**Advanced Management accounting answer key**

1a)

**Statement Showing "Ranking for Manufacturing"**

| | A (₹) | B (₹) | C (₹) |
|---|---|---|---|
| Demand | 1,200 | 1,200 | 1,500 |
| Buy Price | 280 | xxx | 161 |
| *Less:* Variable Cost | 187 | 215 | 111 |
| Saving in Cost *per unit* | 93 | xxx | 50 |
| Hrs. Required -"Q" | 3 | 3 | 1 |
| Saving in Cost *per machine hour* | 31 | xxx | 50 |
| Ranking | III | I | II |

**Statement Showing "Optimum Production Plan"**

| Product | Units | Machine Hrs./ Unit | Machine Hrs. Required | Balance Hrs. |
|---|---|---|---|---|
| B | 1,200 | 3 | 3,600 | 4,200 |
| C | 1,500 | 1 | 1,500 | 2,700 |
| A (Balance) | 900* | 3 | 2,700 | --- |

* $\left(\frac{2,700\text{ hrs.}}{3\text{hrs.}}\right)$

Balance quantity of A, 300 units to be purchased from outside.

**Statement Showing "Conditions for Justification (i)"**

| | Product A | Product C |
|---|---|---|
| Buy Price | < 337 *Or* | > 142 |
| Variable Cost | > 130 *Or* | < 130 |

1b)

Throughout Accounting ratio is highest for 'Machine 2'.

∴ '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 (₹ ) | 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 |

1c)

**Working Notes**

| # | Data | Reasoning | Decision |
|---|---|---|---|
| i. | Similar Products<br>Similar Production Resources | OH Cost based on production units is appropriate. ABC will also yield identical results | ABC system not required for OH allocation |
| ii | Present OH Cost = 10/u. Proposed<br>Increase due to ABC system : 120000/20000 = 6/u | Current OH cost of 10/u will increase by 6 per unit due to installing ABC system (60% increase) | For allocation purpose, ABC not justified |
| iii. | Both have +ive contribution / u. Market demand determines the mix | OH allocation has no role in decision making | No need for ABC System |
| iv. | For the purpose of OH allocation, ABC need not be installed. However, if the fixed overheads of ₹ 2,00,000 are analysed by activity and thereby a saving of at least ₹ 1,20,000 be expected (which is the cost of installing ABC system), then, ABC system may be installed | | |
| v. | For the non cash component of depn = 90,000 , FC that can be saved is a maximum of 1,10,000 (2,00,000 – 90,000).<br>Hence, this is clearly less than ABC cost installation. Hence do not install ABC System | | |

1d)

$R_1C_1$ appears at the intersection of $R_1$ and $C_1$. Hence, it will have its zero replaced by minimum of a, b, c, or d in the next operation since the number of lines to cover zeros is less than 3.

In the next step, a or b or c or d will have one zero. Then, number of lines will be 3, the order of the matrix. Assignments will be made to the Zeros. Hence, $R_1C_1$ cannot figure in this.

**Interpretation**

An assignment of $R_1C_1$ will eliminate the use of other costs available on $R_1$ and $C_1$ entirely. The left over will be a, b, c, or d combinations which are more than zero. Hence, $R_1C_1$ taking on assignment will be non-optimal.

2A)

**(i)** Present Level:

Weighted average contribution per unit

(3,000 x 25 + 2,000 x 20)/(3,000+2,000) Or, (3 x 25 + 2x 20)/(2+3) = 23 ₹/unit.

BEP = Present level Fixed cost/ weighted average Contribution per unit

= 46,000/23 = 2000 units.

or (E 1200 units & Z 800 units)

**(ii)** Minimum units for incremental level:

next 1,000 units of E get contribution of 25 x 1000 = 25,000

next 1,000 units of E or Z get 20/unit as Contribution = 20,000

next 125 units of E or Z get 20/unit as Contribution = 2,500

Total 2,125 units are the minimum requirement for 47,500 incremental fixed cost

Minimum units required:

| E | Z | Total |
|---|---|---|
| 2,000 | 125 | 2,125 |
| | or | |
| 1,000 | 1,125 | 2,125 |

**(iii)** Optimal profit – best mix:

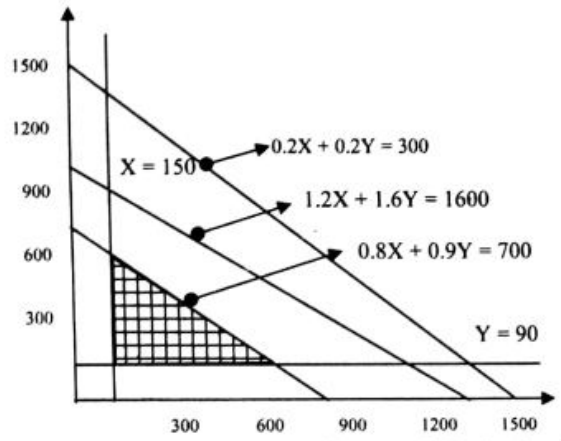
| | Product E | | Product Z | | Total quantity |
|---|---|---|---|---|---|
| | Units | Contribution/u | Units | Contribution/u | |
| Present | 3,000 | 25 | 2,000 | 20 | 5,000 |
| Next | 1,000 | 25 | | | 1,000 |
| Next | 1,000 | 20 | 1,000 | 20 | 2,000 |
| Next | - | - | 1,000 | 20 | 1,000 |
| Total for best mix | 5,000 | | 4,000 | | |
| Contribution value (₹) | 4,000 x 25 + 1,000 x20 = 1,20,000 | | 4,000 x 20 = 80,000 | | 2,00,000 |
| Average Contribution per unit (₹) = 2,00,000 / 9,000 = 22.22 | | | | | |
| Maximum profits (₹) = 2,00,000 – 93,500 = 1,06,500 | | | | | |

2B)

**Solution:** Let X and Y be the number of units of Products REGULAR and SUPER respectively. The LPP is –

Maximise Profit Z = 50X + 75Y, subject to 1.2X + 1.6Y ≤ 1,600 (Assembly Time Constraint).....Equation 1
0.8X + 0.9Y ≤ 700 (Paint Time Constraint).....Equation 2
0.2X + 0.2Y ≤ 300 (Inspection Time Constraint).....Equation 3
X ≥ 150 and Y ≥ 90 (Regular Customers Demand).....Equations 4 & 5

**Note:** Non–negativity assumption is not applicable due to the minimum demand condition as above.




From **Eqn.1,** we have 1.2X + 1.6Y = 1600
When X = 0, Y = 1000, Also X = 1333.33 when Y = 0

From **Eqn.2,** we have 0.8X + 0.9Y = 700
When X = 0, Y = 777.78, Also X = 875 when Y = 0

From **Eqn.3,** we have 0.2X + 0.2Y = 300
When X = 0, Y = 1500, Also X = 1500 when Y = 0.

Also the lines X = 150 and Y = 90 are plotted on the graph to define the feasible region as indicated herein.

Solving 0.8X + 0.9Y = 700 and Y = 90, we get
X = 773.75, Y = 90

Solving 0.8X + 0.9Y = 700 and X = 150, we get
X = 150, Y = 644.44

The co–ordinates of the corners of the Feasible Region is evaluated for Maximum Profit as below –

| **Point** | X = 150, Y = 90 | X = 773.75, Y = 90 | X = 150, Y = 644.44 |
|---|---|---|---|
| **Z = 50X + 75Y** | 14,250 | 45,438 | **55,833 (maximum)** |

The Maximum Profit is at the point X = 150, Y = 644.44. Hence, the Company should produce 150 units of REGULAR and 644.44 units of SUPER per week. Maximum Profit per week = ₹ 55,833.

**Note:** Graphical Method has been used here. Simplex Method can also be applied as under –

Since we have the constraints X ≥ 150 and Y ≥ 90, let X = A + 150, and Y = B + 90, where A, B ≥ 0.

After introducing A and B, the LPP will be –
Maximise Profit Z = 50(A+150) + 75(B+90),
1.2(A+150) + 1.6 (B+90) ≤ 1,600 (Assembly Time)
0.8 (A+150) + 0.9 (B+90) ≤ 700 (Paint Time)
0.2 (A+150) + 0.2 (B+90) ≤ 300 (Inspection Time)
A, B ≥ 0. (Non–Negativity Assumption)

Multiplying Constraints by 10 (to remove decimals) we have –
So, Maximise Profit Z = 50A + 75B + 14,250, subject to
12A + 16B ≤ 12,760
8A + 9B ≤ 4,990
2A + 2B ≤ 2,520
A, B ≥ 0.

After introducing Slack Variables $S1_1$, S2 and S3, we have

Maximise Profit Z = 50A + 75B + 14,250.....becomes Maximise Profit Z = 50A + 75B + $0S_1$ + $0S_2$ + $0S_3$ + 14,250
12A + 16B ≤ 12,760.....becomes 12A + 16B + $S_1$ = 12,760
8A + 9B ≤ 4,990.....becomes 8A + 9B + $S_2$ = 4,990
2A + 2B ≤ 2,520.....becomes 2A + 2B + $S_3$ = 2,520
A, B ≥ 0 .....becomes A, B, $S_1$, $S_2$, $S_3$ ≥ 0

**First Simplex Table:**

| **Fixed Ratio** | **Program** | **Profit** | **Quantity** | **A** | **B** | $S_1$ | $S_2$ | $S_3$ | **Repl. Ratio** |
|---|---|---|---|---|---|---|---|---|---|
| 16/9 | $S_1$ | 0 | 12,760 | 12 | 16 | 1 | 0 | 0 | 797.50 |
| NA | $S_2$ | 0 | 4,990 | 8 | 9 | 0 | 1 | 0 | **554.44** Min non–ve |
| 2/9 | $S_3$ | 0 | 2,520 | 2 | 2 | 0 | 0 | 1 | 1260.00 |
| **Decision:** | | Z (Objective Value) | | 50 | 75 | 0 | 0 | 0 | |
| **In** = Key Column = B | | C (Computed Value) | | 0 | 0 | 0 | 0 | 0 | |
| **Out**= Key Row = $S_2$ | | **Net Evaluation Row** | | 50 | **75** Max. +ve | 0 | 0 | 0 | |

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

| Computation for $S_1$ Row | | | | | | | Computation for $S_3$ Row | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 12760 | 12 | 16 | 1 | 0 | 0 | **A** | 2520 | 2 | 2 | 0 | 0 | 1 |
| **– B** | 79840/9 | 128/9 | 16 | 0 | 16/9 | 0 | **– B** | 9980/9 | 16/9 | 2 | 0 | 2/9 | 0 |
| **A–B** | 35000/9 | –20/9 | 0 | 1 | –16/9 | 0 | **A–B** | 12700/9 | 2/9 | 0 | 0 | –2/9 | 1 |

The above A–B values are carried over to the Second Simplex Table in **$S_1$ and $S_3$ Rows** (being Non–Key Rows of 1st Table).

**Second Simplex Table:**

| Fixed Ratio | Program | Profit | Quantity | A | B | $S_1$ | $S_2$ | $S_3$ | Repl. Ratio |
|---|---|---|---|---|---|---|---|---|---|
| | $S_1$ | 0 | 35,000/9 | –20/9 | 0 | 1 | –16/9 | 0 | |
| | B | 75 | 4,990/9 | 8/9 | 1 | 0 | 1/9 | 0 | |
| | $S_3$ | 0 | 12,700/9 | 2/9 | 0 | 0 | –2/9 | 1 | |
| **Decision:** Since all NER ≤ 0 for max. objective, the Second Table is **optimal.** | | Z (Objective Value) | | 50 | 75 | 0 | 0 | 0 | |
| | | C (Computed Value) | | 200/3 | 75 | 0 | 75/9 | 0 | |
| | | **Net Evaluation Row** | | –50/3 | 0 | 0 | –75/9 | 0 | |

**Answer:** A=0, B=4,990/9. Substituting these values in X=A + 150, and Y=B + 90, we have, **X=150**, Y=5,800/9 = 644.44,
**Maximum Profit = ₹ 55,833**

**Note:** As per Simplex Table above, Painting Time is fully used (and has an Opportunity Cost of **₹ 75/9** per hour), whereas Assembly and Inspection are idle to the extent of 35000/9 (i.e. 3,889) hours and 12,700/9 (i.e. 1411) hours respectively.

3A)

**Workings**

| Units | Average LabourHrs. /unit |
|---|---|
| 1 | 2,000 (₹16,000 ÷ ₹8) [for first unit of production] |
| 2 | 1,600 (80% of 2,000 hours) |
| 4 | 1,280 (80% of 1,600 hours) |
| 8 | 1,024 (80% of 1,280 hours) |

Variable Cost *per unit* excluding Labour Cost:

| | | (₹) |
|---|---|---|
| Material Cost | = | 20,000 |
| Variable Overheads | = | 4,000 |
| Variable Cost | = | 24,000 |

If both the orders came together, learning rate 80% applies and 8 units can be made, with average time of 1,024 hours per unit.

| Cost to XY | | (₹) |
|---|---|---|
| Variable Cost excluding Labour | = | 24,000 |
| Labour Cost (1,024 hrs. × ₹8/hr) | = | 8,192 |
| | = | 32,192 |

**Option-I**

In this case,

| Particulars | Q | P | Total |
|---|---|---|---|
| Selling Price p. u. (₹) | 34,400 | 33,000 | |
| Variable Cost p. u. (₹) | 32,192 | 32,192 | |
| Contribution p. u. (₹) | 2,208 | 808 | |
| No. of Units | 4 | 4 | |
| Contribution (₹) | 8,832 | 3,232 | 12,064 |

**Option- II**

If P Ltd supplies its labour. 80% learning curve will apply to 4 units each of XY Ltd. & P Ltd.
Hence: hrs / unit = 1,280 (as calculated in the working note)

| Particulars | Q | P | Total |
|---|---|---|---|
| Selling Price p. u. (₹) | 34,400 | 28,000 | |
| Variable Cost p. u. (₹) (Excluding Labour cost) | 24,000 | 24,000 | |
| Labour Cost p. u. (₹) | | | |
| 1,280 hrs. × ₹ 8 | 10,240 | -- | |
| 1,280 hrs. × ₹ 2 | -- | 2,560 | |
| Total Variable Cost p. u. (₹) | 34,240 | 26,560 | |
| Contribution p. u. (₹) | 160 | 1,440 | |
| Units | 4 | 4 | |
| Contribution (₹) | 640 | 5,760 | 6,400 |

**Decision**

XY Ltd. should not take labour from P Ltd. It should choose Option-I.

3B)

**Solution:** Initial Basic Feasible Solution is determined as under from the data given above.

| Place | M – 1 | M – 2 | M – 3 | M – 4 | Requirement |
|---|---|---|---|---|---|
| A | 5 | [12] 2 | [1] 4 | [9] 3 | 22 |
| B | 4 | 8 | [15] 1 | 6 | 15 |
| C | [7] 4 | 6 | [1] 7 | 5 | 8 |
| Demand | 7 | 12 | 17 | 9 | **45** |

In the above IBFS,

- Number of allocated cells is 6.
- m + n – 1 (i.e. Rows + Columns – 1) = 3 + 4 – 1 = 6.

Hence, there is no degeneracy. This can be tested for optimality.

**Note:** Cost Differences have not been computed since the Clerk's allocation is taken as the IBFS.

**OPTIMALITY TEST:** **Table 1 = U + V for allocated cells computed as below:**

| U & V | 4 – 7 = – 3 | 2 – 4 = – 2 | 0 (base) | 3 – 4 = – 1 |
|---|---|---|---|---|
| 4 – 0 = 4 | 5 | [12] 2 | [1] 4 | [9] 3 |
| 1 – 0 = 1 | 4 | 8 | [15] 1 | 6 |
| 7 – 0 = 7 | [7] 4 | 6 | [1] 7 | 5 |

**Table 2 = U + V for Unallocated Cells**

| | | | |
|---|---|---|---|
| 4 + (–3) = 1 | | | |
| 1 + (–3) = –2 | 1 + (–2) = –1 | | 1 + (–1) = 0 |
| | 7 + (–2) = 5 | | 7 + (–1) = 6 |

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

| | | | |
|---|---|---|---|
| 5 – 1 = 4 | | | |
| 4 – (–2) = 6 | 8 – (–1) = 9 | | 6 – 0 = 6 |
| | 6 – 5 = 1 | | 5 – 6 = [–1] |

There is one negative element in the NET, hence scheduling by the Clerk is not optimal. Selected Quantity = 1, being the least of the quantity allocated to the Negative Corners of the Loop

| | | | | |
|---|---|---|---|---|
| 4 | | +ve | | –ve |
| 6 | 9 | | | 6 |
| | 1 | –ve | +ve Corner | –1 |

**ABFS–1:** The new U + V for Allocated Cells is computed from the above.

The alternative allocation is shown below:

| | | | | |
|---|---|---|---|---|
| 20 | 100 18 | 18 | 17 | 17 |
| 150 + 50 = 200 16 | 50 – 50 = 0 16 | 200 16 | 15 | 16 |
| 50 – 50 = 0 15 | 0 + 50 = 50 15 | 15 | 125 13 | 75 14 |

The cost from the above alternative re–allocation is:

| Particulars | P | Q | R | S | T |
|---|---|---|---|---|---|
| Private | | 100 × 18 = 18.00 | | | |
| National | 200 × 16 = 32.00 | | 200 × 16=32.00 | | |
| Co–op | | 50 × 15 = 7.50 | | 125 × 13=16.25 | 75 × 14=10.50 |

Minimum Cost = Total of above = **₹ 1,16,250**

**Alternative Optimal Solution – 3:**

Alternative Optimal Solution is obtained by drawing a loop from the "Zero" entry in the NET, as indicated here

| | | | | |
|---|---|---|---|---|
| 2 | | 0 | 1 | 0 |
| +ve | | – ve 200 | 1 | 1 |
| – ve 50 | 0 | +ve (Origin)0 | | |

Least Qtty of –ve corners = 50. So, Alternative Optimal Solution is obtained by adding 50 to +ve corners, subtracting 50 from – ve corners and leaving the other cells undisturbed.

The alternative allocation is shown below:

| | | | | |
|---|---|---|---|---|
| 20 | 100 18 | 18 | 17 | 17 |
| 150 + 50 = 200 16 | 50 16 | 200 – 50 = 150 16 | 15 | 16 |
| 50 – 50 = 0 15 | 15 | 0 + 50 = 50 15 | 125 13 | 75 14 |

The cost from the above alternative re–allocation is:

| Particulars | P | Q | R | S | T |
|---|---|---|---|---|---|
| Private | | 100 × 18 = 18.00 | | | |
| National | 200 × 16 = 32.00 | 50 × 16 = 8.00 | 150 × 16 = 24.00 | | |
| Co–op | | | 50 × 15 = 7.50 | 125 × 13 = 16.25 | 75 × 14 = 10.50 |

Minimum Cost = Total of above = **₹ 1,16,250**

**Alternative Optimal Solution – 4:**

Alternative Optimal Solution is obtained by drawing a loop from the "Zero" entry in the NET, as indicated here

| | | | | |
|---|---|---|---|---|
| 2 | –ve 100 | 0 | 1 | +ve (Origin)0 |
| +ve 150 | +ve | 200 | 1 | 1 |
| + ve | 0 | 0 | | –ve 75 |

Least Qtty of –ve corners = 75. So, Alternative Optimal Solution is obtained by adding 75 to +ve corners, subtracting 75 from –ve corners & leaving the other cells undisturbed.

The alternative allocation is shown below:

| | | | | |
|---|---|---|---|---|
| 20 | 100 – 75 = 25 18 | 18 | 17 | 0 + 75 = 75 17 |
| 150 – 75 = 75 16 | 50 + 75 = 125 16 | 200 16 | 15 | 16 |
| 50 + 75 = 125 15 | 15 | 15 | 125 13 | 75 – 75 = 0 14 |

The cost from the above alternative re–allocation is:

| Particulars | P | Q | R | S | T |
|---|---|---|---|---|---|
| Private | | 25 × 18= 4.50 | | | 75 × 17=12.75 |
| National | 75 × 16 = 12.00 | 125 × 16=20.00 | 200 × 16=32.00 | | |
| Co–op | 125 × 15 = 18.75 | | | 125 × 13=16.25 | |

Minimum Cost = Total of above = **₹ 1,16,250**

4A)

**(i) Production Budget May'17 (tons)**

| Particulars | Super | Normal |
|---|---|---|
| Expected Sales | 200 | 80 |
| *Add:* Budgeted Inventory (31st May) | 20 | 15 |
| Total Requirements | 220 | 95 |
| *Less:* Actual Inventory (1st May) | 40 | 20 |
| Required Production | 180 | 75 |

**(ii) Materials Purchase Budget May'17 (tons)**

| Particulars | Grade A | Grade B | Grade C | Grade D |
|---|---|---|---|---|
| Requirement for Production | 126.00 (180 × 70%) | 54.00 (180 × 30%) | 30.00 (75 × 40%) | 45.00 (75 × 60%) |
| *Add:* Budgeted Inventory (31st May) | 50.00 | 56.00 | 250.90 | 40.50 |
| Total Requirements | 176.00 | 110.00 | 280.90 | 85.50 |
| *Less:* Actual Inventory (1st May) | 40.00 | 25.00 | 150.00 | 60.00 |
| Quantity *to be purchased* | 136.00 | 85.00 | 130.90 | 25.50 |
| *Add:* Lose of Weight* (Seasoning) | 24.00 | 15.00 | 23.10 | 4.50 |
| Quantity *to be purchased* (Gross) | 160.00 | 100.00 | 154.00 | 30.00 |

(*) Quantity *to be purchased* × 15% / 85%

**(b) (i) Direct Material Usage Variance**

= Standard Cost of Standard Quantity for Actual Production – Standard Cost of Actual Quantity

$$= \left(\frac{₹\,28,80,000}{60,000\,\text{units}} \times 66,000\,\text{units}\right) - \left(\frac{₹\,36,30,000}{₹\,11} \times ₹\,12\right)$$

= ₹ 31,68,000 – ₹ 39,60,000

= ₹ 7,92,000 (A)

**(ii) Direct Material Price Variance**

= Standard Cost of Actual Quantity – Actual Cost

= ₹ 39,60,000 – ₹ 36,30,000

= ₹ 3,30,000 (F)

**(iii) Direct Labour Efficiency Variance**

= Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time

$$= \left(\frac{₹\ 43,20,000}{60,000\ \text{units}} \times 66,000\ \text{units}\right) - \left(\frac{₹\ 52,80,000}{₹\ 10} \times ₹\ 9\right)$$

= ₹ 47,52,000 – ₹ 47,52,000

= NIL

**(iv) Direct Labour Rate Variance**

= Standard Cost of Actual Time – Actual Cost

= ₹ 47,52,000 – ₹ 52,80,000

= ₹ 5,28,000 (A)

**(v) Variable Overhead Cost Variance**

= Standard Variable Overheads for Production – Actual Variable Overheads

$$= \left(\frac{₹\ 72,00,000}{60,000\ \text{units}} \times 66,000\ \text{units}\right) - ₹\ 81,84,000$$

= ₹ 2,64,000 (A)

**(vi) Sales Margin Volume Variance**

= Standard Margin – Budgeted Margin*

$$= \left(\frac{₹\ 36,00,000}{60,000\ \text{units}} \times 66,000\ \text{units}\right) - ₹\ 36,00,000$$

= ₹ 3,60,000 (F)

(*) Budgeted Margin

= ₹ 1,80,00,000 – ₹ 1,44,00,000

= ₹ 36,00,000

5A)

**(i) Comparative Statement of cost for purchasing from Y Co Ltd under current policy & JIT**

| Particulars | Current Policy | JIT |
|---|---|---|
| | ₹ | ₹ |
| Purchasing cost | 18,20,000 (13,000 × 140) | 18,20,260 (13,000 × 140.02) |
| Ordering cost | 26.00(2×13 orders) | 260.00(2×130 orders) |
| Opportunity carrying cost | 10,500.00 (1/2×1000×140×15%) | 1,050.15 (1/2×100×140.02×15%) |
| Other carrying cost (Insurance, material handling etc) | 1,550.00(1/2×1000×3.10) | 155.00 |
| Stock out cost | | 200(4 × 50) |
| Total relevant cost | 18,32,076 | 18,21,925.15 |

Comments: As may be seen from above, the relevant cost under the JIT purchasing policy is lower than the cost incurred under the existing system. Hence, a JIT purchasing policy should be adopted by the company.

**(ii) Statement of cost for purchasing from Z Co Ltd.**

| Particulars | ₹ |
|---|---|
| Purchasing cost | 1,76,800 (13,000x13.60) |
| Ordering Cost | 260.00 (2x130 orders) |
| Opportunity Carrying Cost | 102.00 (1/2×100×13.60× 15%) |
| Other Carrying Cost | 150.00 (1/2×100×3.00) |
| Stock out Cost | 2,880 (8x360) |
| Inspection Cost | 650.00 (13,000 x .05) |
| Customer Return Cost | 6,500.00 ( 13,000 x 2% x 25) |
| Total Relevant Cost | 1,87,342 |

5B)

| Sl. No | Description | Recommend ABC Yes/No | Reason |
|---|---|---|---|
| i) | **K produces one product. Overhead is mainly depreciation** | **No** | • One product situation. For allocation of overhead, ABC is not required.<br>• ABC for cost reduction not beneficial since most of the overhead is depreciation. |
| ii) | **L produces 5 different products with different facilities.** | **Yes** | • Multi product situation. ABC is required for allocation of overhead.<br>• ABC is necessary for pricing.<br>• Cost drivers are likely to be different.<br>• Cost reduction may be possible.<br>• Production facilities are different. |
| iii) | **Professional services – lawyers/ accountants/ computer engineers** | **Yes** | • Variety of services. Hence ABC is required for cost allocation.<br>• Services are very different.<br>• ABC is necessary for pricing.<br>• Cost reduction possible. |
| iv) | **S produces 2 different labour intensive products. High unit contribution and efficient operations.** | **No** | • Different products, but labour intensive. Hence, overhead allocation based on readily traceable direct labour cost will be accurate. Hence, ABC not required for cost allocation.<br>• Low BEP level implies low level of fixed cost as a % of sale price or as a % of total cost.<br>• Many fixed cost activity drivers are likely to align with the direct labour costs. Hence not required for cost allocation.<br>• Efficient operation. Hence ABC not required even for cost reduction or ABC management. |

6A)

**Working Notes:**

1. **Contribution per hour of Super-chips and Okay-chips:**

| | Super-chips | Okay-chips |
|---|---|---|
| Selling price per unit (₹) | 600 | 120 |
| Less : Variable cost per unit (₹) | 300 | 80 |
| Contribution per unit (₹) | 300 | 40 |
| Hours required per unit | 2 | 0.5 |
| Contribution per hour | 150 | 80 |
| | (₹ 300/2 hrs.) | (₹ 40/0.5 hrs.) |

2. **Details of hours utilised in meeting the demand of 15,000 units of Super-chips and utilising the remaining hours for Okay-chips out of available hours of 50,000 per annum:**

| | |
|---|---|
| Hours utilised for manufacturing 15,000 units of Super-chips (15,000 units × 2 hours) | 30,000 |
| Hours utilised for manufacturing 40,000 units of Okay-chips (40,000 units × 0.5 hours) | 20,000 |
| | 50,000 |

3. **Contribution of a process control unit (using an imported complex circuit board):**

| | (₹) |
|---|---|
| Selling price per unit : (A) | 1,400 |
| Variable costs : | |
| Circuit board (Imported) | 600 |
| Other parts | 80 |
| Labour cost (5 hours × ₹ 100) | 500 |
| Total variable cost : (B) | 1,180 |
| Contribution per unit (₹) {(A) – (B)} | 220 |

**4. Contribution of a process control unit (using a Super chip):**

| | (₹) |
|---|---|
| Selling price per unit : (A) | 1,400 |
| Variable costs : | |
| Super chip (Material + Labour costs) | 300 |
| Other parts | 80 |
| Labour cost (6 hours × ₹ 100) | 600 |
| Total variable cost : (B) | 980 |
| Contribution per unit : {(A) – (B)} | 420 |

**5. Incremental contribution per unit of a process control unit, when instead of using imported complex circuit board Super-chip is used:**

Incremental contribution per unit (₹) : 200

*{₹ 420 – ₹ 220} {Refer to working notes 3 & 4}*

**(i) Super-chip to be transferred to Mini Computer Division to replace Circuit Boards :**

Out of 50,000 available hours 30,000 hours are utilised for meeting the demand of 15,000 units of Super-chips, the rest 20,000 hours may be used for manufacturing 40,000 Okay-chips, which yields a contribution of ₹ 40 per unit for ₹ 80/- per hour (*Refer to Working note 1*) or a contribution of ₹ 160 per two-equivalent hours.

In case the company decides to forego the manufacturing of 20,000 units of Okay- chips in favour of 5,000 additional units of Super-chips to be used by Mini-Computer

Division (instead of complex imported Circuit Board) for manufacturing process control units. This decision would increase the existing contribution of Mini-Computer Division by ₹ 200/- per two-equivalent hours (*Refer to Working note 5*).

After taking into account the profit foregone of Okay-chips, the existing contribution of Mini-Computer Division of CIC would increase by ₹ 40 per two equivalent hours.

*Hence the entire requirement of 5,000 units of Super-chips be produced and transferred to Mini-Computer Division.*

**(ii) Minimum transfer price of Super-chip to Mini Computer Division :**

= Variable cost of a Super-chip + Opportunity cost of foregoing the production of an Okay-chip and using the craftsman time for Super-chip

= ₹ 300 + 2 hours × ₹ 80

= ₹ 460

**(iii) Super-chips to be produced for the production of 12,000 units of process control units:**

After meeting out the order of 15,000 Super-chips per year, the concern is left out with 20,000 hours. Use of Super-chips for control units production would increase the existing contribution of Mini-Computer Division by ₹ 200/- per unit. Out of the remaining 20,000 craftmen hours, 10,000 units of Super-chips can be made, which may be used for the production of 10,000 process control units.

6B)

(i) **Customer Wise "Profitability Statement"**

| Particulars | A (₹) | B (₹) | C (₹) | D (₹) |
|---|---|---|---|---|
| **No. of Pizzas** | **1,500** | **2,500** | **4,800** | **4,000** |
| Contribution | 1,08,000 (1,500 × ₹ 72) | 1,67,500 (2,500 × ₹67) | 3,12,000 (4,800 × ₹65) | 2,40,000 (4,000 × ₹60) |
| *Less*: Normal Delivery Cost | 40,000 (₹20 × 20km × 100) | 75,000 (₹20 × 30km × 125) | 3,20,000 (₹20 × 40km × 400) | 1,00,000 (₹20 × 25km × 200) |
| *Less*: Rush Delivery Cost | --- | 8,000 (₹200 × 40) | 4,000 (₹200 × 20) | 6,000 (₹200 × 30) |
| Operating Income | 68,000 | 84,500 | (-) 12,000 | 1,34,000 |

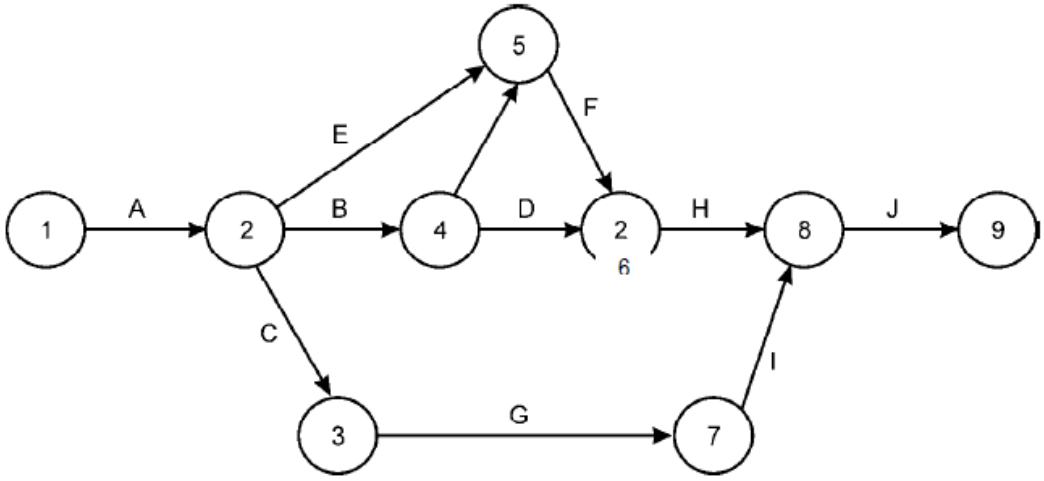
(ii) **Statement Showing – Revised Price *per unit* "A"**

| Particulars | | ₹ |
|---|---|---|
| Existing Operating Income from 'A' | | 68,000 |
| Revised – Normal Delivery Costs (₹20 × 20km × 165) | | 66,000 |
| Revised – Rush Delivery Costs (₹200 × 20) | | 4,000 |
| Total Contribution to be earned from Sales to "A" | ...(A) | 1,38,000 |
| Revised No. of Pizzas (1,500 + 800) | ...(B) | 2,300 |
| Reduced Contribution p.u. | ...(A)/ (B) | 60.00 |

PH cannot reduce the price by more than **₹ 12** *per unit*.

7A)

**Solution:** The required network is given below:



7B)

**Statement Showing "Pareto Analysis of Defects"**

| Defect Type | No. of Items | % of Total Items | Cumulative Total |
|---|---|---|---|
| Scratches on the surface | 110 | 36.67% | 36.67% |
| Rough edges of lenses | 70 | 23.33% | 60.00% |
| Non-uniform grinding of lenses | 60 | 20.00% | 80.00% |
| Frame colours-shade differences | 25 | 8.33% | 88.33% |
| Power mismatches | 20 | 6.67% | 95.00% |
| End frame not equidistant from the centre | 10 | 3.33% | 98.33% |
| Spots/ Strain on lenses | 5 | 1.67% | 100.00% |
| | 300 | 100.00% | |

The company should focus on eliminating *scratches on the surface, rough edges of lenses* and *grinding of lenses* related defects which constitute **80% portion**, according to Pareto Theory.

7c)

| Particulars | Product 'A' 12,500 units | | Product 'F' 12,500 units | | Incremental Revenue/ Cost (₹) |
|---|---|---|---|---|---|
| | Per unit (₹) | Total (₹) | Per unit (₹) | Total (₹) | |
| Sales revenue | 7.00 | 87,500 | 10.00 | 1,25,000 | 37,500 |
| Less: Commission @ 10% | 0.70 | 8,750 | 1.00 | 12,500 | 3,750 |
| Net revenue : (i) | 6.30 | 78,750 | 9.00 | 1,12,500 | 33,750 |
| Raw materials | 1.50 | 18,750 | 2.00 | 25,000 | 6,250 |
| Labour& overheads | 2.10 | 26,250 | 3.50 | 43,750 | 17,500 |
| Additional fixed expenses | | | 0.32 | 4,000 | 4,000 |
| Total cost : (ii) | 3.60 | 45,000 | 5.82 | 72,750 | 27,750 |
| Profit : (i) – (ii) | 2.70 | 33,750 | 3.18 | 39,750 | 6,000 |

The above table shows that by resorting to further processing of 12,500 units the company can earn an additional profit of ₹6,000 per month and hence the proposal is recommended.

**Note:** In the above problem it is likely that the company, instead of utilising its capacity to make product 'F' may go in for a further increase in production of product 'A' to the

extent possible. In such circumstances, the incremental profit of the second alternative should be compared with the incremental profit as obtained above.

7D)

(i) **Invalid:** Kaizen Costing is the system of cost reduction procedures which involves making small and continuous improvements to the production processes rather than innovations or large-scale investment.

(ii) **Valid:** The training of employees is very much a long-term and ongoing process in the Kaizen costing approach. Training enhances the abilities of employees.

(iii) **Invalid:** Kaizen costing approach involves everyone from top management level to the shop floor employees. Every employee's active participation is a must requirement.

(iv) **Invalid:** Though the aim of Kaizen Costing is to reduce the cost but at the same time it also aims to maintain the quality. Kaizen costing also aims to bring the clarity in roles and responsibilities for all employees.

7e)

Primary activities are the activities that are directly involved in transforming inputs into outputs and delivery and after-sales support to output. Following are the primary activities in the value chain of Sinopec Ltd:

(i) **Inbound Logistics**: These activities are related to the material handling and warehousing. It also covers transporting raw material from the supplier to the place of processing inside the factory.

(ii) **Operations:** These activities are directly responsible for the transformation of raw material into final product for the delivery to the consumers.

(iii) **Outbound Logistics:** These activities are involved in movement of finished goods to the point of sales. Order processing and distribution are major part of these activities.

(iv) **Marketing and Sales:** These activities are performed for demand creation and customer solicitation. Communication, pricing and channel management are major part of these activities.

(v) **Service:** These activities are performed after selling the goods to the consumers. Installation, repair and parts replacement are some examples of these activities.