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SUGGESTED SOLUTION

FINAL MAY 2014 EXAM

ADVANCED MANAGEMENT ACCOUNTING

Prelims (Test Code - F N J 3 0 5)

(Date : 08 April, 2014)

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Ans 1

(a)

1) Statement showing Cost Per Patient Day

	Particulars	**₹**	**₹**
A.	Variable Costs:		
	Foods	28,000	
	Laundry Charges	36,000	
	Medicines	32,000	
	Doctor fees [2 x ₹ 10,000 x 12]	2,40,000	3,36,000
B.	Fixed Costs:		
	Repair & Maintenance	10,000	
	Rent [₹ 15,000 x 12]	1,80,000	
	Other fixed expenses	1,46,000	
	Supervisors' salary (2 x 12 x 2,000)	48,000	
	Nurses' salary (4 x 12 x 2,000)	96,000	
	Ward boys' salary (2 x 12 x 1,000)	24,000	5,04,000
C.	Total Costs (A + B)		8,40,000
D.	Add: Profit (100% on Total Cost)		8,40,000
E.	Total Revenue Required		16,80,000
F.	No. of Patient Days [(200 x 20) + (100 x 16)]		5,600
G.	Charge per day per patient [E/F]		300

2) Break even point= $\frac{\text{FixedCosts}}{\text{Contributionperpatientday}}$

= $\frac{\text{RS. 5,04,000}}{\text{RS.300}-\text{RS.60}}$

= 2,100 patient day

Note: Variable Cost per Patient Pay = ₹ 3,36,000/5,600 = ₹ 60

(b)

Statement of cost benefit

Particulars	**W.N. No.**	**₹**
Revenue		34,000
Less: Relevant Cost		
Material	(ii)	2,000
Labour	(iii)	18,000
Consultancy fee	(iv)	2,500
General overhead/Additional		—
Benefits		**11,500**

It is better to accept the offer for the completion of machine because incremental revenue is sufficient to cover the relevant cost.

Working Notes:

(i) Past cost of ₹ 50,000 is Sunk Cost.

(ii) **Material:**

Book Value = 6,000 (obsolete)
Scrap Sale value = 2,000
Relevant cost = 2,000.

(iii) **Labour:**

		₹
	Revenue	30,000
	(-) Direct cost.	(12,000)
Labour	(-) Labour cost	(8,000)
(Casual + Busy)	Contribution	**10,000**
	Offer labour cost	8,000
	+ Cont. lost	10,000
		18,000

(iv)

Cost to be incurred due to acceptance of offer	4,000
Less: benefit to be achieved due to acceptance of offer	1,500
Relevant cost	**2,500**

(v) General overhead always to be termed as sunk cost because change in apportionment does not change in total cash outflow.

(c) Statement of Learning Curve (80%)

Cumulative produce	**Average time per unit**	**Total time**	**incremental hours**
30	200(i.e. 6,000/30)	6,000	—
60	160(i.e. 80% of 200)	9,600(i.e. 160 x 60)	3,600
120	126(i.e. 80% of 160)	15,360(i.e. 120 x 128)	5,760

Incremental time for next 90 units = total time for first 120 units total time for first 30 units
= 15,360 - 6,000 = 9,360 hours

Statement of Revenue Cost

Cost to be incurred:

Material (20,000/30 x 90)	= 60,000
Labour (9,360 x 4)	= 37,440
Variable overhead (9,360 x 0.5)	= 4,680
Tooling cost	= NIL
Fixed overhead	= NIL
Revenue Cost	1,02,120

As relevant cost is less than quoted price. Hence, its better to accept the offer i.e. as the relevant cost ₹ 1, 02,120 is less than quoted price ₹ 1,10,000. Hence it better to accept the offer.

(d) Statement of Comparative Cost Benefit

Saving in Cost:

Particulars		**₹**
Rework (hr) cost	(1,200 x ₹ 40)	4,80,000
Customer support	(800 x ₹ 20)	16,000
Load	(200 x ₹ 180)	36,000
Repair	(800 x ₹ 45)	3,60,000
Additional contribution		
(100 Copies x ₹ 6,000)		6,00,000
Saving in costs		14,92,000
[Extra cost (₹ 50 x 20,000)]		10,00,000
Net Benefit		**4,92,000**

Decision: It is better to Introduce new lens. The additional cost of lens on addition copier has been already analyzed in arriving at figure of contribution £6,000. Hence, there is no need to consider again.

Ans 2

(a)

i. Calculation of Material Cost Variances

Standard Material for Actual Output = 50,000 x 1.3 = 65,000 tons

Basic Calculations for the Computation of Material Cost Variances

SQ for AO	SP	SQ x SP (1)	AQ	AP	AQ x AP(2)	AQ x SP(3)
65,000	4.00	2,60,000	78,000	4.20	3,27,600	3,12,000

A. Material Cost Variance (1 - 2) = ₹ 67,600 (A)
B. Material Usage Variance (1 - 3) = ₹ 52,000 (A)
C. Material Price Variance (3 - 2) = ₹ 15,600 (A)

Verification:

Material Cost Variance = Material Usage Variance + Material Price Variance
= ₹ 52,000 (A) + ₹ 15,600 (A) = ₹ 67,600

ii. Calculation of Labour Cost Variances

Standard hours for Actual Output = 50,000 x 2.9 = 1,45,000

Basic Calculations for the Computation of Labour Cost Variances

SH for AO	SR	SH x SR (1)	AH	AR	AH x AR(2)	AH x SR (3)
1,45,000	2.30	3,33,500	1,50,000	2.50	3,75,000	3,45,000

A. Labour Cost Variance (1 - 2) = ₹ 41,500 (A)
B. Labour Efficiency Variance (1 - 3) = ₹ 11,500 (A)
C. Labour Rate Variance (3 - 2) = ₹ 30,000 (A)
Verification:
Labour Cost Variance = Labour Efficiency Variance + Labour Rate Variance
= ₹ 11,500 (A) + ₹ 30,000 (A) = ₹ 41,500

iii. Calculation of Overhead Cost Variances
Basic Calculations for Variable Overhead Variances

1. Absorbed Overheads (SH x SR) =	₹ 2,17,500
2. Standard Overheads (AH x SR) =	₹ 2,25,000
3. Actual Overheads =	₹ 2,38,000

Computation of Variances

A.	Variable Overheads Efficiency Variance (1 - 2)	= ₹ 2,17,500 - ₹ 2,25,000	= 7,500 (A)
B.	Variable Overheads Expenditure Variance (2 - 3)	= ₹ 2,25,000 - ₹ 2,38,000	= 13,000 (A)
C.	Total Variable Overheads Variance (A + B)		**= ₹ 20,500 (A)**

Basic Calculations for Fixed Overhead Variances

1. Absorbed Overheads (SH x SR) =	₹ 72,500
2. Standard Overheads (AH x SR) =	₹ 75,000
3. Budgeted Overheads (BH x SR) =	₹ 1,00,000
4. Actual Overheads =	₹ 1,02,000

Computation of Variances

A.	Fixed Overheads Efficiency Variance (1 – 2) = ₹ 72,500 – ₹ 75,000	₹ 2,500 (A)
B.	Fixed Overheads Capacity Variance (2 – 3) = ₹ 75,000 – ₹ 1,00,000	₹ 25,000 (A)
C.	Total Fixed Overheads Volume Variance (A + B)	₹ 27,500 (A)
D.	Fixed Overheads Expenditure Variance (3 – 4) = ₹ 1,00,000 – ₹ 1,02,000	₹ 2,000 (A)
E.	Total Fixed Overheads Variance (C + D)	₹ 29,500 (A)

Identification of department(s) who might be held responsible for each variance :

	Name of the Variance	**Name of the Department**
1.	Material Price variance	Purchase Department
2.	Material Usage variance	Production Department/Factory Foreman
3.	Labour Rate Variance	Personnel Dept./Management Policy
4.	Labour Efficiency variance	Production Dept./Factory Foreman
5.	Overhead variances	Production Dept/Factory Foreman mainly

(b)

1) Standard Cost Sheet

	Particulars	**Product 'A'**	**Product 'B'**
A.	Selling Price per unit	₹ 30.00	₹ 40.00
B.	Less: Variable Cost:		
	(i) Direct Material:		
	— X	6.00	12.00
	— Y	1.00	2.00
	(ii) Direct Labour:		
	— P Dept.	2.00	2.00
	— Q Dept.	3.00	3.00
	(iii) Variable Overheads	2.61	1.74
		14.61	20.74
C.	Contribution (A - B)	**15.39**	**19.26**
D.	Less: Fixed Overheads	4.89	3.26
E.	Profit (C - D)	**10.50**	**16.00**

2) And 3) Flexible Budget

Particulars	Product A	Product 'A'	Product 'B'	Product B
	50%	75%	75%	100%
A. Sales (in units)	5,000	7,500	6,000	8,000
B. Selling Price per Unit	₹ 30	₹ 30	₹ 40	₹ 40
C. Total Sales (A × B)	1,50,000	2,25,000	2,40,000	3,20,000
D. Variable Cost of Sales :				
(i) Direct Material : X	30,000	45,000	72,000	96.000
Y	5,000	7,500	12,000	16,000
(ii) Direct Labour:				
P Dept.	10,000	15,000	12,000	16,000
Q Dept.	15,000	22,500	18,000	24,000
(iii) Variable Overheads	13,050	19,575	10,440	13,920
	73,050	1,09,575	1,24,440	1,65,920
E. Contribution (C – D)	76,950	1,15,425	1,15,560	1,54,080
F. Fixed Overheads	48,900	48,900	26,080	26,080
G. Profit (E–F)	**28,050**	**66,525**	**89,480**	**1,28,000**

Ans 3

(a)

1) Statement showing the Cost Per Unit under Various Alternatives

Particulars	20,000 units		40,000 units	
	Automatic Machine	Semi-Automatic Machine	Automatic Machine	Semi-Automatic Machine
Variable cost (₹)	12.00	15.00	12.00	15.00
Fixed overheads other than depreciation	8.10	4.20	4.05	2.10
Depreciation (₹)	4.50	3.00	2.25	1.50
Total cost of manufacture (₹)	24.60	22.20	18.30	18.60
Cost of Buying per unit (₹)	24.00	24.00	24.00	24.00

It is profitable to install semi-automatic machine at the production level of 20,000 units. However at the volume of 40,000 units, automatic machine should be installed.

2) Statement Showing the Change over from Purchase to Manufacture

Particulars	Automatic-Machine	Semi- Automatic Machine
A. Purchase price of component	₹ 24.00	₹ 24.00
B. Variable costs of manufacture	₹ 12.00	₹ 15.00
C. Saving [A -B]	₹ 12.00	₹ 9.00
D. Total Fixed costs (including depreciation)	₹ 2,52,000	₹ 1,44,000
E. Number of units at which change over is effected [D/C]	21,000	16,000

3) Statement Showing Switchover from One Type of Machine to the Other

Particulars	Automatic Machine	Semi Automatic Machine	Difference Machine
Variable cost	₹ 12	₹ 15	₹ 3
Total fixed cost (including Depreciation)	₹ 2,52,000	₹ 1,44,000	₹ 1,08,000
Number of units at which switch over is effected [difference in fixed costs/ difference in variable costs per unit]			36,000 units

Working Note:

Calculation of fixed overheads per unit and depreciation per unit.

Particulars	20,000 units		40,000 units	
	Automatic Machine	Semi-Automatic Machine	Automatic Machine	Semi-Automatic Machine
A. Fixed Overheads (₹)	1,62,000	84,000	1,62,000	64,000
B. Depreciation (₹)	90,000	60,000	90,000	60,000

C. No. of units	20,000	20,000	40,000	40,000
D. Fixed OH per unit (₹) [A/C]	8.10	4.20	4.05	2.10
E. Depreciation per Unit |B/C]	4.50	3.00	2.25	1.50

(b) Step 1 Formulation of LP Problem after introducing slack variables:

Max. $Z = 6X_1 + 8X_2 + 0S_1 + 0S_2$

Subject to constraints:

$2X_1 + 3X_2 + S_1 = 16$

$4X_1 + 2X_2 + S_2 = 16$

$X_1, X_2, S_1, S_2 \geq 0$

Step 2 Preparing Initial Simplex Table:

Simplex Table I

Contribution per unit $C_i \rightarrow$			6	8	0	0	Replacement Ratio
↓ C_i	Variable	Qty	x_1	x_2	S_1	S_2	Qty/Value of Key Column
0	S_1	16	2	3	1	0	$\frac{16}{3} = 5.33$ ←
0	S_2	16	4	2	0	1	$\frac{16}{2} = 8$
Total Contribution (Z_j)			0	0	0	0	
Opportunity Loss ($C_i - Z_j$)			6	8	0	0	

↑ Key Column ↓ Key Element ← Kew Row

Hence, the outgoing variable is S_1 and the incoming variable is X_2

Step 3 Replacing the outgoing variable (S_1) by incoming variable (x_2)together with its contribution per unit.

Step 4Calculating the new values of Key Row as under:

New Values of Key Row $= \frac{\text{OldValuesofKeyRow}}{\text{KeyElement}} = \frac{16}{3}\ \frac{2}{3}\ \frac{3}{3}\ \frac{1}{3}\ \frac{0}{3}$

Step 5
Calculating the new values of other Rows (i.e. Non-key Row) as under:

A	Old Values	16	4	2	0	1
B	New Values of Key Row	$\frac{16}{3}$	$\frac{2}{3}$	1	$\frac{1}{3}$	0
C	Key Column Element	2	2	2	2	2
D	Product of B & C	$\frac{32}{3}$	$\frac{4}{3}$	2	$\frac{2}{3}$	0
E	New Values (A – D)	$\frac{16}{3}$	$\frac{8}{3}$	0	$-\frac{2}{3}$	1

Step 6
Preparing second simplex table

Simplex Table II

Contribution per unit $C_j \rightarrow$			6	8	0	0	Replacement Ratio
$C_j \downarrow$	Variable	Qty	x_1	x_2	S_1	S_2	Qty/Value of Key Column
8	x_2	$\frac{16}{3}$	$\frac{2}{3}$	1	$\frac{1}{3}$	0	$\frac{16/3}{2/3} = 8$
0	S_2	$\frac{16}{3}$	$\boxed{\frac{8}{3}}$ ←	0	$-\frac{2}{3}$	1	$\frac{16/3}{8/3} = 2$ ←
Total Contribution (Z_j)			5.33	8	$\frac{8}{3}$.	0	
Opportunity Loss ($C_j - Z_j$)			− 67	0	$-\frac{8}{3}$	0	

Key Column — Key Element — Key Row

Step 7

Replacing the outgoing variable (S_2) by incoming variable (X_1) together with its contribution per unit.

Step 8

Calculating the new values of Key Row as under:

New Values of Key Row= $\frac{\text{Old Values of Key Row}}{\text{Key Element}}$

$= \frac{16/3}{8/3} \quad \frac{8/3}{8/3} \quad \frac{0}{8/3} \quad \frac{-2/3}{8/3} \quad \frac{1}{8/3}$

$= 2 \quad 1 \quad 0 \quad \frac{-1}{4} \quad \frac{3}{8}$

Step 9

Calculation of the New Values of Non Key Rows as under:

A	Old Values	$\frac{16}{3}$	$\frac{2}{3}$	1	$\frac{1}{3}$	0
B	New Values of Key Row	2	1	0	$\frac{-1}{4}$	$\frac{3}{8}$
C	Key Column Element	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$
D	Product of B & C	$\frac{4}{3}$	$\frac{2}{3}$	0	$\frac{1}{-6}$	$\frac{1}{4}$
E	New Values (A - D)	4	0	1	$\frac{1}{2}$	$-\frac{1}{4}$

Step 10

Simplex Table III

Contribution per unit $C_j \rightarrow$			6	8	0	0
$\downarrow C_j$	Variable	Quantity	x_1	x_2	S_1	S_2
8	x_2	4	0	1	$\frac{1}{2}$	$-\frac{1}{4}$
6	x_1	2	1	0	$-\frac{1}{4}$	$\frac{3}{8}$
Total Contribution (Z_j)		44	6	8	2.5	.25
Opportunity Loss ($C_j - Z_j$)			0	0	–2.5	–.25

Optimal Solution : Since, the values of $C_j - Z_j$ are ≤ 0, the solution is optimal at $x_1 = 2$ and $x_2 = 4$. The optimal value of $Z = 2 \times 6 + 4 \times 8 =$ Rs. 44.

Ans 4

(a)

1) Revised Operating Statement using Contribution approach **(₹ '000)**

Particulars	Foam	Carpets	Upholstery	Total
A. Sales revenue	1,680	1,200	1,200	4,080
B. Less : Variable manufacturing costs:	1,200	700	760	2,660
C. Contribution [A – B]	480	500	440	1,420
D. Traceable Costs :				
Fixed manufacturing costs	—	100	20	120
Administration expenses	94	76	122	292
Selling expenses	162	180	202	544
Total	256	356	344	956
E. Operating income : [C – D)	224	144	96	464
F. Less: Common expenses (₹ 130 + ₹ 100)				230
G. Net Income of the company [E – F]				**234**

Working Notes:

i. Computation of sales revenue of Foam division

Particulars	(₹ '000)
Sales of foam division to outside customers (₹ 1,600 – ₹ 200)	1,400
Less: Variable manufacturing costs (₹ 1200 – ₹ 200)	(1,000)
Mark – up on outside sale	400
Percentage of mark – up (₹ 400 / ₹ 1000) × 100 = 40%	
Transfer price of foam to upholstery division	280
Sales of foam division to outside customers	1,400
Total	**1,680**

ii. Variable Mfg. costs of Upholstery Division in (₹ '000)

(₹ 680– ₹ 200 + ₹ 280) = ₹ 760

iii. Computation of Traceable Administration Expenses

Particulars	Foam	Carpets	Upholstery	Total
A. Given Administration Expenses	134	116	172	422
B. Less : Common Expenses	(40)	(40)	(50)	(130)
(10% of Gross Profit)				
C. Traceable Administration Expenses	94	76	122	292

iv. Traceable Selling Expenses

(₹ in '000)

Particulars	Foam	Carpets	Upholstery	Total
A. Given Selling Expenses	202	210	232	644
B. Less : Common Expenses	(40)	(30)	(30)	(100)
(2.5% of sales)				
C. Traceable Selling Expenses [A – B]	**162**	**180**	**202**	**544**

2) Comparative Profitability & Ranking Statement
(based on contribution approach relevant ratios calculated by using figures of (a) part)

Particulars	Foam	Carpets	Upholstery
Contribution	28.57	41.67	36.67
Margin ratio (in %)	(₹ 480/1680) × 100	(₹ 500/1200) × 100	(₹ 440/1200) × 100
Ranking	III	I	II
Net Contribution	13.33	12	8
Ratio in % Or (operating income ratio)	(₹ 224/1,680) × 100	(₹ 144/1,200) × 100	(₹ 96/1200) × 100
Ranking	**I**	**II**	**III**

Comment: The Manager of Foam Division, appears to be correct in raising objection over the approach used for presenting operating performance of three divisions for Ihe year 2010-2011%, His division is the best among all, on the basis of {Net Contribution/Sales) ratio which is the highest inspite of its contribution margin ratio to be the lowest.

3) The use of contribution approach for reporting is more realistic for assessing the performance of various divisions as it considers variable and traceable costs only and avoids common costs while finding out profitability. This approach enables the management to rightly interpret the information. Further pricing of internal transfers at market price will give due credit to specific profit centre i.e. transferor.

(b)

1) Calculation of Budgeted BEP for the company as a whole

Overall P/V Ratio $= \frac{\text{Total Contribution}}{\text{Total Sales}} \times 100 = \frac{80,000+1,40,000+1,05,000}{10,00,000} \times 100 = \frac{3,25,000}{10,00,000} \times 100 = 32.5\%$

Overall BEP $= \frac{\text{Total Fixed Costs}}{\text{Overall } \frac{P}{V} \text{ Ratio}} = \frac{52,000+1,30,000+78,000}{32.5\%} = \frac{2,60,000}{32.5\%} =$ ₹ 8,00,000

2) Statement showing the Effect on Budgeted Income if Half the Sales of Product B is Shifted Equally to Products A and C

Particulars	Product A	Product B	Product C	Total
	₹	₹	₹	₹
A Sales	3,25,000	2,50,000	4,25,000	10,00,000
B Total cost				
Cost of goods sold	1,46,250	1,35,000	2,12,500	4,93,750
Selling	48,750	45,000	63,750	1,57,500
Fixed Expenses : (apportioned				
according to sales) @ 18%	58,500	45,000	76,500	1,80,000
Administrative @ 8%	26,000	20,000	34,000	80,000
	2,79,500	**2,45,000**	**3,86,750**	**9,11,250**
C Income before Tax [A – B]	45,500	5,000	38,250	88,750
D Income Tax @ 40%	18,200	2,000	15,300	35,500
E Net Income [C – D]	**27,300**	**3,000**	**22,950**	**53,250**

The original budgeted income is ₹ 39,000. Hence, the income would increase by ₹14,250 as a result of the proposed change.

3) Effect of shift in the product mix on Budgeted B.E.P.

Overall P/V Ratio $= \frac{\text{Total Contribution}}{\text{Total Sales}} \times 100$

$$= \frac{1,30,000+70,000+1,48,750}{10,00,000} \times 100 = \frac{3,48,750}{10,00,000} \times 100 = 34.875\%$$

Overall Break – even point= $\frac{\text{total fixed costs}}{\text{Overall P/V Ratio}} = \frac{2,60,000}{34.875\%}$ = ₹ 7,45,520

Thus, the break – even point will stand reduced to sales of ₹ 7,45,520 from ₹ 8,00,000 as result of shift in the total production mix.

Ans 5

(a) Let the Budgeted Selling Price of Product 'B' be x,

Revised Quantity for Actual Mix: A:$\frac{60}{100} \times 110 = 66$Kg.

B:$\frac{40}{100} \times 110 = 44$Kg.

Basic Calculations for the Computation of Sales Variances (on sales value Basis)

Type of Product	BO	BP	BQ x BP (1)	AQ	AP	AQ x AP (2)	AQ x BP (3)	RQ	RQ x BP (4)
A	60	20	1,200	44	25	1,100	880	66	1,320
B	40	x	40x	66	5	330	66x	44	44x
	100		1,200 + 40x	110		1,430	880+66x	110	1,320+44x

1) Sales Value Variance (2−1) = (AQ × AP) − (BQ × BP)

−₹ 170 = 1,430−(1,200 + 40x)

1200 + 40 x = 1,430 + 170 = 1,600

x = (1,600 − 1,200)/40 = ₹ 10 per kg.

2) Sales Volume Variance (3−1) = (AQ × BP) − (BQ × BP)

₹ 70 = (880 + 66x) − (₹ 1,200 + 40x)

₹ 70 = − ₹ 320 + 26 x

x = (320 + 70)/26 = ₹ 15 per kg.

3) Sales Sub-volume Variance (4 − 1) = (RQ × BP) − (BQ × BP)

₹ 160 = (1,320 + 44x) − (1,200 + 40x)

₹ 160 = +₹120 + 4x

X = (₹ 160 − ₹ 120)/4 = ₹ 10 per kg.

4) Sales Mix Variance (3−4) = (AQ × BP) − (RQ × BP)

−₹ 110 = (880 + 66x)−(1,320 + 44x)

− ₹ 110 = −440 + 22x

x = (440 − 110)/22 = ₹ 15 per kg.

5) Sales Price Variance (2−3) = (AQ × AP) − (AQ × BP)

₹ 220 = 1,430 − (880 + 66x)

₹ 220 = + 550 − 66x

x = (550 − 220)/66 = ₹ 5 per kg.

(b) Step 1 - The following matrix gives the cost incurred if the typist (i = A, B, C, D, E) executes the job (j = P, Q, R, S, T) which is calculated by following formula:

$= \frac{\text{Total No.of Pages}}{\text{No.of pages typed/ hour}}$ (Rounded off to next integer) ↕ Rate per hour (₹)

Typist	Job				
	P	Q	R	S	T
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

Step 2 - **Row Subtraction:** Subtracting the minimum element of each row from all elements of that row.

Typist	Job				
	P	Q	R	S	T
A	20	10	0	60	10
B	24	12	0	66	12
C	18	9	0	57	12
D	20	12	0	60	12
E	20	8	0	56	12

Step 3 – Column Subtraction: Subtracting the minimum element of each column from all the elements of that column and then drawing the minimum number of lines to cover all zeros.

Typist	Job				
	P	Q	R	S	T
A	2	2	0	4	0
B	6	4	0	10	2
C	0	1	0	1	2
D	2	4	0	4	2
E	2	0	0	0	2

Since the number of lines = 4 and order of matrix = 5, we will have to take step to increase the number of zeros.

Step 4 – Subtracting the minimum uncovered element (2 in this case) from all uncovered elements and adding it to all elements at the intersection point of the above lines and then drawing minimum number of lines to cover all zeros.

Typist	Job				
	P	Q	R	S	T
A	2	2	2	4	0
B	4	2	0	8	0
C	0	1	2	1	2
D	0	2	0	2	0
E	2	0	2	0	2

Since number of lines = 4 and order of matrix = 5, we will have to take step to increase the number of zeros.

Step 5 – Subtracting the minimum uncovered element (1 in this case) from all uncovered elements and adding it to all elements at the intersection point of the above lines and then drawing the minimum number of lines to cover all zeros.

Typist	Job				
	P	Q	R	S	T
A	2	1	2	3	0
B	4	1	0	7	0
C	0	0	2	0	2
D	0	1	0	1	0
E	3	0	3	0	3

Step 6 – Assignment:- Selecting a row containing exactly one unmarked zero and surrounding it by □ and draw a vertical line thorough the column containing this zero. Repeating this process till no such row is left; then selecting a column containing exactly one unmarked zero and surrounding it by □ and draw a horizontal line through the row containing this zero and repeating the process till no such column is left.

Typist	Job P	Q	R	S	T
A	2	1	2	3	0
B	4	1	0	7	0
C	0	0	2	0	2
D	0	1	0	1	0
E	3	0	3	0	3

Step 7 – Computing minimum cost:

Typist	Job		Cost (₹)
A	T	:	75
B	R	:	66
C	Q	:	66
D	P	:	80
E	S	:	112
	Total	₹	**399**

Alternate solution:

Typist	Job P	Q	R	S	T
A	2	1	2	3	0
B	4	1	0	7	0
C	0	0	2	0	2
D	0	1	0	1	0
E	3	0	3	0	3

Minimum cost:

Typist	Job	Cost (₹)
A	T	75
B	R	66
C	S	114
D	P	80
E	Q	64
	Total	**399**

Ans 6

(a) Statement of comparative cost (Relevant Cost)

Particulars	Present System ₹	JIT System ₹
Purchase Cost	2,00,000 (10 × 20,000)	2,01,000 (10.05 × 20,000)
Ordering Cost	100 (5×20)	1,000 (50×200)
Storage Cost	2,250 (4.50 × 500)	220 (4.5×50)
Stock out Cost	-	300 (3 × 100)
Opportunity Cost	1,000	100.50
	2,03,350	**2,02,625.50**

Decision: It is better to implement just in time due to cost saving ₹ 724.50(2,03,350 – 2,02,625.50)

Working Note:

Particulars	Present	JIT Analysis
Purchase cost	10	10.05
Order	20	200
Required (unit)	20,000	20,000

Order size	1,000	100
Average stock	1/2 × 1,000 = 500	1/2 × 100= 50
Carrying cost	4.5	4.5
Working capital blocked	5,000 (500 × 10)	502.5 (50 × 10.05)
Opp. cost on WC blocked	1,000 (5,000 × 20%)	100.50 (502.5 × 20%)

(b)

Statement showing Allocation of Random Numbers

(Demand)

Demand	Probability	Cumulative probability	Random Nos.
0	0.10	0.10	0-9
1	0.45	0.55	10-54
2	0.30	0.85	55-84
3	0.15	1.00	85-99

Lead Time

2	0.20	0.20	0-19
3	0.65	0.85	20-84
4	0.15	1.00	85-99

Table: Simulation of Demand and Lead Time for 15 Days

Day	Stock on hand Beginning of week	Demand Random No.	Quantity demanded	Quantity received	Stock on hand end of week	Inventory carrying costs	Stock out quantity	Lead Time Costs	Random No.	Lead Time Period
1	10	49	1	–	9	45				
2	9	67	2	–	7	35				
3	7	06	0	–	7	35				
4	7	30	1	–	6	30				
5	6	95	3	–	3	15			84	3
6	3	01	0	–	3	15				
7	3	10	1	–	2	10				
8	2	70	2	12	12	60				
9	12	80	2	–	10	50				
10	10	66	2	–	8	40				
11	8	69	2	–	6	30				
12	6	76	2	–	4	20			79	3
13	4	86	3	–	1	5				
14	1	56	2	–	–	–	1	75		
15	–	84	2	12	10	50				

For the simulated period of 15 days, the total inventory costs are:-

Inventory carrying costs =₹440

Ordering costs (2 orders × 120) =₹240

Stock – out costs (1 stock – out) = ₹75

=₹755

(c)

1) (i) Traditional Absorption Costing

Step 1: Overhead Absorption Rates:

Department 1 = ₹ 11,00,000/1,83,333 = ₹ 6 per Labour Hour

Department 2 = ₹ 15,00,000/5,00,000 = ₹ 3 per Machine Hour

Step 2: Product Cost Statement under Traditional Method

Products	**A**	**B**	**C**
	₹	**₹**	**₹**
Direct Materials	50	40	30
Direct Labour	30	40	50

Overhead:			
Department 1	18	24	30
	(3 hrs. × ₹ 6)	(4 hrs. × ₹ 6)	(5 hrs. × ₹ 6)
Department 2	12	12	21
	(4 hrs. × ₹ 3)	(4 hrs. × ₹ 3)	(7 hrs. × ₹ 3)
Total Cost per unit	**110**	**116**	**131**

(ii) Activity Based Costing

Receiving/inspecting $= \frac{\text{RS.14,00,000}}{\text{5,000(No.of Batches received/inspected)}} =$ **₹ 280 per requisition**

Production Scheduling/Machine set up = ₹1,500 per set up.

Product Cost Statement (Per unit) under ABC system

Products	**A**	**B**	**C**
	₹	**₹**	**₹**
Direct Materials (₹)	50	40	30
Direct Labour (₹)	30	40	50
Overhead*:*			
Receiving	34*	25	19
Production scheduling	36**	20	15
Total cost per unit	**150**	**125**	**114**

{₹ 280 × 1,200} ÷ 10,000 units = ₹ 34*; similarly ₹ 25 and ₹ 19
(₹ 1,500 × 240) + 10,000 units = ₹ 36**; similarly ₹ 20 and ₹ 15

2) Comparison: The two absorption methods produce different results. Product C appears to be much more expensive using the traditional method than it does with ABC, while product A is the opposite. If it is assumed that ABC is more accurate, which it may or may not be, then Product C would be overpriced under the traditional method and sales would presumably be poor as a consequence-assuming competitors supply more cheaply. Product A would be the opposite: sales would be high and it is possible that the company would unknowingly make a loss per unit on product A.

Ans 7

(a) Limitations of Value Chain Analysis

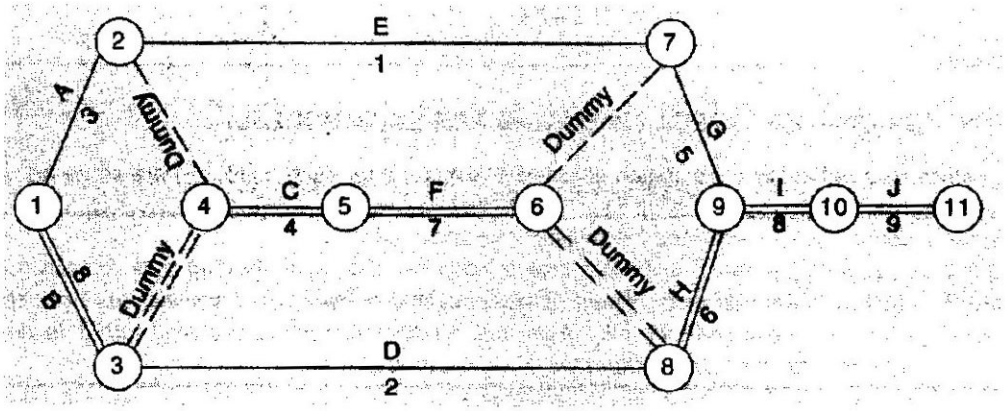
Value chain analysis is neither an exact science nor it is easy. It is more "art" than preparing precise accounting reports. There are several limitations to the implementation and interpretation of value chain analysis.

1. **The Internal data on costs, revenues and assets used for value chain analysis are derived from one period's financial Information.** For long term strategic decision-making changes in cost structures, market prices and capital investments from one period to the next may alter the implications of value chain analysis. Organizations should ensure that the value chain analysis is valid for future periods.
   Otherwise, the value chain analysis must be repeated under new conditions. Identifying stages in an industry's value chain is limited by the ability to locate at least one firm that participates in a specific stage. Breaking a value stage into two or more stages when an outside firm does not compete in these stages is strictly judgement.
2. **It is difficult to find the costs, revenues and assets for each value chain activity.** There is much experimentation underway that may provide better approaches. Having at least one firm operate in each value chain activity helps to identify external prices for goods and services transferred between value chains. For intermediate products or services with no external or competitive market information, transfer prices must be estimated on the basis of the best information available. Isolating cost drivers for each value-creating activity, identifying value chain linkages across activities, and computing supplier and customer profit margins present serious challenges.

3. **The use of full cost assumes that the full capacity of the value chain activity's facilities Is used to derive the costs.** Plant and manufacturing personnel and vendors of equipment are good sources for capacity information. They can also be helpful in estimating the current or replacement cost of the assets. Independent companies, for valuation services for assets must exist.

   Despite the calculational difficulties, experience indicates that performing value chair analysis can yield firms invaluable information for their competitive situation, cost structure and linkages with suppliers and customers.

(b)



Various Paths	Duration of Paths
1 – 2 – 7 – 9 –10 –11	(3 + 1 + 5 + 8 + 9) = 26
1 – 2 – 4 – 5 – 6 – 7 – 9 – 10 – 11	(3 + 0 + 4 + 7 + 0 + 5 + 8 + 9) = 36
1 – 2 – 4 – 5 – 6 – 8 – 9 – 10 – 11	(3 + 0 + 4 + 7 + 0 + 6 + 8 + 9) = 37
1 – 3 – 8 – 9 – 10 – 11	(8 + 2 + 6 + 8 + 9) = 33
1 – 3 – 4 – 5 – 6 – 7 – 9 – 10 – 11	(8 + 0 + 4 + 7 + 0 + 5 + 8 + 9) = 41
1 – 3 – 4 – 5 – 6 – 8 – 9 – 10 – 11	(8 + 0 + 4 + 7 + 0 + 6 + 8 + 9) = 42

Hence the critical path is 1 – 3 – 4 – 5 – 6 – 8 – 9 – 10 – 11 (B – C – F – H – I – J) with duration of 42 days.

(c) Product Life Cycle

(a) Meaning	Each product has a life cycle. The life cycle of a product vary from a few months to several years. For example, in the case of cameras, photocopying machines etc. the life is more than 100 years. Whereas in the case of black and white T.V./V.C.R. it was for few years only. Product life cycle is thus a pattern of expenditure, sale level, revenue and profit over the period from new idea generation to the deletion of product from product range.
Phases of product life cycle	
1. Introduction	During introductory phase, a product is launched into the market. Its customers are innovators. Competition is almost negligible and profits are non-existent.
2. Growth	Under growth phase, sales and profits rise, at a rapid pace. Competitors enter the market often in large numbers. As a result of competition, profits starts declining near the end of the growth phase.
3. Maturity	During the phase of maturity sales continue to increase, but at a decreasing rate. When sales level off, profits of both producers and middlemen decline. The main reason is intense price competition, some firms extend their product lines with new models.
4. Decline	Decline in sales volume characterizes this last phase of the product life cycle. The need or demand for product disappears. Availability of better and less costly substitutes in the market accounts for the arrival of this phase.

(d) Advantages of Simulation

The four advantages for using simulation for solving management problems are given below:

1. **Simulation techniques allow experimentation with a model of the system rather than the actual operating system** - Sometimes experimenting with the actual system itself could prove to be too costly and, in many cases too disruptive. For example, if you are comparing two ways of providing food service in a hospital, the confusion that would result from operating two different systems long enough to get valid observations might be too great. Similarly, the operation of a large computer centre under a number of different operating alternatives might be too expensive to be feasible.
2. **The non technical manager can comprehend simulation more easily than a complex mathematical model** - Simulation does not require simplifications and assumptions to the extent required in analytical solutions. A simulation model is easier to explain to management personnel since it is a description of the behaviour of some system or process.
3. **Sometimes there is not sufficient time to allow the actual system to operate extensively** - For example, if we were studying long term trends in world population, we simply could not wait for the required number of years to see results. Simulation allows the manager to incorporate time into an analysis. In a computer simulation of business operation the manager can compress the result of several years or periods into a few minutes or running time.
4. **The use of simulation enables a manager to provide insights into certain managerial problems** where analytical solution of a model is not possible or where the actual environment is difficult to observe. For example, simulation is widely used is space-flights or the charting of satellite Simulation allows a user to analyse these large complex problems for which analytical results are not available. For example, in an inventory problem if the distribution for demand and lead time for an item follow a standard distribution, such as the position distribution, then a mathematical or analytical solution can be found. However, when mathematically convenient distributions are not applicable to the problem, an analytical analysis of the problem may be impossible. A simulation model is a useful solution procedure for such problems.

(e) Limitation of the assumption of PERT and CPM

1. Beta distribution may not always be applicable.
2. The formulae for expected duration and standard deviation are simplification. In certain cases, errors due to these have been found up to 33%.
3. The above errors may get compounded or may cancel each other.
4. Activities are assumed to be independent. But the limitations on the resources may not justify the assumption.
5. It may not always be possible to sort out completely identifiable activities and to state where they begin and where they end.
6. If there exist alternatives in outcome, they need to be incorporated by way of a decision tree analysis.
7. Time estimates have a subjective element and to this extent, techniques could be weak. Contractors can manipulate and underestimate time in cost plus contract bids. In incentive contracts, overestimation is likely.
8. Cost-time tradeoffs/Cost Curve Slopes are subjective and even experts may be widely off the mark even after honest deliberations.

MARKS ALLOCATION SHEET

Que. No.	*Sub point No.(if any)*	*Name of Chapter*	*Description of Concept*	*Mark Allocation*	*Total Marks*
1	(a)	Operating costing	Calculation of cost per patient day	4	
1	(a)	Operating costing	Calculation of Break even point	1	5
1	(b)	Relevant costing	Statement showing cost benefit	1	
1	(b)	Relevant costing	Calculation of relevant cost		
1	(b)	Relevant costing	- Material	1	
1	(b)	Relevant costing	- Labour	1	
1	(b)	Relevant costing	- Consultancy fee	1	
1	(b)	Relevant costing	Conclusion	1	5
1	(c)	Learning curve	Statement of learning curve	2	
1	(c)	Learning curve	Statement of revenue cost	2	
1	(c)	Learning curve	Conclusion	1	5
1	(d)	TQM	Statement of comparative cost benefit	3.5	
1	(d)	TQM	Decision	1.5	5
2	(a)	Standard costing	Calculation of material cost variance	2	
2	(a)	Standard costing	Calculation of labour cost variance	2	
2	(a)	Standard costing	Calculation of variable overheads cost variance	1	
2	(a)	Standard costing	Calculation of fixed overheads cost variance	2.5	
2	(a)	Standard costing	Name of the department responsible for variance	2.5	10
2	(b)	Budget	Standard cost sheet	2	
2	(b)	Budget	Flexible budget for Product A	2	
2	(b)	Budget	Flexible budget for Product B	2	6
3	(a)	Marginal Costing	Statement showing cost per unit (each alternative have 2 marks)	4	
3	(a)	Marginal Costing	Statement showing change over form purchase to manufacture (each machine have 1.5marks)	3	
3	(a)	Marginal Costing	Calculation showing switch over from one type of machine to another	1	8
3	(b)	LPP	Formulation of LPP problem	1	
3	(b)	LPP	Calculation of optimal solution	7	8
4	(a)	Transfer Pricing	Revised operating statement using contribution approach (including workings)	3.5	
4	(a)	Transfer Pricing	Comparative profitability & ranking statement	2	
4	(a)	Transfer Pricing	Comment in point (2)	1	
4	(a)	Transfer Pricing	Explanation of point (3)	1.5	8

4	(b)	Marginal Costing	Calculation of budgeted BEP for company as a whole	2	
4	(b)	Marginal Costing	Effect on budgeted income if half the sales of product B is shifted equally to products A & C	4	
4	(b)	Marginal Costing	Effect of shift in the product mix on budgeted B.E.P.	2	8
5	(a)	Standard costing	Sales value variance	1	
5	(a)	Standard costing	Sales volume variance	1	
5	(a)	Standard costing	Sales sub-volume variance	1.5	
5	(a)	Standard costing	Sales mix variance	1.5	
5	(a)	Standard costing	Sales price variance	1	8
5	(b)	Assignment	Formulation of cost matrix	2	
5	(b)	Assignment	Calculation of optimal solution	6	
5	(b)	Assignment	Computing minimum cost	2	10
6	(a)	JIT	statement of comparative cost (relevant cost)	2	
6	(a)	JIT	Decision	1	3
6	(b)	Simulation	Statement showing allocation of random numbers – demand	1	
6	(b)	Simulation	Statement showing allocation of random numbers - lead time	1	
6	(b)	Simulation	Simultation of demand & lead time	5	
6	(b)	Simulation	Calculation of total inventory cost	1	8
6	(c)	ABC	Calculation of product cost as per traditional absorption	2	
6	(c)	ABC	Calculation of product cost as per ABC system	2	
6	(c)	ABC	Comparison	1	5
7	(a)	Value chain	Limitations	4	4
7	(b)	CPM	Draw network	3	
7	(b)	CPM	Critical path	0.5	
7	(b)	CPM	Project duration	0.5	4
7	(c)	Product life cycle	Meaning	2	
7	(c)	Product life cycle	Phases (each have 0.5 marks)	2	4
7	(d)	simulation	Each advantage have 1 mark	4	4
7	(e)	PERT & CPM	Each point have 1 mark (any four)	4	4