'n	↓ Max.

Conclusion:

Volumes of Market Demand for	Answer & Reason
Manufacture be recommended at all	15,000 units (Being the lower of BEQ of both options)
Fully in-house production be recommended at all	Exceeding 24,200 units (Above Indifference Point, Option with Higher PVR should be preferred)
Sub-Contracting option be recommended	15,000 to 24,200 units (Below Indifference Point, Option with Lower Fixed Cost to be preferred)

Question 1(b): Relevant Costs – Incremental Approach

N 11 (5 Marks)

Pigments Ltd is a Chemical Factory producing Joint Products J, K and L at a Joint Cost of Production of ₹ 9,60,000. The Sales are –

J: 60,000 units at ₹ 5 per unit, K: 20,000 units at ₹ 20 per unit, and L: 40,000 units at ₹ 10 per unit

The Company seeks your advice regarding the following options available –

Option I: After the Joint Process, all of L can be further processed to make 36,000 units of M, at an additional processing cost of ₹ 1,80,000 and M can be sold at ₹ 18 per unit.

Option II: The facilities used to convert L to M may be used to make 7,000 units of an additional product A, with a different Raw Material Input. A can be made at an additional Variable Manufacturing Cost of ₹ 12 per unit and will fetch ₹ 30 as the Selling Price, but the Company will have to offer one unit of J as a free gift for each unit of A sold.

Evaluate the proposals using the Incremental Cost Approach.

Solution:

Particulars	Option I	Option II
1. Additional Revenue	Sales Revenue of M = $36,000 \times ₹ 18$ = ₹ 6,48,000	Contrib. from A = $7,000 \times ₹ (30-12)$ = ₹ 1,26,000
2. Additional Costs		
(a) Processing	Given ₹ 1,80,000	NA
(b) Opportunity Cost = Revenue lost	On L = $40,000 \times ₹ 10$ = ₹ 4,00,000	On J = $7,000 \times ₹ 5$ = ₹ 35,000
Total Additional Cost	₹ 5,80,000	₹ 35,000
3. Net Additional Benefit (1 – 2)	₹ 68,000	₹ 91,000

Conclusion: Option II is preferable due to higher additional benefit.

Notes and Assumptions:

- Joint Cost of Production is a sunk cost and irrelevant for the decision.
- Sales Revenue of K is irrelevant, since it will be obtained in any case.
- Additional Processing Cost of ₹ 1,80,000 under Option I is assumed as processing related, and will be incurred only under Option I. It is not considered as a Facility-related cost, and is not considered under Option II.

Question 1(c): Network Analysis – Theory

N 11 (5 Marks)

State any 5 limitations of the assumptions of PERT and CPM.

- Beta Distribution may not always be applicable.
- The formulae for the Expected Duration (t_e) and SD are simplifications. Certain Mathematicians have observed that in certain cases, because of these assumptions, the errors may even be to the tune of 33%. Errors owing to the aforesaid simplification and assumption may be compounded or may cancel each other to an extent.
- In computing the SD of the Critical Path, independence of activities is implied. Limitations of Resources may invalidate the independence which exists by the very definition of an activity.
- It is not always possible to sort out completely identifiable activities, and to state where they begin and where they end.
- In projects with uncertainty, there may be alternatives with differing outcomes. For example, if a particular hardness is not obtained in a metal, an alloy might have to be used that is more expensive and also inferior on certain technical considerations. In such cases, it may be worthwhile to consider the concept of Decision Tree Analysis.
- Time Estimates in activities have an element of subjectiveness and, to that extent, the techniques could be weak. The Contractors react to this weakness shrewdly whilst bidding. In case of Cost-Plus-Contracts, the Contractors may deliberately "under estimate" the time for chances of being awarded with the contract. Incentive-Type Contracts might lead to an opposite bias.
- Cost-time trade-offs, for deriving the Cost Curve Slopes, are subjective and call for a great deal of expertise of the technology as well as genuine effort to estimate. Such guesses may be wide off the mark.

Question 1(d): Total Quality Management – Theory – Refer Page 11.5, Q.No.8

N 11 (5 Marks)

Classify the following items under appropriate categories of Quality Costs viz. Prevention Costs, Appraisal Costs, Internal Failure Costs and External Failure Costs:

Question	Answer	Question	Answer
1. Rework	Internal Failure	6. Discount on Defective Sale	External Failure
2. Disposal of Scrap	Internal Failure	7. Raw Material Inspection	Appraisal
3. Warranty Repairs	External Failure	8. Finished Product Inspection	Appraisal
4. Revenue Loss	External Failure	9. Establishment of Quality Circles	Prevention
5. Repair to Manufacturing Equipment	Internal Failure	10. Packaging Inspection	Appraisal

Question 2(a): Standard Costing – Sales Margin Variances**N 11 (10 Marks)**

The Budget and Actual Operating Data for a year pertaining to 4 products in a Store are given below:

Product	Budget Data			Actual Operating Results		
	Gallons	Selling Price (₹ Per gallon)	Variable Costs (₹ per gallon)	Gallons	Selling Price (₹ per gallon)	Variable Costs (₹ per gallon)
V	2,50,000	1.2	0.5	1,80,000	1.00	0.45
C	3,00,000	1.5	0.6	2,70,000	1.35	0.50
S	2,00,000	1.8	0.7	3,30,000	2.00	0.75
A	50,000	2.5	1.0	1,80,000	3.00	1.20

You are required to compute for the individual products and in total – (1) Sales Margin Price Variance, (2) Sales Margin Mix Variance, and (3) Sales Margin Volume Variance. Indicate whether the variances are Favourable (F) or Unfavourable (A or U).

Solution:

1. Computation of Revised Actual Quantity (RAQ)					2. Computation of Budgeted and Actual Margin		
Total AQ Sold = 9,60,000						Budgeted Margin(BM) = BP – Std Cost(SC)	Actual Margin (AM) = Actual Price (AP) – Std Cost (SC)
Type	V	C	S	A	V	1.2 – 0.5 = 0.70	1.00 – 0.5 = 0.50
Budgeted Mix	25	30	20	5	C	1.5 – 0.6 = 0.90	1.35 – 0.6 = 0.75
RAQ	3,00,000	3,60,000	2,40,000	60,000	S	1.8 – 0.7 = 1.10	2.00 – 0.7 = 1.30
	gallons	gallons	gallons	gallons	A	2.5 – 1.0 = 1.50	3.00 – 1.0 = 2.00

3. Sales Variances Computation Chart under Margin Approach

Product	(1): BQ × BM	(2): RAQ × BM	(3): AQ × BM	(4): AQ × AM
V	2,50,000 gallons × ₹ 0.70 = ₹ 1,75,000	3,00,000 gallons × ₹ 0.70 = ₹ 2,10,000	1,80,000 gallons × ₹ 0.70 = ₹ 1,26,000	1,80,000 gallons × ₹ 0.50 = ₹ 90,000
C	3,00,000 gallons × ₹ 0.90 = ₹ 2,70,000	3,60,000 gallons × ₹ 0.90 = ₹ 3,24,000	2,70,000 gallons × ₹ 0.90 = ₹ 2,43,000	2,70,000 gallons × ₹ 0.75 = ₹ 2,02,500
S	2,00,000 gallons × ₹ 1.10 = ₹ 2,20,000	2,40,000 gallons × ₹ 1.10 = ₹ 2,64,000	3,30,000 gallons × ₹ 1.10 = ₹ 3,63,000	3,30,000 gallons × ₹ 1.30 = ₹ 4,29,000
A	50,000 gallons × ₹ 1.50 = ₹ 75,000	60,000 gallons × ₹ 1.50 = ₹ 90,000	1,80,000 gallons × ₹ 1.50 = ₹ 2,70,000	1,80,000 gallons × ₹ 2.00 = ₹ 3,60,000
Total	₹ 7,40,000	₹ 8,88,000	₹ 10,02,000	₹ 10,81,500

Sales Margin Quantity Variance = ₹ 7,40,000 – ₹ 8,88,000 = ₹ 1,48,000 F
 + Sales Margin Mix Variance = ₹ 8,88,000 – ₹ 10,02,000 = ₹ 1,14,000 F
 + Sales Margin Price Variance = ₹ 10,02,000 – ₹ 10,81,500 = ₹ 79,500 F

Sales Margin Volume Variance = ₹ 7,40,000 – ₹ 10,02,000 = ₹ 2,62,000 F
 + Sales Margin Price Variance b/fd as above = ₹ 79,500 F

Total Sales Margin Variance = ₹ 7,40,000 – ₹ 10,81,500 = ₹ 3,41,500 F

Product-wise Breakup of Variances (Margin Approach):

Particulars	V	C	S	A	Total
(a) Sales Margin Quantity Variance = (1) – (2)	₹ 35,000 F	₹ 54,000 F	₹ 44,000 F	₹ 15,000 F	₹ 1,48,000 F
(b) Sales Margin Mix Variance = (2) – (3)	₹ 84,000 A	₹ 81,000 A	₹ 99,000 F	₹ 1,80,000 F	₹ 1,14,000 F
(c) Sales Margin Volume Variance (a + b)	₹ 49,000 A	₹ 27,000 A	₹ 1,43,000 F	₹ 1,95,000 F	₹ 2,62,000 F
(d) Sales Margin Price Variance (3) – (4)	₹ 36,000 A	₹ 40,500 A	₹ 66,000 F	₹ 90,000 F	₹ 79,500 F
(e) Total Sales Margin Variance (c+d)=(1-4)	₹ 85,000 A	₹ 67,500 A	₹ 2,09,000 F	₹ 2,85,000 F	₹ 3,41,500 F

Question 2(b): Assignment**N 11 (6 Marks)**

A City Corporation has decided to carry out road repairs on 4 main roads in the city. The Government has agreed to make a Special Grant of ₹ 50 Lakhs towards the cost with the condition that the repairs should be carried out at lowest cost. Five Contractors have sent in their bids. Only one road will be awarded to one Contractor. The bids are given below –

Contractors	Road →	Cost of Repairs (₹ In Lakhs)			
		R ₁	R ₂	R ₃	R ₄
	C ₁	9	14	19	15
	C ₂	7	17	20	19
	C ₃	9	18	21	18
	C ₄	10	12	18	19
	C ₅	10	15	21	16

You are informed that C₂ should get R₁ and C₄ should get R₂ to minimize costs. Required –

- What is the minimum cost allocation?
- How much is the minimum discount that the eliminated Contractor should offer for meriting a contract?
- Independent of Q.No.2 above, if the Corporation can negotiate to get a uniform discount rate from each Contractor, what is the Minimum Rate of Discount so that the cost is within the Grant Amount?

Solution: Since it is given that C₂ should get R₁ and C₄ should get R₂ to minimize costs, these two Rows and Columns are deleted, and the Matrix is simplified into a 3 × 3 Matrix, along with a Dummy Column, to make it balanced, as under –

Step 1: Reduced Matrix				Step 2: Column Operations (Note)				Step 3: Drawing Lines, we have			
	R ₃	R ₄	Dummy		R ₃	R ₄	Dummy		R ₃	R ₄	Dummy
C ₁	19	15	0	C ₁	0	0	0	C ₁	0	0	0
C ₃	21	18	0	C ₃	2	3	0	C ₃	2	3	0
C ₅	21	16	0	C ₅	2	1	0	C ₅	2	1	0

Note: Row Operations will result in the same Matrix as Step 1, since there is a Zero in every Row (due to Dummy Column)

Since number of lines in Step 3 < Order of Matrix, we revise the matrix by identifying the Least Open Element, i.e. 1.

Step 4: Revised Matrix				Step 5: Optimal Assignment				Step 6: Minimum Cost Allocation			
	R ₃	R ₄	Dummy		R ₃	R ₄	Dummy	Contractor	Route	Cost (₹)	
C ₁	0	0	1	C ₁	0	✗	1	C ₁	R ₃	19 Lakhs	
C ₃	1	2	0	C ₃	1	2	0	C ₂	Given R ₁	7 Lakhs	
C ₅	1	0	0	C ₅	1	0	✗	C ₃	Dummy	Nil	
Note: Since Lines = Order of Matrix (3), Optimal Assignment is possible after Step 4.								C ₄	Given R ₂	12 Lakhs	
								C ₅	R ₄	16 Lakhs	
								Total		54Lakhs	

Q.No.2: The Eliminated Contractor (i.e. Dummy Road Allocation) is C₃. For meriting a Contract, the discount should be –

Situation: For C ₃ to get	Reason	Minimum Discount to be given by C ₃
Contract R ₃ instead of C ₁	C ₁ bids 19 Lakhs but C ₃ bids 21 Lakhs	21 – 19 = ₹ 2 Lakhs
Contract R ₄ instead of C ₅	C ₅ bids 16 Lakhs but C ₃ bids 18 Lakhs	18 – 16 = ₹ 2 Lakhs

Q.No.3: Uniform Rate of Discount to ensure that cost is within the Grant Amount = $\frac{54 - 50}{50} = 8\%$

Question 3(a): ABC System – Theory

N 11 (8 Marks)

PQ Ltd makes two products P and Q, which are similar products with slight difference in dimensions. but use the same manufacturing processes and facilities. Production may be made interchangeably after altering machine set-up. Production time is the same for both products. The Cost Structure is as follows (Figures ₹ Per unit)

Particulars	P	Q
Selling Price	100	120
Variable Manufacturing Cost (directly linked to units produced)	45	50
Contribution	55	70
Fixed Manufacturing Cost	10	10
Profit	45	60

Fixed Cost per unit has been calculated based on the total practical capacity of 20,000 units per annum (which is either P or Q or both put together). Market Demand is expected to be the deciding factor regarding the Product Mix for the next 2 years. The Company does not stock Inventory of Finished Goods. The Company wishes to know whether ABC System is to be set up at a cost of ₹ 10,000 per month for the purpose of tracking and recording the Fixed Overhead Costs for allocation to products.

Required:

1. Support your advice with appropriate reasons. 6 Marks
2. Independent of the above, if you are told to assume that Fixed Costs stated above, consist of a non-cash component of Depreciation to Plant at ₹ 90,000 for the year, will your advice change? Explain. 2 Marks

Solution: Total Fixed Costs = 20,000 units × ₹ 10 p.u. = ₹ 2,00,000
 Cost of installing the ABC System = 12 months × ₹ 10,000 = ₹ 1,20,000.

The benefits of ABC System include the following –

1. **Better linking of OH to Products**, since Overheads are high in relation to Direct Costs.
2. **Better evaluation of Resource Consumption:** Product / Service Profitability can be measured reasonably accurately, only if consumption of resources can be traced to each individual product / customer, using ABC System.
3. **Better analysis of Support Service Costs**, since new production techniques have resulted in the increase of the proportion of Support Service Costs in the total cost of delivering value to customers.
4. **Better Basis for Strategy**, since ABC helps to estimate cost of individual products / services more accurately than Traditional Absorption Costing System, and helps in formulating the appropriate marketing / corporate strategy.
5. **Better Cost Tracing**, i.e. reduced cost of tracking resources consumption to a large number of activities.
6. **Better Cost Analysis**, i.e. costs are analysed into the Activity Hierarchy – (a) Unit Level Activities, (b) Batch Level Activities, (c) Product Level Activities and (d) Facility Level Activities. Further, distinction is drawn between VA Activity Expenses (i.e. Costs) and NVA Activity Expenses (i.e. Losses).

If the benefits derived from ABC System, (by way of elimination of NVA Activity Expenses, and reduction in resource consumption in VA Activities), exceed the ABC System Costs of ₹ 1,20,000, the proposal is worthwhile.

Effect of Depreciation: Out of the Total OH, if Depreciation is ₹ 90,000, the balance Cash OH is ₹ 1,10,000. It is highly improbable that the entire OH would be eliminated / reduced to zero by implementing ABC System. Even if that were to happen, the benefit by way of OH Cost Reduction is lower than the ABC Installation Costs of ₹ 1,20,000. Hence, ABC System is **not worthwhile** in this case.

Question 3(b): Transfer Pricing Methods – Basics

N 11 (8 Marks)

In a Company, Division A makes Product A and Division B makes Product B. One unit of B needs one unit of A as input. State the Unit Transfer Price to be adapted by the Transferring Division A to B in each of the following independent situations:

Situation	Answer: Transfer Price =
1. There is a ready market for A. There are no constraints for production or demand for A and A does not incur any external Selling Cost.	Market Price (or) Relevant Costs (i.e. VC + SFC + OC)
2. Supply is more than demand for A. External market resorts to distress price for A and this is expected to last for a temporary period. The product cannot be stocked until better times.	Variable Cost + Reasonable Margin (Margin to be negotiated)
3. Product A is highly specialized. Internal specifications are too many that B has to only buy from A.	Relevant Costs (i.e. VC + SFC + OC, if any)
4. A has excess capacity. It can transfer any quantity to B. Goal congruence is to be achieved.	Variable Cost + Reasonable Margin (Margin to be negotiated)
5. A has no spare capacity and has adequate demand in a competitive market.	Relevant Costs (i.e. VC + SFC + OC) (or) Market Price less SOH if any.
6. A has no spare capacity and has adequate demand in a competitive market. But on units transferred to B, it incurs ₹ 10 per unit as additional Transport Cost and ₹ 10,000 as Fixed Expenses irrespective of the number of units transferred.	Relevant Costs (i.e. VC + Trpt Costs + SFC + OC) Fixed Costs ₹ 10,000 to be absorbed by the number of units transferred.

Question 4(a): Flexible Budget**N 11 (10 Marks)**

Alfa Mills prepared the following budget for its Production Department for a year for 12,000 units of production.

Particulars	₹
Raw Material at ₹ 3 per unit	36,000
Labour 2 hours/unit at ₹ 2.5 per hour	60,000
Production Overheads:	
Power (Variable)	3,000
Repairs (Variable)	1,500
Indirect Labour (80% Variable)	2,400
Factory Rent (Fixed)	3,600
Factory Insurance (Fixed)	1,800
Other Manufacturing Expenses (50% Variable)	600
Total Production Cost	1,08,900

Present the Flexible Budget under Fixed and Variable Costs for – (a) Production of 10,000 units, and (b) Production of 15,000 units, for which Raw Material Price increases by 10% for the entire quantity and Labour Rate increases by ₹ 0.5 per hour for the full Direct Labour Hours.

Solution:**Flexible Budget**

Particulars	Given 12,000 Units	For 10,000 Units	For 15,000 Units
Variable Costs:			
Raw Materials	$12,000 \times ₹ 3 \text{ pu} = 36,000$	$10,000 \times ₹ 3 \text{ pu} = 30,000$	$15,000 \times ₹ 3 \text{ pu} \times 110\% = 49,500$
Labour	$12,000 \times 2 \text{ hrs} \times ₹ 2.5 \text{ ph} = 60,000$	$10,000 \times 2 \text{ hrs} \times ₹ 2.5 \text{ ph} = 50,000$	$15,000 \times 2 \text{ hrs} \times ₹ 3 \text{ ph} = 90,000$
Power	Given = 3,000	$\frac{3,000}{12,000} \times 10,000 = 2,500$	$\frac{3,000}{12,000} \times 15,000 = 3,750$
Repairs	Given = 1,500	$\frac{1,500}{12,000} \times 10,000 = 1,250$	$\frac{1,500}{12,000} \times 15,000 = 1,875$
Indirect Labour	$2,400 \times 80\% = 1,920$	$\frac{1,920}{12,000} \times 10,000 = 1,600$	$\frac{1,920}{12,000} \times 15,000 = 2,400$
Other Mfg Expenses	$600 \times 50\% = 300$	$\frac{300}{12,000} \times 10,000 = 250$	$\frac{300}{12,000} \times 15,000 = 375$
Sub-Total A	1,02,720	85,600	1,47,900
Fixed Costs:			
Indirect Labour	$2,400 \times 20\% = 480$	480	480
Factory Rent	Given = 3,600	3,600	3,600
Factory Insurance	Given = 1,800	1,800	1,800
Other Mfg Expenses	$600 \times 50\% = 300$	300	300
Sub-Total B	6,180	6,180	6,180
Total Prodn Cost (A+B)	1,08,900	91,780	1,54,080
Average Cost per unit	9.075	9.178	10.272

Question 4(b): Effect of SV Costs on BEQ**N 11 (6 Marks)**

Happy Holidays Co. contracts to take children on Excursion Trips. Relevant data for a proposed Excursion Trip is given below:

Particulars	₹
Revenue per trip per child	4,000
Expenses that have to be incurred:	
Train Fare per Child per trip	1,700
Meals per Child per trip	300
Craft Materials per Child per trip	600
Room Rent per trip (4 Children can be accommodated in a room)	760
Local Transport at Picnic Spots (per Vehicle) (each vehicle can seat 6 children excluding the Driver)	1,200

Fixed Costs that are required to be covered in a trip ₹ 5,18,130

Find the minimum number of children to cross the Break Even Point and start earning a profit.

Solution:

Particulars	₹
Revenue per Child	4,000
Less: Direct Variable Cost per Child (1,700 + 300 + 600)	2,600
Contribution per Child , without considering Room Rent and Local Transport Costs	1,400
In addition, Room Rent is incurred in Blocks of 4 Children and Transport in incurred in Blocks of 6 Children.	

Let the BEP number of Children = "x". So, Total Contribution = 1,400 × x = 1,400 x.

At BEP, Total Contribution = Fixed Costs (i.e. Given FC + Room Rent + Local Transport)

$$\text{So, } 1,400x = 5,18,130 + \left(\frac{x}{4} \times 760\right) + \left(\frac{x}{6} \times 1,200\right). \quad \text{On solving, we get, } 1,400x = 5,18,130 + 190x + 200x$$

$$\text{Simplifying, we have } (1,400 - 190 - 200)x = 5,18,130. \quad \text{So, } 1,010x = 5,18,130. \quad \text{So, } x = \frac{5,18,130}{1,010} = 513$$

The above BEP is computed to localize the search for the actual BEP, since Room Rent and Transport Costs are Semi-Variable Costs, and actual BEP can be computed by comparing Contribution and Fixed Costs at the following levels –

No. of Children	510	511	512	513	514	515	516	517
Total Contrib. at ₹ 1,400	7,14,000	7,15,400	7,16,800	7,18,200	7,19,600	7,21,000	7,22,400	7,23,800
General FC	5,18,130	5,18,130	5,18,130	5,18,130	5,18,130	5,18,130	5,18,130	5,18,130
Room Rent	97,280	97,280	97,280	98,040	98,040	98,040	98,040	98,800
Transport Costs	1,02,000	1,03,200	1,03,200	1,03,200	1,03,200	1,03,200	1,03,200	1,04,400
Total of Costs above	7,17,410	7,18,610	7,18,610	7,19,370	7,19,370	7,19,370	7,19,370	7,21,330
Profit / (Loss)	(3,410)	(3,210)	(1,810)	(1,170)	230	1,630	3,030	2,470

Note: The above Table is prepared based on approximate BEP = 513 as computed above. We identify a multiple of 4 and 6 which lies **below 513** (i.e. 512 is multiple of 4 and 510 is multiple of 6), and a multiple of 4 and 6 which lies **above 513** (i.e. 516 is a multiple of 4 as well as 6), and computations are made accordingly.

From the above Table, it is observed that **BEP = 514 Children**.

Question 5(a): Relevant Costing – Timing of New Product Launch**N 11 (6 Marks)**

Quickcomp is a successful version of a Software Package that is widely used. Fastercomp is the next version, for which the development is complete and it is ready to be sold immediately in the market as budgeted. However, for Fastercomp, User Manuals, Training Modules and Diskettes have not yet been made, whereas, for the Quickcomp Version, these are overstocked by 5,000 units. Release of Fastercomp will render the Quickcomp Version not saleable. The following data is provided (in ₹)

Particulars	Quickcomp	Fastercomp
Selling Price per unit	14,000	19,000
Variable Cost per unit (consisting of User Manuals, Training Modules and Diskettes)	1,000	4,000
Development Cost per unit (Total Cost of Development spread over the expected Sales Quantity during the products' life-cycle)	7,000	10,000
Marketing / Administration Cost per unit (Fixed Budgeted Annual Outflow divided by the expected Sales Quantity for each product for the year)	3,500	4,000
Total Cost per unit	11,500	18,000
Operating Income per unit	2,500	1,000

From a purely financial perspective, the Company wants your advice whether to delay the release of the new version by 2 months by when the inventory of the existing version would have sold out, or to release the new version immediately. Support your advice with relevant figures.

Solution: Effect of releasing Fastercomp Now

Particulars	₹ Lakhs
Benefit = Contribution from Fastercomp = 5,000 units × (₹ 19,000 – ₹ 4,000)	750
Cost = Sales Revenue of Quickcomp lost = 5,000 units × ₹ 14,000	700
Net Benefit in releasing Fastercomp now	50

Notes and Assumptions

- Development Cost is a sunk cost, and hence irrelevant.
- Fixed Marketing and Administrative Costs is an apportionment of FC, and hence irrelevant.
- Variable Costs of Quickcomp is historical and irrelevant.
- If Fastercomp is released now, the entire Sale Revenue (not Contribution) of Quickcomp is relevant as Opportunity Cost.

Question 5(b): Linear Programming – Simplex Method**N 11 (10 Marks)**

Given below is the relevant portion of the First Iteration of a Linear Program under the Simplex Method, using the usual notations.

			X_1	X_2	S_1	S_2	S_3
Quantity	Basic Variable	Contribution per unit	50	40	0	0	0
150	S_1	0	3	5	1	0	0
20	S_2	0	0	1	0	1	0
296	S_3	0	8	5	0	0	1

- (i) Write the Initial Linear Program with the Objective Function and the Inequalities. The following questions are to be answered independent of each other and based on the iteration given above:
- (ii) What is the Opportunity Cost of bringing one unit of X_1 into the solution?
- (iii) If we bring 4 units of X_1 into the solution, by how much will the Basic Variables change?
- (iv) What will be the change in the value of the Objective Function if 4 units of X_2 are brought into the solution?
- (v) What will be the quantity of the Incoming Variable?

Solution: Q.No.1: Let X_1 and X_2 be the number of units of Products, with three constraints as under –

$$\begin{aligned} \text{Maximise Contribution } Z &= 50 X_1 + 40 X_2 \text{ subject to: } 3 X_1 + 5 X_2 \leq 150 && \text{(Constraint 1)} \\ & && X_2 \leq 20 && \text{(Constraint 2)} \\ & && 8 X_1 + 5 X_2 \leq 296 && \text{(Constraint 3)} \\ & && X_1, X_2, \geq 0 && \text{(Non-Negativity Assumption)} \end{aligned}$$

First Simplex Table is completed as under –

FR	Program	C_n pu	Quantity	X_1	X_2	S_1	S_2	S_3	Repl. Ratio
3/8	S_1	0	150	3	5	1	0	0	50
0	S_2	0	50	0	1	0	1	0	Infinity
NA	S_3	0	296	8	5	0	0	1	37 Min non-ve
Decision:			Z (Objective Value)	50	40	0	0	0	
In = Key Column = X_1			C (Computed Value)	0	0	0	0	0	
Out = Key Row = S_3			Net Evaluation Row	50 max +ve	40	0	0	0	

Q.No.2: Opportunity Cost / Gain of bringing one unit of X_1 into the solution = NER of X_1 = 50 computed above.**Q.No.3:** If 4 units of X_1 are brought into the solution at this stage, the Basic Variables will change as under (from the Co-efficient Columns):

$$\begin{aligned} S_1 \text{ will change by} &= 4 \times 3 \text{ (} S_1 X_1 \text{ Entry)} = 12, \\ S_2 \text{ will change by} &= 4 \times 0 \text{ (} S_2 X_1 \text{ Entry)} = 0, \text{ and} \\ S_3 \text{ will change by} &= 4 \times 8 \text{ (} S_3 X_1 \text{ Entry)} = 32. \end{aligned}$$

Note: The Numbers under the Non-Program Variables X_1 and X_2 represent the Substitution Ratio, i.e. to produce 1 unit of X_1 , 3 units of S_1 must be sacrificed.**Q.No.4:** If 4 units of X_2 are brought into the solution at this stage, the Value of Objective Function will change by 4×40 (NER of X_2 in above Table) = 160.**Q.No.5:** Quantity of Incoming Variable X_1 (in the Second Simplex Table) = 37 (being the Minimum Non-Negative Replacement Ratio of First Simplex Table) as computed above.**Question 6(a): Network Analysis – Reverse Working****N 11 (10 Marks)**

The number of days of Total Float (TF), Earliest Start Times (EST) and durations in days are given for some of the following activities.

- (i) Draw the Network.
- (ii) List the Paths with their corresponding durations and state when the Project can be completed.

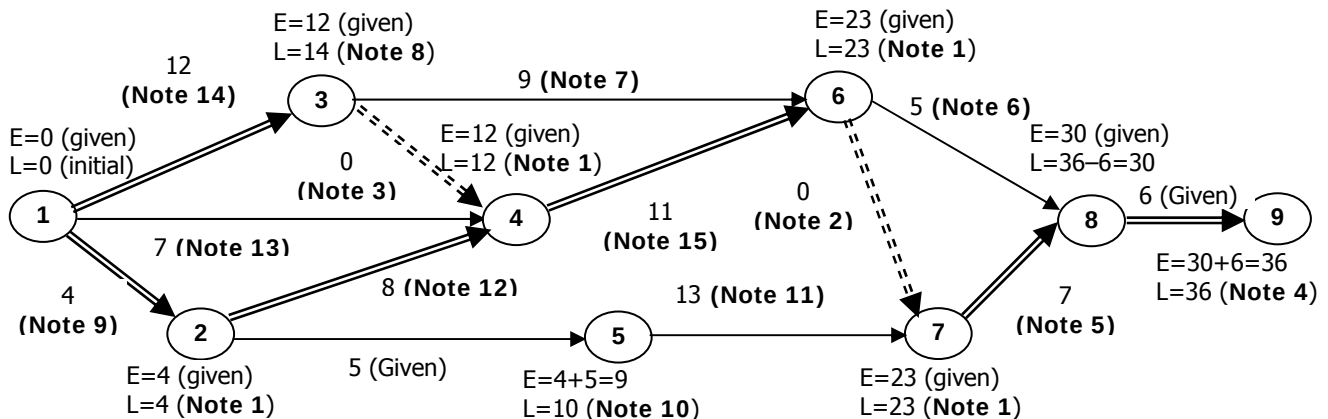
Activity	TF	EST	Duration
1 – 2	0	0	
1 – 3	0		
1 – 4	5		
2 – 4	0	4	
2 – 5	1		5
3 – 6	2	12	
4 – 6	0	12	
5 – 7	3		
6 – 7		23	
6 – 8	2		
7 – 8	0	23	
8 – 9		30	6

Solution:**Notes and Assumptions**

- Given that Activities 1 – 2, 1 – 3, 2 – 4, 4 – 6, 7 – 8 have Total Float = 0, and hence lie on the **Critical Path**. Hence, it follows that Activity 6 – 7 (i.e. linking activity between 4 – 6 and 7 – 8), and Activity 8 – 9 (terminal / last activity) should **also** be on the **Critical Path**, and hence their Total Floats = Zero. Also, their E and L event times (by Forward and Backward Pass computation) of these activities should be the same. So, **CP is 1 – 2 – 4 – 6 – 7 – 8 – 9**.
- Activity 6 – 7 & 7 – 8 have same EST, so, it means that Activity Duration of 6 – 7 = 0, and hence it is a Dummy Activity.
- It is given that Activity 1 – 3 has Total Float = 0, (i.e. Critical Path Activity), but it is not connected logically to any further activity lying on the Critical Path as in Point 1 above. Hence, to clarify precedence of activities, Activity 3–4 is now introduced as a Dummy Activity, so as to result in **another Critical Path 1 – 3 – 4 – 6 – 7 – 8 – 9**.

After drawing the Network Diagram and updating the information given in the question, the following additional computations are made –

- For Terminal Event 9, E and L Values are the same. Hence, E Value as per Forward Pass = 36 = L Value also.
- Duration of Activity 7–8 = 'E' of Node 8 less 'E' of Node 7 = 30 – 23 = 7.
- Duration of Activity 6–8 = 'E' of Node 8 less 'E' of Node 6 less Total Float of 6–8 = 30 – 23 – 2 = 5
- Duration of Activity 3–6 = 'E' of Node 6 less 'E' of Node 3 less Total Float of 3–6 = 23 – 12 – 2 = 9
- 'L' of Node 3 = L of Node 6 less Duration of Activity 3–6 = 23 – 9 = 14
- Duration of Activity 1–2 = 'E' of Node 2 less 'E' of Node 1 = 4 – 0 = 4.
- 'L' of Node 5 = L of Node 2 + Duration of Activity 2–5 + Total Float of 2–5 = 4 + 5 + 1 = 10
- Duration of Activity 5–7 = 'L' of Node 7 less 'L' of Node 5 = 23 – 10 = 13
- Duration of Activity 2–4 = 'L' of Node 4 less 'L' of Node 2 = 12 – 4 = 8
- Duration of Activity 1–4 = 'L' of Node 4 less 'L' of Node 1 less Total Float of 1–4 = 12 – 0 – 5 = 7
- Duration of Activity 1–3 = 'E' of Node 3 less 'E' of Node 1 = 12 – 0 = 12.
- Duration of Activity 4–6 = 'E' of Node 6 less 'E' of Node 4 = 23 – 12 = 11.



Paths	Duration (days)
1 – 3 – 6 – 8 – 9	$12 + 9 + 5 + 6 = 32$
1 – 3 – 6 – 7 – 8 – 9	$12 + 9 + 0 + 7 + 6 = 34$
1 – 3 – 4 – 6 – 7 – 8 – 9	$12 + 0 + 11 + 0 + 7 + 6 = 36$ (Critical Path)
1 – 4 – 6 – 8 – 9	$7 + 11 + 5 + 6 = 29$
1 – 4 – 6 – 7 – 8 – 9	$7 + 11 + 0 + 7 + 6 = 31$
1 – 2 – 4 – 6 – 8 – 9	$4 + 8 + 11 + 5 + 6 = 34$
1 – 2 – 4 – 6 – 7 – 8 – 9	$4 + 8 + 11 + 0 + 7 + 6 = 36$ (Critical Path)
1 – 2 – 5 – 7 – 8 – 9	$4 + 5 + 13 + 7 + 6 = 35$

Observation: The Project can be completed in **36 days** (i.e. Critical Path Duration)

Note: Inspite of the above computation, there will still be an inconsistency in the computation of Floats in the Path 1 – 2 – 5 – 7 – 8 – 9, based on the data given in the question.

Question 6(b): Pricing Strategies – Theory

N 11 (4 Marks)

State the Pricing Policy most suitable in each of the following independent situations:

Situation	Answer and Reference
1. The Company makes original equipments and does Defence Contract work. There are other Companies which also undertake such projects.	Sealed Bid Pricing Page No.3.5, Q.No.13
2. The Product made by a Company is new to the market. It is expected to enjoy a long-term demand. Competition is expected very soon, since the product will be desirable to most Customers.	Skimming Pricing Page No.3.9, Q.No.25
3. Stock of processed ready-to-eat products, whose shelf-life will soon be over in the next 2 months. The product is going to be discontinued.	Variable Cost / Below VC Pricing Page No.3.3, Q.No.5
4. A Company sells a homogeneous product in a highly competitive market.	Going Rate Pricing Page No.3.4, Q.No.12

Question 6(c): Marginal Costing – Indifference Point

N 11 (2 Marks)

Two Companies, H and L, have the same values for Turnover and Net Profit and make a similar product. H has a higher PV Ratio than L. Which Company will perform better when: (i) the market demand is high? (ii) the market demand is low?

Solution: Since Companies H and L have the same Sales Value and Net Profit, but H has a higher PVR, it is inferred that H also has a higher Fixed Cost than L (since PVR is higher for Company H, its higher Contribution should be reduced by a higher Fixed Cost burden, in order to result in the same Net Profit as Company L). So, the inference is as under –

Market Demand	Profitable Company	Reason
High	H	Higher PVR (above Indifference Point)
Present Situation	Either H or L	Same Profit (= Indifference Point)
Low	L	Lower Fixed Cost (below Indifference Point)

Question 7: Answer any 4 out of the following 5 questions:

N 11 (4 × 4 = 16 Marks)

Question	Answer Reference
(a) What are the steps involved in the Simulation Process?	Page No.21.1, Q.No.1 (RTP, N 06, M 09)
(b) What are the limitations of the Learning Curve Theory?	Page No.20.2, Q.No.5 (RTP)
(c) Briefly explain the phases in the Life Cycle of a product.	Page No.10.1, Q.No.3
(d) Explain briefly Pareto Analysis and mention some of its uses.	Page No.3.12, Q.No.33, 34 (N 08)
(e) Explain the concept of Just In Time approach in a production process.	Page No.13.1, Q.No.1,2,3 (N 08)