

PAPER – 5 : ADVANCED MANAGEMENT ACCOUNTING

Question No. 1 is compulsory. Answer any five questions from the rest.

Working notes should form part of the answer.

Question 1

(a) Bloom Ltd. makes 3 products, A, B and C. The following information is available:

	(Figures in Rupees per unit)		
	A	B	C
Selling price (peak-season)	550	630	690
Selling price (off-season)	550	604	690
Material cost	230	260	290
Labour (peak-season)	110	120	150
Labour (off-season)	100	99	149
Variable production overhead	100	120	130
Variable selling overhead (only for peak-season)	10	20	15
Labour hours required for one unit of production	8	11	7 (hours)

Material cost and variable production overheads are the same for the peak-season and off-season. Variable selling overheads are not incurred in the off-season. Fixed costs amount to Rs. 26,780 for each season, of which Rs. 2,000 is towards salary for special technician, incurred only for product B, and Rs. 4,780 is the amount that will be incurred on after-sales warranty and free maintenance of only product C, to match competition.

Labour force can be interchangeably used for all the products. During peak-season, there is labour shortage and the maximum labour hours available are 1,617 hours. During off-season, labour is freely available, but demand is limited to 100 units of A, 115 units of B and 135 units of C, with production facility being limited to 215 units for A, B and C put together.

You are required to:

- Advise the company about the best product mix during peak-season for maximum profit.
- What will be the maximum profit for the off-season?

- (b) The cost matrix giving selling costs per unit of a product by salesman A, B, C and D in regions R₁, R₂, R₃ and R₄ is given below:

	A	B	C	D
R ₁	4	12	16	8
R ₂	20	28	32	24
R ₃	36	44	48	40
R ₄	52	60	64	56

- (i) Assign one salesman to one region to minimise the selling cost.
- (ii) If the selling price of the product is Rs. 200 per unit and variable cost excluding the selling cost given in the table is Rs. 100 per unit, find the assignment that would maximise the contribution.
- (iii) What other conclusion can you make from the above? (12 + 8 = 20 Marks)

Answer

(a)

Bloom Ltd.

Peak Season.

Statement of Contribution and BEP (in units)

Figures Rs.

Product	A	B	C
A. Selling Price per unit	<u>550</u>	<u>630</u>	<u>690</u>
Variable Costs per unit:			
Direct Material	230	260	290
Direct Labour	110	120	150
Variable Overhead – Production	100	120	130
Variable Overhead-Selling	<u>10</u>	<u>20</u>	<u>15</u>
B. Total Variable Cost	450	520	585
C. Contribution / unit (A – B)	100	110	105
D. Direct Labour hours / required per unit	8	11	7
E. Contribution per Labour Hour (C / D)	12.5	10	15
F. Ranking	2	3	1

General Fixed Overhead			20,000
Specific Fixed overhead	2,000	4,780	<u>6,780</u>
G. Total Fixed Overhead			26,780
H. BEP (units) (for only 1 Product at a time) (G/C)	$\frac{20,000}{100} = 200$	$\frac{22,000}{110} = 200$	$\frac{24,780}{105} = 236$

Maximum units that can be produced of product C with limited labour hours 1,617.

$$= \frac{1,617}{7} = 231.$$

231 < Break Even units.

Hence, Bloom Ltd. cannot produce C.

Next rank = A

Maximum units of A that can be produced with limited labour hours = $\frac{1,617}{8} = 202$ units.

Break Even units of A = 200

∴ Profit if only A is produced

	Rs.
Contribution = Rs. 202 × 100	20,200
Fixed Cost	<u>20,000</u>
Profit	<u>200</u>

Off Season

Bloom Ltd.
Off Season
Statement of Contribution and demand

		Figures Rs. per unit		
	Product	A	B	C
A	Selling Price	550	604	690
	Direct Material	230	260	290
	Direct Labour	100	99	149
	Production-Variable Overhead	<u>100</u>	<u>120</u>	<u>130</u>
B	Total Variable Cost	430	479	569
C	Contribution per unit (A – B)	120	125	121
	Ranking	3	1	2
	Maximum demand	100	115	135
	Overall limit of production			215 units

Statement of profitability under different options

(limit of production = 215 units)

	A	B	C	Total	Fixed Cost	Profit (loss)
Contribution per unit	120	125	121	-		
Option 1: Units	-	115	100	215		
Contribution (Rs.)	-	14,375	12,100	26,475	26,780	(305)
Option 2: Units	100	115	-	215		
Contribution (Rs.)	12,000	14,375	-	26,375	22,000	4,375
Option 3: Units	80	-	135	215		
Contribution (Rs.)	9,600	-	16,335	25,935	24,780	1,155

Best strategy is to produce 100 units of product A and 115 units of product B during off-season.

Maximum profit = Rs. 4,375.

(i) Best strategy for peak-season is to produce 202 units of A.

(ii) Maximum profit for off-season Rs. 4,375.

(b) (i)

4	12	16	8
20	28	32	24
36	44	48	40
52	60	64	56

Subtracting minimum element – each row.

0	8	12	4
0	8	12	4
0	8	12	4
0	8	12	4

Subtracting minimum element – each column,

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Minimum no. of lines to cover all zeros = 4 = order of matrix. Hence optional assignment is possible.

$$\text{Minimum cost} = 4 + 28 + 48 + 56 = 136.$$

$$= AR_1 + BR_2 + CR_3 + DR_4$$

Since all are zeros, there are 24 solutions to this assignment problem.

Viz.	A	B	C	D	
	R ₁	R ₂	R ₃	R ₄	
	R ₂	R ₃	R ₄	R ₁	
	R ₃	R ₄	R ₁	R ₂	
	R ₄	R ₁	R ₂	R ₃	
	R ₁	R ₃	R ₄	R ₂	etc.

A can be assigned in 4 ways, B in 3 ways for each of A's 4 ways.

(ii) SP – VC = 100 Rs.

	A	B	C	D
R ₁	96	88	84	92
R ₂	80	72	68	76
R ₃	64	56	52	60
R ₄	48	40	36	44

Subtracting the highest term

0	8	12	4
16	24	28	20
32	40	44	36
48	56	60	52

Subtracting minimum term of each row.

0	8	12	4
0	8	12	4
0	8	12	4
0	8	12	4

Which is the same as the earlier matrix

$$\text{Maximum contribution} = \text{Rs. } (96 + 72 + 52 + 44) = \text{Rs. } 264.$$

Alternative Solution:

Maximisation of contribution is same as minimizing cost. Hence, same assignments as in (i) will be the optional solution.

Maximum Contribution Rs. $(400 - 136) = \text{Rs. } 264$

- (iii) (a) The relative cost of assigning person i to region r does not change by addition or subtraction of a constant from either a row, or column or all elements of the matrix.
- (b) Minimising cost is the same as maximizing contribution. Hence, the assignment solution will be the same, applying point (i) above.
- (c) Many zero's represent many feasible least cost assignment. Here, all zeros mean maximum permutation of a 4×4 matrix, viz. $4 \times 3 \times 2 \times 1 = 24$ solutions are possible.

Question 2

- (a) Tripod Ltd. has three divisions – X, Y and Z, which make products X, Y and Z respectively. For division Y, the only direct material is product X and for Z, the only direct material is product Y. Division X purchases all its raw material from outside. Direct selling overhead, representing commission to external sales agents are avoided on all internal transfers. Division Y additionally incurs Rs. 10 per unit and Rs. 8 per unit on units delivered to external customers and Z respectively. Y also incurs Rs. 6 per unit picked up from X, whereas external suppliers supply at Y's factory at the stated price of Rs. 85 per unit.

Additional information is given below:

	Figures Rs./unit		
	X	Y	Z
Direct materials (external supplier rate)	40	85	135
Direct labour	30	50	45
Sales Agent's commission	15	15	10
Selling price in external market	110	170	240
Production capacity	20,000	30,000	40,000 units
External demand	14,000	26,000	42,000 units

You are required to discuss the range of negotiation for Managers X, Y and Z, for the number of units and the transfer price for internal transfers.

- (b) Differentiate between 'Traditional Management Accounting' and 'Value Chain Analysis in the strategic framework'.
(11 + 5 = 16 Marks)

Answer

Analysis of range of negotiation for Manager of Division X

(Figures in Rs.)

(a)

Division X			
Outside sales		Sales to Y (Range)	
Selling Price	110	70	79
(-) Commission	<u>15</u>	—	<u>—</u>
Net Selling Price	95	70	79
Variable Cost	<u>70</u>	<u>70</u>	<u>70</u>
Contribution per unit	25	0	9
Units	14,000	6,000	6,000
Total contribution			
(Units × Contribution per unit)	<u>3,50,000</u>	0	54,000

Analysis of Range of negotiation for Manager of Division Y

(Figures in Rs.)

Division Y						
Outside Sales			Sale to Z			
From A	From outside		From A	From outside		
Price range	<u>70</u>	79	85	70	79	85
Add: Transport	<u>6</u>	<u>6</u>	—	<u>6</u>	<u>6</u>	—
	76	85	85	76	85	85
Add: Direct Labour	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>
	126	135	135	126	135	135
Add: Delivery cost	<u>10</u>	<u>10</u>	<u>10</u>	<u>8</u>	<u>8</u>	<u>8</u>

	136	145	145		134	143	143
Add: Sales							
Commission	<u>15</u>	<u>15</u>	<u>15</u>		<u>—</u>	<u>—</u>	<u>—</u>
Total Cost	151	160	160	134	134	143	143
Selling Price	<u>170</u>	<u>170</u>	<u>170</u>	<u>134</u>	<u>135</u>	<u>135</u>	<u>135</u>
Contribution	19	10	10	<u>0</u>	<u>+1</u>	<u>(-) 8</u>	<u>(-) 8</u>

Range of Negotiations:

Manager of division X will sell 14,000 units outside at 110 Rs. per unit and earn contribution of Rs. 3.50 lakhs.

Excess capacity of 6,000 units can be offered to Y at a price between 70 (the variable manufacturing cost at X) and Rs. 95 (the maximum amount to equal outside contribution). But Y can get the material outside @ 85. So, y will not pay to X anything above $(Rs.85 - 6) = Rs. 79$ to match external available price.

X will be attracted to sell to Y only in the range of 71 – 79 Rs. per unit at a volume of 6,000 units.

At Rs. 70, X will be indifferent, but may offer to sell to Y to use idle capacity.

Z will not buy from Y at anything above 135. If X sells to Y at 70 per unit, Y can sell to Z at 134 and earn no contribution, only for surplus capacity and if units transferred by X to Y at Rs. 70 per unit.

	Y	Z
Provided X sells to Y at Rs. 70 per unit	Sell 4,000 units to Z at 134 (Indifferent)	Buy 4,000 units from y at 134 (attracted)
	Sell 4,000 units to Z at 135 (willingly for a contribution of Re. 1)	Indifferent, since market price is also 135

For buying from X at 71 – 79 price range, Y will be interested in selling to Z only at prices 136 – 143, which will not interest Z.

Thus Y will sell to Z only if X sells to Y at Rs. 70 per unit and Y will supply to Z maximum 4,000 units.

- (b) Traditional management accounting focuses on internal information. It often places excessive emphasis on manufacturing costs. It also assumes that cost reduction must be found in the “value-added” process i.e. selling price less the cost of raw material. The value chain analysis approach encompasses external and internal data, uses appropriate cost drivers for all major value-creating processes, exploits linkages throughout the value chain, and provides continuous monitoring of a firm's strategic competitive advantages.

Value Chain vs. Traditional Management Accounting

	Traditional Management Accounting	Value Chain Analysis in the strategic framework
1.	If focuses on internal information	Focuses on external informations.
2.	Application of single cost driver at the overall firm level is taken.	Application of multiple cost drivers i.e. structural and executional are taken for each value activity.
3.	It assume that cost reduction must be found in the value added process	Exploits linkages throughout the value chain i.e. within firm, with suppliers and customers.
4.	Insights for strategic decisions somewhat limited in traditional management accounting	Identify cost driver at the individual activity level and develop cost / differentiation advantage either by controlling those drivers better than competitors by reconfiguring the value chain.

Question 3

- (a) The following profit reconciliation statement has been prepared by the Cost Accountant of RSQ Ltd. for March, 2008:

	Rs.	
Budget profit	2,40,000	
Sales price variance	51,000	(F)
Sales volume profit variance	<u>42,000</u>	(A)
	2,49,000	
Material price variance	15,880	(A)
Material usage variance	3,200	(F)
Labour rate variance	78,400	(F)
Labour efficiency variance	32,000	(A)
Variable overhead expenditure variance	8,000	(F)
Variable overhead efficiency variance	12,000	(A)
Fixed overhead volume variance	1,96,000	(A)
Fixed overhead expenditure variance	<u>4,000</u>	(F)
Actual profit	<u>86,720</u>	

Budgeted production and sales volumes for Mach, 2008 were equal and the level of finished goods stock was unchanged, but the stock of raw materials decreased by 6,400 kg (valued at standard price) during the month.

The standard cost card is as under:

Material 4 kg @ Rs. 2.00	8.00
Labour 4 hours @ Rs. 32.00	128.00
Variable overhead	
4 hours @ Rs. 12.00	48.00
Fixed overheads	
4 hours @ Rs. 28.00	<u>112.00</u>
	296.00
Standard profit	<u>24.00</u>
Standard selling price	<u>320.00</u>

The actual labour rate was Rs. 2.24 lower than the standard hourly rate.

You are required to calculate:

- (i) Actual quantity of material purchased
 - (ii) Actual production and sales volume
 - (iii) Actual number of hours worked
 - (iv) Actual variable and fixed overhead cost incurred.
- (b) A company produces three products A, B and C. The following information is available for a period:

	A	B	C
Contribution	30	25	15
(Rupees per unit)			
(Sales – Direct materials)			

Machine hours required per unit of production:

	Hours			
	A	B	C	Throughout accounting ratio
Machine 1	10	2	4	133.33%
Machine 2	15	3	6	200%
Machine 3	5	1	2	66.67%

Estimated sales demand for A, B and C are 500 units each and machine capacity is limited to 6,000 hours for each machine.

You are required to analyse the above information and apply theory of constraints process to remove the constraints.

How many units of each product will be made?

(11 + 5 = 16 Marks)

Answer

$$\begin{aligned}
 \text{(a) (i) Budgeted volume} &= \frac{\text{Budgeted profit}}{\text{Budgeted profit per unit}} \\
 &= \frac{2,40,000}{24.00} \\
 &= 10,000 \text{ units}
 \end{aligned}$$

$$\begin{aligned}
 \text{Difference between actual and budgeted volume} &= \frac{\text{Fixed overhead volume variance}}{\text{Standard fixed overhead rate}} \\
 &= \frac{1,96,000}{112} \\
 &= 1,750 \text{ units}
 \end{aligned}$$

Actual Production = Budgeted volume – Difference between actual and budget volume

$$= 10,000 - 1,750$$

$$= 8,250 \text{ units}$$

(ii) Actual production = 8,250 units

$$\text{Material quantity} = 4 \text{ kg.} \times 8,250 = 33,000 \text{ kg.}$$

Less: Difference in material use

$$\text{Material} = \frac{\text{Usage variance}}{\text{Standard price}} = \frac{3,200}{2.00} = 1,600 \text{ kg.}$$

$$\text{Actual usages} \quad 31,400 \text{ kg.}$$

$$\text{Less: Decrease in stock} \quad \underline{6,400 \text{ kg.}}$$

$$\text{Actual purchases} \quad \underline{25,000 \text{ kg.}}$$

(iii) Actual hours

$$8,250 \text{ units} \times 4 \text{ hours} = 33,000 \text{ hours}$$

Difference in actual and standard

$$\frac{\text{Efficiency variance}}{\text{Standard rate}} = \frac{32,000 \text{ (A)}}{32.00} = 1,000 \text{ (A) hours}$$

$$\text{Actual hours} \quad \underline{34,000 \text{ hours}}$$

- (iv) Actual variable overhead incurred:
- | | |
|--|------------------------|
| Standard cost of variable overhead = $8,250 \times 48$ | = Rs. 3,96,000 |
| Total variable overhead cost variance [8,000 (F) + 12,000 (A)] | = <u>Rs. 4,000 (A)</u> |
| Actual variable overhead | = <u>Rs. 4,00,000</u> |
- (v) Actual fixed overhead:
- | | |
|---------------------------------------|------------------------|
| Budgeted fixed overhead = | |
| Budgeted units $\times$ Budgeted rate | |
| = $10,000 \times 112$ | = Rs. 11,20,000 |
| Expenditure variance | = <u>Rs. 4,000 (F)</u> |
| Actual fixed overhead | = <u>Rs. 11,16,000</u> |
- It can also be calculated as below:
- Actual fixed overhead:
- | | |
|---|---------------------------|
| Standard fixed overhead = (Actual output $\times$ Standard fixed overhead rate per unit) $8,250 \times 112$ | = Rs. 9,24,000 |
| Total fixed overhead variance [1,96,000 (A) + 4,000 (F)] | = <u>Rs. 1,92,000 (A)</u> |
| Actual fixed overhead | = <u>Rs. 11,16,000</u> |
- (vi) Actual sales volume:
- Sales volume variance = Standard profit per unit (Actual quantity of sales – Standard quantity of sales)
- $42,000 (A) = 24 (\text{Actual Quantity of sales} - 10,000)$
- Actual quantity of sales = 8,250 units
- Alternative for (iv) and (v) points
- (1) Variable overhead cost variance = (Standard hours for actual output $\times$ Standard variable overhead rate per hour) – Actual variable overhead cost
- $4,000 (A) = (4 \times 8,250 \times 12) - \text{Actual variable overhead}$
- Actual variable overhead = Rs. 4,00,000.
- (2) Fixed overhead cost variance = (Standard hours for actual output $\times$ Standard fixed overhead rate per hour) – Actual fixed overheads
- $1,92,000 (A) = (4 \times 8,250 \times 28) - \text{Actual fixed overheads}$
- Actual fixed overhead = Rs. 11,16,000.
- (b) Throughout Accounting ratio is highest for 'Machine 2'.
- $\therefore$ 'Machine 2' is the bottleneck

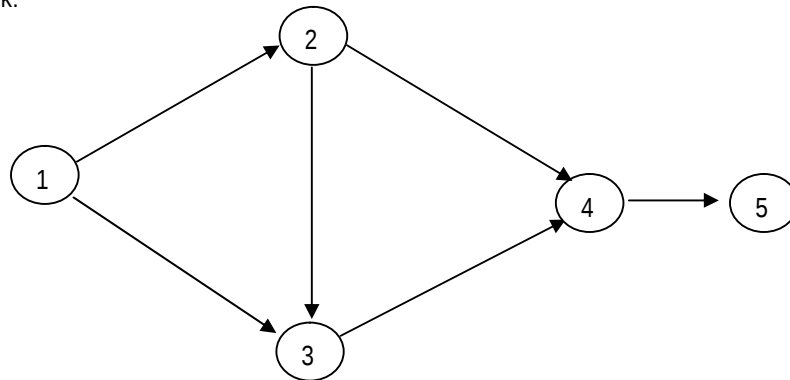
Contribution per unit of bottleneck machine hour :

Total 'Machine 2' hours available = 6,000

	A	B	C
A. Contribution per unit (Rs.)	30	25	15
B. 'Machine 2' hours	15	3	6
C. Contribution per 'Machine 2' hours (A / B)	2	8.33	2.50
D. Ranking	3	1	2
E. Maximum Demand	500	500	500
'Machine 2' hours required (B × E)	7,500	1,500	3,000
'Machine 2' hours available	1,500	1,500	3,000
Units	100	500	500

Question 4

- (a) The normal time, crash time and crashing cost per day are given for the following network:



Activity	Normal time (days)	Crash time (days)	Crashing cost (Rs./day)
1–2	18	14	40
1–3	23	22	20
2–3	8	5	60
2–4	10	6	40
3–4	3	2	80
4–5	8	6	50

- (i) Crash the project duration in steps and arrive at the minimum duration. What will be the critical path and the cost of crashing?
- (ii) If there is an indirect cost of Rs. 70 per day, what will be the optimal project duration and the cost of crashing?
- (b) The budgeted and actual cost data of M Ltd. for 6 months from April to September, 2008 are as under:

	Budget	Actual
Production units	16,000	14,000
Material cost	Rs. 25,60,000 (1,600 MT @ Rs. 1,600)	Rs. 41,60,000 (at Rs. 1,650)
Labour cost	Rs. 16,00,000 (at Rs. 40 per hour)	Rs. 15,99,840 (@ Rs. 44 per hour)
Variable overhead	Rs. 3,00,000	Rs. 2,76,000
Fixed overhead	Rs. 4,60,000	Rs. 5,80,000

In the first half of financial year 2009-10, production is budgeted for 30,000 units, material cost per tonne will increase from last year's actual by Rs. 150, but it is proposed to maintain the consumption efficiency of 2008 as budgeted. Labour efficiency will be lower by 1% and labour rate will be Rs. 44 per hour. Variable and fixed overheads will go up by 20% over 2008 actuals.

Prepare the Production Cost budget for the period April-September, 2009 giving all the workings. (10 + 6 = 16 Marks)

Answer

- (a) (i) Critical path

1 – 2 – 3 – 4 – 5 37 days

Paths:

	Normal	Crash
1 – 2 – 4 – 5	36	26
1 – 2 – 3 – 4 – 5	37	27
1 – 3 – 4 – 5	34	30

	Crash Activity	Days,	Cost
Step I	1 – 2	1	40
II	1 – 2	1	40
III	4 – 5	1	50

IV	4 – 5	1	50
V	2 – 3	1	60
VI	1 – 2 & 1 – 3	<u>1</u>	<u>60</u> (40 + 20)
		<u>6</u>	300

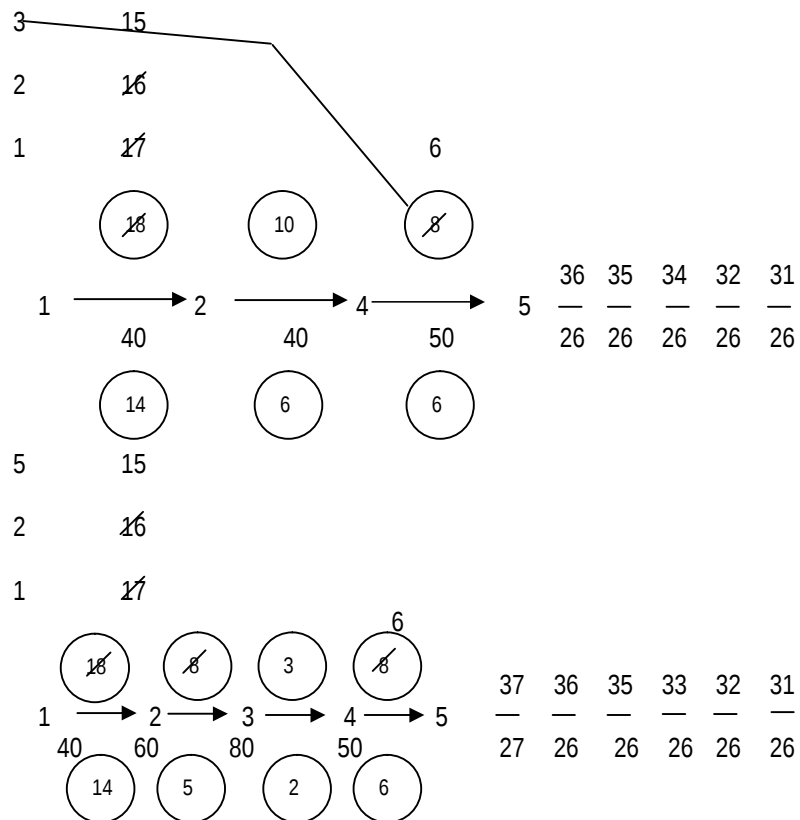
Revised critical paths : $\left. \begin{array}{l} 1-2-4-5 \\ 1-2-3-4-5 \\ 1-3-4-5 \end{array} \right\} 31 \text{ days}$

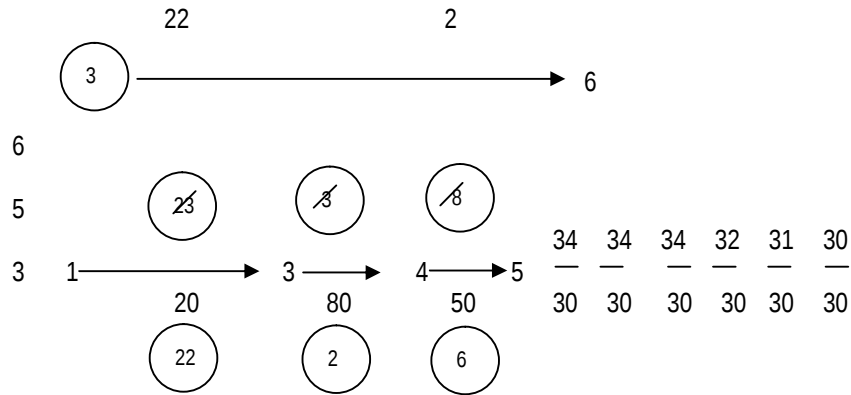
VII 1 – 2 & 3 – 4 (40 + 80) $\frac{120}{420}$ 30 days

But VII is not done if indirect cost = 70, which is < 120.

(ii) Project duration is 31 days and cost of crashing is 300.

Workings of Crashing:





Critical Path : 1 – 2 – 3 – 4 – 5 (37 days) Crashing cost

(1)	1 – 2	1 day	40
(2)	1 – 2	1 day	40
(3)	4 – 5	2 days	100
(4)	2 – 3	1 day	60
(5)	1 – 2 & 1 – 3	1 day (40 + 20)	<u>60</u>
			<u>300</u>

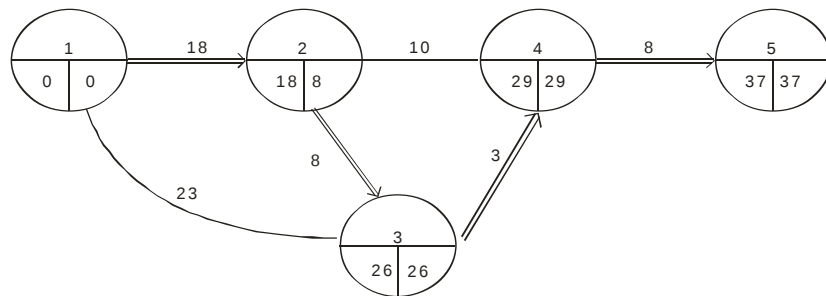
Revised critical Path : 1 – 2 – 4 – 5
 1 – 2 – 3 – 4 – 5
 1 – 3 – 4 – 5

Duration 31 days

(Note: After each crashing a networking diagram has to be drawn and critical path has to be decided).

Alternative Solution:

(i) Network Diagram:



Project duration = 37 days.

Critical Paths :

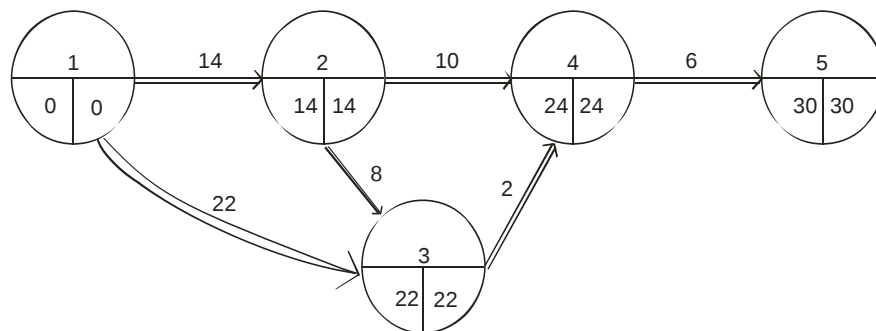
(i) 1 → 3 → 4 → 5

(ii) 1 – 2 – 3 – 4 – 5

Crashing by Steps

Step : 1	Crash activity	Crashing No. of days	Crash cost per day (Rs.)	Crashing cost (Rs.)
	1–2	3	40	120
Step : 2	1–2	1	40	40
	1–3	1	20	20
Step : 3	4–5	2	50	100
Step : 4	3–4	1	80	<u>80</u>
				<u>360</u>

Revised Network



Effective crashing days = 7

Critical Paths:

(i) 1 – 2 – 4 – 5

(ii) 1 – 3 – 4 – 5

(iii) 1 – 2 – 3 – 4 – 5

Project duration = 30 days

Crashing cost = Rs. 360

- (ii) For optimal project duration, we have to consider indirect cost per day i.e., Rs. 70. The crashing cost of activity 3–4 is Rs. 80 which is higher than indirect cost per day. Hence, we may opt it out (Step 4).

In that case, project duration = 31 days.

Crashing cost = Rs. 280.

Saving in indirect cost = $6 \times \text{Rs. } 70 = \text{Rs. } 420$.

(b)

Production Cost Budget
(for 6 months ending 30th September, 2009)

	30,000 units	
	Cost per unit	Total
	Rs.	Rs.
Material cost	180	54,00,000
Labour cost	115.21	34,56,420
Variable overhead	23.65	7,09,500
Fixed overhead	<u>23.2</u>	<u>6,96,000</u>
	<u>342.06</u>	<u>1,02,61,920</u>

Assumption : Here, difference in actual and standard time is also considered for calculating the lower efficiency i.e. $3.74\% + 1\% = 4.74\%$

Working Notes:

I. Material cost

$$\text{Material consumption per unit} = \frac{1,600 \text{ MT}}{16,000} = 0.10 \text{ MT}$$

Consumption for 30,000 units = 3,000 MT.

Cost of 3,000 MT @ Rs. 1,800 per MT = Rs. 54,00,000.

II. Labour cost can be calculated as follows:

Time required for 30,000 units = 75,000 hours

Add: $*(3.74\% + 1\%) = 4.74\%$ for lower efficiency = 3,555 hours

= 78,555 hours

$$*3.74\% = \frac{\text{Difference in actual and standard hours}}{\text{Actual hours}} \times 100$$

$$= \frac{1,360 \text{ hours}}{36,360 \text{ hours}}$$

$$\begin{aligned}\text{Labour cost} &= 78,555 \text{ hours} \times 44 \text{ per hour} \\ &= 34,56,420.\end{aligned}$$

III. Variable overhead

$$\text{Actual rate} = \frac{\text{Rs. } 2,76,000}{14,000 \text{ units}} = 19.71 \text{ per unit}$$

$$\text{Add: } 20 = \underline{3.94}$$

$$\text{New rate} = \underline{23.65}$$

$$\begin{aligned}\text{Total variable overhead} &= 30,000 \times 23.65 \\ &= \text{Rs. } 7,09,500\end{aligned}$$

IV. Fixed overhead

$$\text{Actual} = \text{Rs. } 5,80,000$$

$$\text{Add: } 20\% = \text{Rs. } \underline{1,16,000}$$

$$= \text{Rs. } \underline{6,96,000}$$

According to above the production cost budget will be as follows:

Alternative Production Cost Budget
(for 6 months ending 30th September, 2009)

	30,000 units	
	Cost per unit	Total
	Rs.	Rs.
Material cost	180	54,00,000
Labour cost	111.1	33,33,000
Variable overhead	23.65	7,09,500
Fixed overhead	<u>23.2</u>	<u>6,96,000</u>
	<u>337.95</u>	<u>1,01,38,500</u>

Working Notes:

I. Material cost

$$\text{Material consumption per unit} = \frac{1,600 \text{ MT}}{16,000} = 0.10 \text{ MT}$$

$$\text{Consumption for } 30,000 \text{ units} = 3,000 \text{ MT.}$$

$$\text{Cost of } 3,000 \text{ MT @ Rs. } 1,800 \text{ per MT} = \text{Rs. } 54,00,000.$$

II. Labour Cost:

$$2008 - \text{Total Budgeted Hour} = \frac{16,00,000}{40} = 40,000 \text{ hours}$$

$$\text{Labour hour budget for each unit} = \frac{40,000}{16,000} = 2.5$$

$$\text{Actual time paid} = \frac{15,99,840}{44} = 36,360 \text{ hours}$$

$$\text{Less: Standard labour hours for 14,000 units (i.e. } 14,000 \times 2.5) = 35,000 \text{ hours}$$

$$\text{Difference in actual and standard hours} = \underline{1,360}$$

$$\text{Time required for 30,000 units (30,000} \times 2.5) = 75,000 \text{ hours}$$

$$\text{Add: 1\% for lower efficiency} = \underline{750 \text{ hours}}$$

$$= \underline{75,750 \text{ hours}}$$

$$\begin{aligned} \text{Labour cost} &= 75,750 \text{ hours} \times 44 \text{ per hour} \\ &= 33,33,000 \end{aligned}$$

III. Variable overhead

$$\text{Actual rate} = \frac{\text{Rs. } 2,76,000}{14,000 \text{ units}} = 19.71 \text{ per unit}$$

$$\text{Add: 20} = \underline{3.94}$$

$$\text{New rate} = \underline{23.65}$$

$$\text{Total variable overhead} = 30,000 \times 23.65 = \text{Rs. } 7,09,500$$

IV. Fixed overhead

$$\text{Actual} = \text{Rs. } 5,80,000$$

$$\text{Add: 20\%} = \text{Rs. } \underline{1,16,000}$$

$$= \text{Rs. } \underline{6,96,000}$$

Question 5

- (a) What are the requisites for the installation of a uniform costing system ?
- (b) Write a short note on the procedure in hypothesis testing.
- (c) A company has prepared the following budget for the forthcoming year:

	Rs. lakhs
Sales	<u>20.00</u>
Direct materials	3.60

Direct labour	6.40
Factory overheads:	
Variable	2.20
Fixed	2.60
Administration overheads	1.80
Sales commission	1.00
Fixed selling overheads	<u>0.40</u>
Total costs	<u>18.00</u>
Profit	<u>2.00</u>

The policy of the company in fixing selling prices is to charge all overheads other than the prime costs on the basis of percentage of direct wages and to add a mark up of one-ninth of total costs for profit.

While the company is confident of achieving the budget drawn up as above, a new customer approached the company directly for execution of a special order. The direct materials and direct labour costs of the special order are estimated respectively at Rs. 36,000 and Rs. 64,000. This special order is in excess of the budgeted sales as envisaged above. The company submitted a quotation of Rs. 2,00,000 for the special order based on its policy. The new customer is willing to pay a price of Rs. 1,50,000 for the special order. The company is hesitant to accept the order below total cost as, according to the company management, it will lead to a loss.

You are required to state your arguments and advise the management on the acceptance of the special order. (4 + 5 + 7 = 16 Marks)

Answer

- (a) Requisites for the installation of uniform costing: Essential requisites for the installation of uniform costing are as under:
- The firm's in the industry should be willing to share / furnish relevant data or information.
 - A spirit of cooperation and mutual trust should prevail among the participating firms.
 - Mutual exchange of ideas, methods used, special achievement made, research and know how etc. should be frequent.
 - Bigger firms should take the lead towards sharing their experience and know how with the smaller firm to enable the latter to improve their performance.
 - In case of accounting methods, principles, procedure and production method uniformity must be established.

(b) Procedure in Hypothesis Testing: Following procedure is followed in hypothesis testing:

1. Formulate the hypotheses: Set up a null hypothesis stating, for e.g. $H_0 : \theta = \theta_0$ and an alternative hypothesis H_1 , which contradicts H_0 . H_0 and H_1 cannot be done simultaneously. If one is true, the other is false.
2. Choose a level of significance, i.e. degree of confidence. This determines the acceptance rejection region. For example, $Z_{.05}$ in a 2 tailed 'Z' test is.
3. Select test statistic: For $n > 30$, Z statistic is used, implying normal distribution for large samples. For small samples, we use t_1 , F_1 and χ^2 distribution.
4. Compute the sample values according to the test statistic.
5. Compare with the table value of the statistic and conclude.

(c) Analysis of Cost and profit:

	Rs. (lakhs)	Rs. (lakhs)
Direct material	3.60	
Direct labour	<u>6.40</u>	
Prime cost		10.00
Overhead:		
Variable factory overhead	2.20	
Fixed factory overhead	2.60	
Administration overheads	1.80	
Selling commission	1.00	
Fixed selling overheads	<u>0.40</u>	<u>8.00</u>
Total cost		18.00
Profit		<u>2.00</u>

Rate of profit on costs $(2/18) = 1/9$

Overhead absorption rate based on direct wages = $(8.00 / 6.40) \times 100 = 125\%$ of direct wages

Break up of new order:	Rs.
Direct Materials	36,000
Direct Labour	64,000
Overheads 125% of direct wages	80,000
Total costs	1,80,000
Profit 1/9	20,000
Selling Price	2,00,000

The following points emerge:

- (i) Factory overheads only are to be recovered on the basis of direct wages.
- (ii) The special order is a direct order. Hence commission is not payable.
- (iii) The budgeted sales are achieved. Hence all fixed overheads are recovered. Hence, no fixed overheads will be chargeable to the special order.

Based on the above, the factory variable overheads recovery rate may be calculated as under:

Total variable factory overheads Rs. 2.20 lakhs

Direct wages Rs. 6.40 lakhs

Factory overhead rate = $(2.20 / 6.40) \times 100 = 34.375\%$

Applying this rate the cost of the special order will be as under:

	Rs.
Direct materials	36,000
Direct labour	64,000
Overheads 34.375% of direct wages	22,000
Total costs	1,22,000
Price offered	1,50,000
Margin	28,000 (more than 1/9)

Hence, the order is acceptable at the price of Rs. 1,50,000.

Question 6

- (a) TQ Ltd. implemented a quality improvement programme and had the following results:

	2007	2008
	(Figures in Rs. '000)	
Sales	6,000	6,000
Scrap	600	300
Rework	500	400
Production inspection	200	240
Product warranty	300	150
Quality training	75	150
Materials inspection	80	60

You are required to:

- (i) Classify the quality costs as prevention, appraisal, internal failure and external failure and express each class as a percentage of sales.
 - (ii) Compute the amount of increase in profits due to quality improvement.
- (b) The following matrix gives the unit cost of transporting a product from production plants P_1 , P_2 and P_3 to destinations D_1 , D_2 and D_3 . Plants P_1 , P_2 and P_3 have a maximum production of 65, 24 and 111 units respectively and destinations D_1 , D_2 and D_3 must receive at least 60, 65 and 75 units respectively:

To \ From	D_1	D_2	D_3	Supply
P_1	400	600	800	65
P_2	1,000	1,200	1,400	24
P_3	500	900	700	111
Demand	60	65	75	200

You are required to formulate the above as a linear programming problem. (Only formulation is needed. Please do not solve).

- (c) What is trend? What are the various methods of fitting a straight line to a time series?

(4 + 9 + 3 = 16 Marks)

Answer

- (a) (i) Classification of Quality Costs

Figures Rs. '000

	2007	% of sales	2008	% of sales
Sales	<u>6,000</u>		<u>6,000</u>	
Prevention				
Quality training	<u>75</u>	1.25	<u>150</u>	2.5
Appraisal				
Product Inspection	<u>200</u>		<u>240</u>	
Materials Inspection	<u>80</u>		<u>60</u>	
	<u>280</u>	4.67	<u>300</u>	5
Internal Failure				
Scrap	<u>600</u>		<u>300</u>	
Rework	<u>500</u>		<u>400</u>	
	<u>1,100</u>	18.33	<u>700</u>	11.67
External Failure				
Product warranty	<u>300</u>	5	<u>150</u>	<u>2.5</u>
	<u>1,755</u>	29.25	<u>1,300</u>	<u>21.67</u>

- (ii) Cost reduction was effected by 7.58% (29.25 – 21.67) of sales, which is an increase in profit by Rs.4,55,000.

- (b) Let $p_i d_j$ be the variable to denote the number of units of product from the i th plant to the j th destination, so that

$P_1 d_1$ = transport from plant P_1 to D_1

$P_2 d_2$ = transport from plant P_2 to D_2 etc.

Objective function

$$\begin{aligned} \text{Minimize } z = & 400 p_1 d_1 + 600 p_1 d_2 + 800 p_1 d_3 + 1000 p_2 d_1 + 1200 p_2 d_2 + 1400 p_2 d_3 \\ & + 500 p_3 d_1 + 900 p_3 d_2 + 700 p_3 d_3. \end{aligned}$$

Subject to:

$$\left. \begin{aligned} p_1 d_1 + p_1 d_2 + p_1 d_3 &\leq 65 \\ p_2 d_1 + p_2 d_2 + p_2 d_3 &\leq 24 \\ p_3 d_1 + p_3 d_2 + p_3 d_3 &\leq 111 \end{aligned} \right\} \text{(Plant constraints)}$$

and

$$\left. \begin{aligned} p_1 d_1 + p_2 d_1 + p_3 d_1 &\geq 60 \\ p_1 d_2 + p_2 d_2 + p_3 d_2 &\geq 65 \\ p_1 d_3 + p_2 d_3 + p_3 d_3 &\geq 75 \end{aligned} \right\} \text{(destination constraints)}$$

all $p_i d_j \geq 0$

- (c) Trend is the long term movement of a time series. Any increase or decrease in the values of a variable occurring over a period of several years gives a trend.

The various methods of fitting a straight line to a time series are:

- (i) Free hand method.
- (ii) The method of semi-averages.
- (iii) The method of moving averages.
- (iv) The method of least squares.

Question 7

- (a) Paints Ltd. manufactures 2,00,000 tins of paint at normal capacity. It incurs the following manufacturing costs per unit:

	Rs.
Direct material	7.80
Direct labour	2.10
Variable overhead	2.50
Fixed overhead	<u>4.00</u>
Production cost / unit	<u>16.40</u>

Each unit is sold for Rs. 21, with an additional variable selling overhead incurred at Rs. 0.60 per unit.

During the next quarter, only 10,000 units can be produced and sold. Management plans to shut down the plant estimating that the fixed manufacturing cost can be reduced to Rs. 74,000 for the quarter.

When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of plant shut down for the quarter are estimated at Rs. 14,000.

You are required:

- (i) To advise whether it is more economical to shut down the plant during the quarter rather than operate the plant.
 - (ii) Calculate the shut down point for the quarter in terms of numbering units.
- (b) Describe the Just-in-time systems.
- (c) Briefly explain skimming pricing and penetration pricing policies. (6 + 6 + 4 = 16 Marks)

Answer

- (a) Contribution per tin = Selling Price – Variable cost
 $= 21 - (7.8 + 2.1 + 2.5 + 0.6)$
 $= \text{Rs. } 8 \text{ per tin.}$

Loss on operation:

Fixed cost per annum = 2,00,000 units $\times$ 4 per unit = 8 lakhs.

$\therefore$ Fixed cost for 1 quarter = $\frac{8}{4} = 2$ lakhs

	Rs.
Fixed cost for the quarter	2,00,000
Less: Contribution on operation (8 $\times$ 10,000)	<u>80,000</u>
Expected loss on operation	<u>(1,20,000)</u>

Loss on shut down:

	Rs.
Unavoidable Fixed Cost	74,000
Additional shut down cost	<u>14,000</u>
Loss on shut-down	<u>(88,000)</u>

Conclusion: Better to shut down and save Rs. 32,000.

$$\begin{aligned}
 \text{Shut-down point (number of units)} &= \frac{\text{Avoidable Fixed Cost}}{\text{Contribution per unit}} \\
 &= \frac{2,00,000 - 88,000}{8} \\
 &= \frac{1,12,000}{8} = 14,000 \text{ units.}
 \end{aligned}$$

- (b) A complete JIT system begins with production, includes deliveries to a company's production facilities, continues through the manufacturing plant and even includes the types of transactions processed by the accounting system.
- (i) The company must ensure that it receives its supplies on time, preferably directly at the production facility that needs them. The company engineers must assist suppliers at their premises and ensure defect free supplies. Thus raw material inventory is reduced if correct quantities are delivered as per production schedules.
 - (ii) Long set-up times are reduced into short ones by eliminating inefficiency. Thus the WIP is reduced and so is the number of products before defects are identified.
 - (iii) A 'Kanban' card, which authorizes production of the right quantity by its feeder machine ensures 'pulling' the production process and elimination of inventory. Another method is the introduction of a working cell, which is a cluster of machines run by a single trained operator. This also identifies defects quickly and reduces maintenance costs. Both methods are used together.
 - (iv) Work force is trained to be empowered to halt operations, understand more about the system, product flow, different machines and thus, elaborate reporting of a past variance is eliminated.
 - (v) Suppliers may be paid based on production units adjusted for defects.
- (c) Skimming prices: Policy of highly pricing a product at the entry level into the market and reducing it later.

For example: Electronic goods, mobile phone, Flat, TVs, etc.

It is used when market is price insensitive, demand inelastic or to recover high promotional costs.

Penetration Pricing: Policy of entering the market with a low price, then establishing the product and then increasing the price.

This is also used by companies with established markets, when products are in any stage of their life cycle, to avoid competition. This is also known as "stay-out pricing".

For example, entry of a new model small segment car into the market.