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SUGGESTED SOLUTION

CA FINAL

SUBJECT- SCM PE

Test Code – FNJ 7388

BRANCH - () (Date :)

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Answer 1

(i) Selling Price for "Comfort" that would maximize its contribution at Maturity Stage

Contribution per unit of "Comfort" = Selling Price per unit – Variable

Cost per unit Total Contribution = Contribution per unit × Units sold

All figures in Rupees

Sales (units) per week	550	725	1,000	1,150	1,200
Selling Price per unit	1,750	1,600	1,525	1,450	1,300
Less: Variable Cost per unit	750	750	750	750	750
Contribution per unit	1,000	850	775	700	550
Total Contribution	5,50,000	6,16,250	7,75,000	8,05,000	6,60,000

Total contribution is maximum when sales are 1,150 units. Therefore, the selling price per unit of "Comfort" should be Rs. **1,450 per unit**.

(3 marks)

(ii) Production Number of "Sports" and Selling Price per unit

Amber Ltd. has a production capacity of 3,500 hours per week. As explained in (i) above, it would manufacture 1,150 units of "Comfort" per week. Each unit of "Comfort" requires 2 hours of production. Therefore, total production hours for Comfort would be 1,150 units × 2 hours = 2,300 hours per week.

Production capacity remaining to manufacture "Sports" = 3,500 hours – 2,300 hours

= **1,200 hours per week**. Each unit of "Sports" requires 2.5 hours of production.

Therefore, the number of "Sports" units that can be produced = 1,200 hours / 2.5 hours **= 480 units per week.**

(2 marks)

Linear relationship between Selling Price and Number of Units Demanded has been given to be P= a – bx.

P = Selling Price per unit

a = Selling Price when demand will be zero

b (slope) = Change in Price / Change in Quantity x = Quantity

Demanded

Given, at a Selling Price of Rs.1,000 per unit, Quantity Demanded will be 1,000 units per week. For every Rs.100, per unit increase / decrease in Selling Price, the Quantity

Demanded will decrease / increase by 200 units per week respectively. A Rs.500 per unit increase in Selling Price will result in fall of 1,000 units of Sales per week. The Selling Price at which Sales will be Zero i.e. a = Rs.1,500 per unit.

b (slope) = Change in Price / Change in Quantity = Rs.100 / 200 = 0.50

Penetration pricing is most commonly associated with a marketing objective of increasing market share or sales volume, rather than short term profit maximization. Thus, substituting the values in the equation to find the Selling Price of "Sports" when the Quantity Sold is 480 units:

P = a – bx

= 1,500 – 0.50 × (480)

= 1,500 – 240

= Rs.1,260

Sports should be sold at Rs.**1,260 per unit during the growth stage.**

(**3 marks)**

Alternative

Hours after production of Product 'Comfort' (3,500-1,150×2) =1,200 hours to be utilized to produce product 'Sports'.

1,200 hours/ 2.5 = 480 units

10% increase in selling price will lead to 20% decrease in demand of units of product "Sports". Here we can produce only 480 units which amounts to 52% decrease in units so the selling price should be increased by 26% as per given price demand function. So, the selling price per unit will be 1,260 for 480 units of product "Sports".

(b) "Ethnic" is given to be a highly innovative product that is about to be launched into the market. The product with unique features that will differentiate it from other products leading to a revolutionary impact on market and customer behavior. There seem to be no competitors providing similar products.

Skimming Price Strategy is adopted to charge high prices in the introduction stage in order to recover costs. Skimming Price will be suitable for "Ethnic" because:

- Market for the product is not yet established. Initially high promotional expense may have to be incurred to create customer awareness and build a market for the product.
- Due to its innovative feature, the customers would not mind paying a premium for the unique product offering. Demand would be inelastic.
- The market demand is unknown. Initial capital outlay to produce this product may be high, resulting in high cost of production.
- Production and promotional costs in the initial years is likely to be high. Therefore, a higher selling price would help Amber Ltd. to recover the costs. Since demand is likely to be inelastic, charging a premium may not be a problem.
- The price can be gradually reduced once the market for the product is established.

Competitors may reverse engineer and offer similar products, due to which price may have to be lowered in the long run to retain customers.

Penetration Pricing is adopted to charge a low price in the initial stage for penetrating the market as quickly as possible. For a new product, this low-price strategy will popularize the product. Once the market is established, the price may be increased. Penetration pricing will be suitable when:

- Demand for the product is elastic, more demand when prices are low.
- Large scale production of the product yields economies of scale.
- Threat of competition requires prices to be set low. It serves as an entry barrier to prospective competitors as well.

Product "Ethnic" is an innovative product that the manufacturer believes will change the whole market once it is launched. A strategy of penetration pricing could be effective in discouraging potential new entrants to the market. However, the product is believed to be unique and as such demand is likely to be fairly inelastic. In this instance a policy of penetration pricing could significantly reduce revenue without a corresponding increase in sales. Thus, this strategy is not suitable for "Ethnic".

(4 marks)

(c) Impact on Unit Selling Price and Average Cost of Production per unit at each stage of "Ethnic" Product Lifecycle

Introduction Stage

As explained in (b) above, at the Introduction Stage of Lifecycle, due to high cost of production and initial promotion expenditure, the unit cost of production will be high. Using Skimming Price Policy, the unit selling price will also be high.

Growth Stage

This is the second phase of the Life-Cycle, product awareness among customers would result in increased demand. Therefore, scale of production likely to increase. The new market segment would attract competitors, who are like to reverse engineer and offer similar products in the market. Promotional activities and marketing activities need to continue to maintain and gain market share.

Accordingly, the unit selling price would reduce from the introduction stage on account of the following reasons:

Competitors offering similar product would take away the uniqueness feature of "Ethnic".

Again, to gain market share, the unit selling price may have to be lowered to make it attractive to a larger segment of customers.

The unit cost of production is also likely to reduce due to the following reasons:

- Increased production would result in increased material procurement from suppliers.

Bulk purchasing discounts can be negotiated with them to lower cost of production.

- Learning curve and experience would enable the labor force to become more efficient. This leads to higher production with the same level of resources leading to cost savings.
- Larger production batches due to increase in scale of operations will reduce the unit variable overhead cost.
- Economies of scale would result due to fixed overhead cost being spread over larger number of units.

Maturity Stage

The third phase of Product Life-Cycle that is characterized by an established market for "Ethnic". After rapid growth in sale volume in the previous stages, growth of sales for the product will saturate. Competition would be high due to large number of rivals in the market, this may lead to decreasing market share.

It is likely that the price of the product will be lowered further at the maturity stage in a bid to preserve sales volumes**.** The company may attempt to preserve sales volumes by employing an extension strategy rather than reducing the selling price. For example, they may introduce product add-ons to the market that are compatible with "Ethnic".

Unit production cost will remain constant

- Direct material cost will remain constant. If procurement is lower than the growth phase, it might even lead to slightly higher prices since supplier may not extend bulk discounts.
- The benefits of efficient production due to the effect of learning and experience may also have waned. Therefore, unit labour cost is also likely to remain constant.
- Since scale of production is no longer increasing, the unit variable overhead costs are also likely to remain constant.

Decline Stage

This last stage in the product cycle is characterized by saturated market, declining sales, change in customer's tastes etc. Profitability may slowly start decreasing with fall in sales.

At the decline stage, Product "Ethnic" is likely to have been surpassed by more advanced products in the market and consequently will become obsolete**.** The company will not want to incur inventory holding costs for an obsolete product and is likely to sell "Ethnic" at marginal cost or perhaps lower.

Sales volumes at the decline stage are likely to be low as the product is surpassed by new exciting products that have been introduced to the market. Furthermore, the workforce may be less interested in manufacturing a declining product and may be looking to learn new skills. For both of these reasons, unit production costs are likely to increase at the decline stage.

(**8 marks)**

Answer 2 (A)

APC Ltd. Transfer Pricing

(i) Profitability of each division and the company as a whole when Division X supplies 240,000 units of Gex annually to Division Y.

Division Y produces 1,20,000 units of Gextin. Each component of Gextin requires 2 components of Gex that it currently procures from Division X. Therefore, it procures 2,40,000 units of Gex from Division X annually.

Division X has an overall capacity of 5,00,000 units annually to produce Gex. Of this it produces 2,40,000 units for Division Y, which it must first cater to. The remaining 2,60,000 units of Gex is sold to external customers.

Divisional and Overall Profitability of APC Ltd.

Sr. No.	Particulars	Division X				Division Y		Total APC Ltd
		Per unit of Gex	External Sales	Internal Sales	Total Division X	Per unit of Gextin	External Sales	
			2,60,000 units	2,40,000 Units	5,00,000 Units		1,20,000 units	
1	Selling Price	50	1,30,00,000	1,20,00,000	2,50,00,000	180	2,16,00,000	4,66,00,000
2	Less: Variable Cost							
a	Direct Material							
b	Component Gex	---	---	---	---	100	1,20,00,000	1,20,00,000
c	Other materials	12	31,20,000	28,80,000	60,00,000	22	26,40,000	86,40,000
d	Direct Labour	16	41,60,000	38,40,000	80,00,000	13	15,60,000	95,60,000
e	Manufacturing Over-head	2	5,20,000	4,80,000	10,00,000	5	6,00,000	16,00,000
f	Selling and Distribution Costs	4	10,40,000	----	10,40,000	2	2,40,000	12,80,000
	Total	34	88,40,000	72,00,000	1,60,40,000	142	1,70,40,000	3,30,80,000
3	Contribution (Step 1 - 2)	16	41,60,000	48,00,000	89,60,000	38	45,60,000	1,35,20,000
4	Annual Fixed Cost				40,00,000		20,00,000	60,00,000
5	Annual Profit (Step 3 - 4)				**49,60,000**		**25,60,000**	**75,20,000**

Note

Division X does not incur marketing costs on internal sales. Therefore, cost not incurred on transfer of 240,000 units to Division Y.

(**2 marks)**

(ii) Impact if Division Y accepts to buy 240,000 units of Gex annually from the external supplier at Rs.47 per unit of Gex.

Sr. No.	Particulars	Division X				Division Y		Total
		Per unit of Gex	External Sales	Internal Sales	Total Division X	Per unit of Gextin	External Sales	
			3,00,000 units	0 Units	3,00,000 units		1,20,000 units	
1	Selling Price	50	1,50,00,000	-	1,50,00,000	180	2,16,00,000	3,66,00,000
2	Less: Variable Cost							
a	Direct Material							
b	Component Gex	-	-	-	-	94	1,12,80,000	1,12,80,000
c	Other Materials	12	36,00,000	-	36,00,000	22	26,40,000	62,40,000
d	Direct Labour	16	48,00,000	-	48,00,000	13	15,60,000	63,60,000
e	Manufacturing Overhead	2	6,00,000	-	6,00,000	5	6,00,000	12,00,000
f	Selling and Distribution Costs	4	12,00,000	-	12,00,000	2	2,40,000	14,40,000
	Total	34	1,02,00,000	-	1,02,00,000	136	1,63,20,000	2,65,20,000
3	Contribution (Step 1 - 2)	16	48,00,000	-	48,00,000	44	52,80,000	1,00,80,000
4	Annual Fixed Cost				40,00,000		20,00,000	60,00,000
5	Annual Profit (Step 3 - 4)				8,00,000		32,80,000	40,80,000

Analysis APC Ltd

Overall profitability of APC Ltd. reduces from Rs.75,20,000 per annum to Rs.40,80,000 per annum. The reduction in profit is therefore Rs.34,40,000 per annum. Reasons are:

(a) The cost of manufacturing Gex is only Rs.30 per unit while Division Y is procuring this at Rs.47 per unit from an external supplier. Annually this results in a loss of Rs.40,80,000 (240,000 units of Gex×Rs.17 per unit).

(b) Since Division X no longer makes Gex for internal sales, it can ramp up its external sales to meet the full annual demand of 300,000 units. This results in extra external sales of 40,000 units annually. Each unit gives a contribution of Rs.16 per unit. Therefore, additional contribution from sale of 40,000 units of Gex to external customers is Rs.640,000 per annum.

(c) Therefore, netting both (a) and (b) above, the net loss to the company is Rs.**34,40,000** per annum.

Division Y

Impact on profit of Division Y, increase from Rs.25,60,000 per annum to Rs.32,80,000 per annum that is Rs.**7,20,000** per annum increase. This is due to the savings in procurement cost of Gex for Division Y. Instead of procuring Gex at Rs.50 per unit Division Y proposes to buy it at Rs.47 per unit externally. For its annual demand of 2,40,000 units of Gex**, it translates to savings of** Rs.**7,20,000 annually in procurement cost for Division Y.**

Division X

Impact on profit of Division X, reduction from Rs.49,60,000 per annum to Rs.8,00,000 per annum. A substantial reduction of Rs.**41,60,000** in its divisional profit per year. Division X earns a contribution of Rs.20 per unit of Gex from its internal transfer to Division Y. (Selling price Rs.50 per unit less variable cost of manufacturing Rs.30 per unit). If Division Y procures Gex externally, this would result in an annual loss of

Rs.48,00,000 in contribution for Division X (240,000 units ×Rs.20 per unit). However, due to additional external sales of 40,000 units of Gex, Division X can earn an additional contribution of Rs.6,40,000 per year (40,000 units of Gex × Rs.16 contribution per unit of external sale). Offsetting, this results in a lower contribution **of** Rs.**41,60,000 per annum for Division X.**

This also results in excess capacity of 2,00,000 units per annum in Division X.

(**4 marks)**

(iii) APC Ltd. can suffer a loss of Rs.34,40,000 per annum if Division Y decides to procure Gex from the external supplier. It costs on Rs.30 per unit to manufacture Gex internally as compared to Rs.47 per unit that Division Y is willing to pay to the external supplier. However, Division X is unwilling to reduce the price from Rs.50 per unit since divisional performance is done based on the profit margin ratio of the division. Therefore, the management of the company has to step in to promote goal congruence. If Division Y buys GEX from the external supplier, not only is it costly for the company, it also results in a lot of unused capacity lying idle in Division X.

In the current scenario, one possible way of arriving at an acceptable transfer price range could be:

Division X is currently working at full capacity of 5,00,000 units per annum. Of this production, 2,40,000 units is supplied internally to Division Y while the balance is supplied to external market. The marginal cost of production of Gex is Rs.30 per unit. If this were sold externally, it would earn a contribution of Rs.16 per unit. **Therefore, the minimum transfer price the Division X would demand = marginal cost of production per unit + opportunity cost per unit =** Rs.**30 +** Rs.**16 =** Rs.**46 per unit of Gex.**

(The other way of looking at this could also be that Division X does not incur any selling and distribution costs on internal transfers. To outside clients it needs to spend Rs.4 per unit towards the same. Therefore, to make its price more competitive with the external market, Division X can reduce the price by Rs.4 per unit, which it has been recovering from Division Y for a cost it does not incur in internal transfers. Thus, based on its cost structure and the competitive profit margin it earns from external sales, it can price its internal transfers at Rs.46 per unit.)

Division Y will be willing to pay the lower of net marginal revenue or the external buy- in price.

The Net Marginal Revenue per unit of Gextin = Selling price per Gextin – (marginal cost for Division Y other than the cost of Gex) = Rs.180 - Rs.42 = Rs.138 per unit of Gextin. This

translates that Division Y will be willing to pay upto Rs.69 per unit of Gex, that it can incur without incurring a divisional loss. Meanwhile, the external buy-in price is Rs.47 per unit.

Therefore, the maximum price Division Y will be willing to pay = lower of Net Marginal Revenue or external buy-in price = lower of Rs.**69 or** Rs.**47 per unit of Gex. Therefore, Division Y will be willing to pay maximum** Rs.**47 per unit of Gex to Division X.**

Therefore, the transfer price range can be set between Rs.**46 -** Rs.**47** per unit of Gex. Division X would then have to compete with the external supplier to retain its internal sales. This would promote more efficient working between Division X and Y. **By selling it at** Rs.**46 per unit, the contribution of Division X would be maintained at Rs.**16 per unit. For Division Y. the procurement of Gex at **Rs.**46 per unit would be beneficial since it is lower than the external market price. If transfer price set at external market rate **Rs.**47 per unit, Division Y would still be able to improve its profit margin as compared to the original transfer price of **Rs.**50 per unit.

Given that the marginal cost of manufacturing Gex is only Rs.30 per unit, the management has to ensure that production of Gex is made in-house. Performance measure at a divisional level should then not be restricted to financial performance alone (full profit responsibility) and should be accordingly modified to include non- financial / operational measures as well.

(4 marks)

Answer 2 (B)

(i) **A. Statement Showing Effective Cost before Inspection**

Particulars	**DJ Ltd.**	**PJ Ltd.**	**ZJ Ltd.**
Units Supplies (No.s)	12,000	12,000	12,000
Defectives Expected (No.s)	360	600	240
Costs:			
Purchase of Components	28,800	28,080	31,200
Add: Production Damage on Defective Components (@ Rs.200 per 100 components)	720	1,200	480
Total	29,520	29,280	31,680
Good Components (Nos.)	11,640	11,400	11,760
Cost per 100 Good Components	**253.61**	**256.84**	**269.39**

B. Statement Showing Effective Cost after Inspection

Particulars	**DJ Ltd.**	**PJ Ltd.**	**ZJ Ltd.**
Units Supplies (No.s)	12,000	12,000	12,000
Defects Not Expected (No.s)	36	60	24
Defectives Expected (No.s)	324	540	216
Components Paid For	11,676	11,460	11,784
Costs:			
Purchase of Components	28,022.40	26,816.40	30,638.40
Add: Inspection Cost	3,120.00	3,120.00	3,120.00

Add: Production Damage on Defective Components (@ Rs.200 per 100 components)	72.00	120.00	48.00
Total	31,214.40	30,056.40	33,806.40
Good Components (Nos.)	11,640	11,400	11,760
Cost per 100 Good Components	**268.16**	**263.65**	**287.47**

ADVICE Whether Inspection at the Point of Receipt is Justified

On comparing the cost under situation, A and B shown above, we find that it will not be economical to install a system of inspection.

Further we also need to consider that presently many organizations are undergoing Just in Time (JIT) implementation. JIT aims to find a way of working and managing to eliminate wastes in a process. Achievement of this is ensured through eliminating the need to perform incoming inspection. Inspection does not reduce the number of defects, it does not help in improving quality. In general inspection, does not add value to the product. It simply serves as a means of identifying defects the supplier has failed to recognize subsequent to the manufacturing of the product.

As a matter of fact, organizations implementing JIT are seeking eventually to eliminate the need for performing incoming inspection activities through a combination of reducing the supplier base, selection through qualification and vendor development. Vendor development and its proper management seeks to assist the supplier who maintains an interest in striving to provide 100% defect-free materials and parts.

So, to decision whether inspection at the point of receipt is justified or not will also depend on Qualitative factors as well.

(8 Marks)

(ii) On comparing the buying cost of components under different situations, as analysed and advised above, if company decides not to install a system of inspection, supplier DJ would be cheaper otherwise supplier PJ would be cheaper and company may choose supplier accordingly.

(2 Marks)

Note : This question can also be solved by assuming receipt of **good components** as requirement i.e. 12,000 units.

Answer 3

(a) **(i) Calculation of last year ROI of Division II**

= Controllable Profit/ Controllable Net Asset

= Rs.16,80,000/ Rs.52,50,000

= **32%**

(1 Mark)

(ii) **Calculation of ROI of New Product Line**

Particulars	**Amount (**Rs.)
Sales	90,00,000
Less: Variable Cost	58,50,000
Controllable Contribution	31,50,000
Less: Fixed Cost	25,20,000
Controllable Profit	6,30,000
Investment Available	30,00,000
Return on the Proposed Line (ROI)	**21%**

The manager of Division II would be unwilling to invest the additional Rs.30 lacs because this would decrease the Division II's ROI of 32% to 28%.

[Rs.16,80,000+Rs.6,30,000/ (Rs.52,50,000+Rs.30,00,000)]

(2 Marks)

(iii) Generally, a manager who is evaluated based on ROI will reject any project whose rate of return is below the Division's current ROI even if the rate of return of the project is above the company's minimum required rate of return. In contrast, managers who are evaluated using residual income will pursue any project whose rate of return is above the minimum required rate of return, because it will increase their residual income. So, in the best interest of the company as a whole, residual income approach can be used for evaluation of managerial performance.

Alternative

To overcome some of the dysfunctional consequences of ROI, the residual income approach can be used. For the investment decision for Divisions II, the residual income calculations are as follows:

Proposed Investment	Rs. 30,00,000
Controllable Profit	Rs.6,30,000
Cost of Capital (18%)	Rs.5,40,000
Residual Income(RI)	**90,000**

Advise

This calculation indicates that the residual income of Division II will increase if manager accept the project. However, it is important to note that Residual Income does not always point to the right decision, because notional interest on accounting capital employed is not the same as IRR on cash investment. This Project has 1.65% IRR.

Overall, Residual Income is more likely than ROI to improve when managers make correct investment decisions, and so is probably a 'safer' basis than ROI on which to measure performance.

(2 Marks)

(iv) **Manufacturing Cycle Efficiency (MCE)**

$$\frac{\text{Processing Time}}{\text{Inspection Time} + \text{Process Time} + \text{Queue Time} + \text{Move Time} + \text{Wait Time}}$$

$$= \frac{\mathbf{2.8\ days}}{0.5\ \text{days} + 2.8\ \text{days} + 4.0\ \text{days} + 0.7\ \text{days} + 16.0\ \text{days}}$$

= 11.67 %

Interpretation

In AKG, the MCE is 11.67%, which means that 88.33% of the time a unit is in process is spent on the activities that do not add value to the product. Monitoring the MCE helps companies to reduce non -value added activities and thus get products into the hands of customers more quickly and at a lower cost.

(3 Marks)

(v) **Percentage of Time Spent on Non- Value Added Activities**

= 100% -11.67%

= 88.33%

(1 Mark)

(vi) **Delivery Cycle Time**

= 0.5 days + 2.8 days + 4.0 days + 0.7 days + 16 days

= 24 days

(1 Mark)

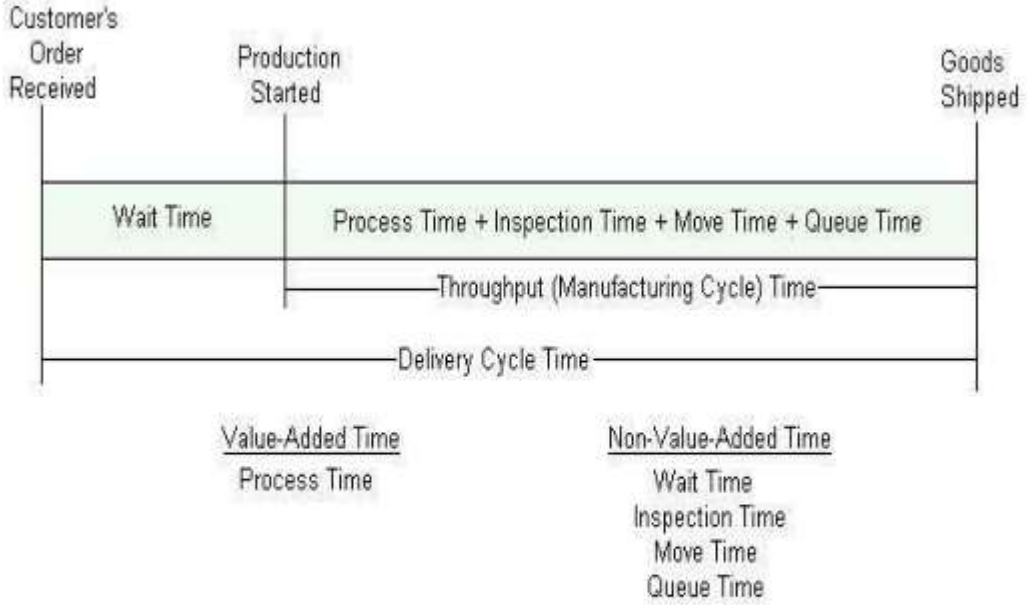
(vii) **Revised MCE**

$$= \frac{\mathbf{2.8\ days}}{0.5\ \text{days} + 2.8\ \text{days} + 0\ \text{days} + 0.7\ \text{days} + 16.0\ \text{days}}$$

= 14 %

(2 Marks)

Alternative (iv) to (vii)



Value-Added Time	Non-Value-Added Time
Process Time	Wait Time
	Inspection Time
	Move Time
	Queue Time

(iv) Manufacturing Cycle Efficiency (MCE)

$$= \frac{\text{Value Added Time (Processing Time)}}{\text{Throughput (Manufacturing Cycle) Time}}$$

$$= \frac{2.8 \text{ days}}{0.5 \text{ days} + 2.8 \text{ days} + 4.0 \text{ days} + 0.7 \text{ days}}$$

= 35%

Interpretation

In AKG, the MCE is 35%, which means that 65% of the time a unit is in process is spent on the activities that do not add value to the product. Monitoring the MCE helps companies to reduce non -value added activities and thus get products into the hands of customers more quickly and at a lower cost.

(v) Percentage of Time Spent on Non- Value Added Activities

= 100% -35%

= 65%

(vi) Delivery Cycle Time

= 0.5 days + 2.8 days + 4.0 days + 0.7 days + 16 days

= 24 days

(vii) Revised MCE

$$= \frac{2.8 \text{ days}}{0.5 \text{ days} + 2.8 \text{ days} + 0 \text{ days} + 0.7 \text{ days}}$$

= 70%

(b)

Perspective	Strategic Objective	Measure
Financial	▪ Improve ROI ▪ Increase Sales	▪ % increase in ROI ▪ % increase in sales
Customer Perspective	▪ Improve brand recognition ▪ Customer retention	▪ % of target audience who recognize brand ▪ %of suggestions/ complaints responded ▪ % increase in repeat customers/ Number of repeat customers
Internal Perspective	▪ Improve in product quality ▪ Improve on time delivery to customers ▪ Reduction in time spent in non-value added activities	▪ % reduction in defect rate ▪ % of orders on time ▪ % increase in MCE
Learning & Innovation	▪ Expansion of eco-friendly product line ▪ Introduction of limited edition items	▪ No of eco-friendly products developed. ▪ No of limited editions introduced.

(8 Marks)

Answer 4(A)

Activity-based costing, flexible-budget variances for finance function activities.

(i) **Receivables**

Receivables is an output unit level activity. Its flexible-budget variance can be calculated as follows:

Flexible Budget Variance

= Flexible Budget Costs – Actual Costs

= Rs. 6.39 × 9,48,000 – Rs. 7.50 × 9,48,000

= Rs. 60,57,720 – Rs. 71,10,000

= Rs. **10,52,280 (A)**

(2 Marks)

(ii) **Payables**

Payables is a batch level activity.

	Static-Budget Amounts	Actual Amounts
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	5	4.468
c. Number of batches (a / b)	2,00,000	2,12,175
d. Cost per batch	Rs.29	Rs.28
e. Total payables activity cost (c×d)	Rs.58,00,000	Rs.59,40,900

Step 1: The number of batches in which payables should have been processed

= 9,48,000 actual units / 5 budgeted units per batch

= **189,600 batches**

Step 2: The flexible-budget amount for payables

= 1,89,600 batches × Rs. 29 budgeted cost per batch

= Rs. **54,98,400**

The flexible-budget variance can be computed as follows:

Flexible-Budget Variance

= Flexible-Budget Costs – Actual Costs

= 1,89,600 × Rs. 29 – 2,12,175 × Rs. 28

= Rs. 54,98,400 – Rs. 59,40,900

= Rs. **4,42,500 (A)**

(4 Marks)

(iii) **Travel Expenses**

Travel expenses is a batch level activity.

	Static-Budget Amounts	**Actual Amounts**
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	500	501.587
c. Number of batches (a / b)	2,000	1,890
d. Cost per batch	Rs.76	Rs.74
e. Total travel expenses activity cost (c×d)	Rs.1,52,000	Rs.1,39,860

Step 1: The number of batches in which the travel expense should have been processed

= 948,000 actual units/ 500 budgeted units per batch

= 1,896 batches

Step 2: The flexible-budget amount for travel expenses

= 1,896 batches × Rs. 76 budgeted cost per batch

= Rs. **1,44,096**

The flexible budget variance can be calculated as follows:

Flexible Budget Variance

= Flexible-Budget Costs – Actual Costs

= 1,896 × Rs. 76 – 1,890 × Rs. 74

= Rs. 1,44,096 – Rs. 1,39,860

= Rs. **4,236 (F)**

(4 Marks)

Answer 4(B)

(i) Cool Air Ltd. purchases 25,000 units of components to manufacture 25,000 fans annually. The external purchase price per component is Rs.190 per unit. It has the option of manufacturing these components in house. The cost structure of manufacturing these components would be as below:

Cost Structure	**Cost per component unit (Rs.)**
Direct Materials	80
Direct Labor	75
Variable Factory Overhead (70% of Rs.40)	28
Total	183

Analysis

If Cool Air Ltd. decides to manufacture the components in-house, the following would be the financial impact:

(a) Production Capacity will increase from 25,000 fans to 30,000 fans.

(b) Variable Cost of Production of fan would be Rs.1,710 [(2,500 - 600) -190] per unit.

(c) Fixed Factory Overhead of Rs.12 per component would be incurred irrespective of whether component is produced or not. Therefore, this cost is not considered.

(d) Increase in advertising expense would be Rs.100,000 per month or Rs.12,00,000 annually.

(e) Overall selling price would reduce from the current rate of Rs.2,500 per fan to Rs.2,375 (95% of Rs.2,500) per fan.

(f) Current contribution considering a procurement price of Rs.190 per component unit, is Rs.600 per fan. As calculated above, if produced in house, the variable cost would be Rs.183 per component unit. This would result in an increase in contribution by Rs.7 per fan (procurement price of Rs.190 per component unit less variable cost of Rs.183 per component unit). In addition, there is an impact of Rs.125 on account of reduction in selling price. Therefore, the contribution if component produced in house would be Rs.482 per fan (Rs.600+Rs.7-Rs.125).

To summarize the above figures:

Particulars	**Procurement 25,000 Components**		**Produce 30,000 Components**	
	Per Fan Rs.	**Total** Rs.	**Per Fan** Rs.	**Total** Rs.
Selling price per fan	2,500	6,25,00,000	2,375	7,12,50,000
Contribution per fan	600	1,50,00,000	482	1,44,60,000

Therefore, incremental loss by switching to in house production (on a total basis) would be Rs.**17,40,000** (incremental loss Rs.5,40,000 – additional advertising expenses Rs.12,00,000). On a per unit basis, it would result in a **loss of** Rs.**58 per fan**.

(8 Marks)

(ii) Recommendation

As explained above, if production increases from 25,000 fans to 30,000 fans, it would not be profitable to make these components in house. Overall profit decreased by Rs.17,40,000. However, Company may prefer to make component, even though it could be financially beneficial to buy from outside supplier. Sometimes qualitative factors become very important and can override some financial benefit. This can be coupled with uncertainty about the supplier's ability or intention to maintain the price, quality, delivery dates of the components etc.

Alternatively, the company may continue with the sale of 25,000 units without any price reduction and advertising expenses. The component required for the 25,000 fans may be produced internally at a cost of Rs.183 per unit. In this situation, the contribution shall be increased by Rs.1,75,000 (Rs.7 × 25,000 units).

So, Cool Air Ltd. may recommend about the most profitable alternative after due and careful consideration of the facts illustrated above.

(2 Marks)

Answer 5(A)

(i) Calculation of Loss of Time Per Shift

	(Mins)
Break	45
Clean up Period	10
Unplanned Downtime	36
Total Time Loss Per Shift	91

Availability Ratio *per shift* $= \left\{\frac{720 \text{ mins.} - 91 \text{ mins.}}{720 \text{ mins.}}\right\} \times 100\%$

$=$ **87.36 %**

Actual Production = 3,360parts

Standard time = 10seconds

Standard Time Required = 3,360parts × 10seconds/ 60

(Ideal Time) = 560 minutes

Actual Time Taken = 720 mins. – 91 mins.

= 629 minutes

Performance Ratio = $\left\{\frac{560 \text{ mins.}}{629 \text{ mins.}}\right\} \times 100\%$

= **89.03%**

Quality Ratio = $\left\{\frac{3{,}360 \text{ parts} - 75 \text{ parts}}{3{,}360 \text{ parts}}\right\} \times 100\%$

= **97.77%**

Thus, **OEE** = 0.8736 × 0.8903 × 0.9777

= **76.04%**

Comment

Since OEE of APZ Company Ltd. is lesser than 85 % i.e. World Class Performance Level, Company is advised to improve its each ratio i.e. availability ratio, performance ratio and quality ratio by collecting information related to all downtime and losses on machines, analyzing such information through graphs and charts, making improvement decisions thereon like autonomous maintenance, preventive maintenance, reduction in set up time etc. and implementing the same.

(6 Marks)

Alternative

1. Scheduled Time = 12 hours = 720 Minutes (12 × 60)
2. Planned Down Time = 3 breaks × 15 minutes + clean- up 10 minutes = 55 minutes
3. Net Available Time (NAT) = 720 – 55 = 665 minutes

Automated Machine A

1. Unplanned Downtime = 36 minutes
2. Net Operating Time (NOT) = Net Available Time – Unplanned Downtime
3. NOT = 665 – 36 = 629 minutes
4. Ideal Operating Time (IOT): 3,360 Total Parts × 10 seconds = 33,600 / 60 = 560 minutes
5. Lost Operating Time (LOT): 75 Scrap Parts × 10 seconds = 750 / 60 = 12.50 minutes

Automated Machine A: OEE Factors are calculated as follows

1. Availability: NOT / NAT = (629 / 665) × 100 = **94.59 %**
2. Performance: IOT / NOT = (560 / 629) × 100 = **89.03%**
3. Quality: (IOT – LOT) / IOT = (560 – 12.50) / 560 × 100 = **97.77%**
4. OEE = A × P × Q = 94.59% × 89.03% × 97.77% = **82.34%**

Comment

Since the OEE of APZ Company Ltd is very close to 85% i.e. world class performance level, company should take measures to improve it and strive to attain 85% level. Availability Ratio of machine A10 is 94.59% exceeding the ideal value of > 90% which is good but the Performance and Quality Ratios need attention as they are below their ideal values of 95% and 99% respectively.

Note : **OEE** can also be computed directly as under:

1) (Good Counts × Ideal Cycle Time)/ Planned Production Time **Or**
2) (Ideal Operating Time – Loss Operating Time)/ Net Available Time

(6 Marks)

(ii) **The connection between TQM and TPM are summarized below:**

- TQM and TPM make company more competitive by reducing costs, improving customer satisfactions and slashing lead times.
- Involvement of the workers into all phases of TQM and TPM is necessary.
- Both processes need fundamental training and education of participants.
- TPM and TQM take long time to notice sustained tangible benefits.
- Commitment from top managements is necessary for success of the implementation.

(4 Marks)

Answer 5(B)

The company has a plan to produce 1,80,000 units and it proposed to adopt Cost plus Pricing approach with a markup of 25% on full budgeted cost. To achieve this pricing policy, the company has to sell its product at the price calculated below:

Qty.	1,80,000 units
Variable Cost (1,80,000 units × ₹25)	45,00,000
Add: Fixed Cost	12,60,000
Total Budgeted Cost	57,60,000
Add: Profit (25% of ₹57,60,000)	14,40,000
Revenue (need to earn)	72,00,000
Selling Price *per unit* $\left(\frac{₹72,00,000}{1,80,000\ units}\right)$	40 p.u.

However, at selling price Rs.40 per unit, the company can sell 1,50,000 units only, which is 30,000 units less than the budgeted production units.

After analyzing the price-demand pattern in the market (which is price sensitive), to sell all the budgeted units market price needs to be further lowered, which might be lower than the total cost of production.

Statement Showing "Profit at Different Demand & Price Levels"

	I	II	III	IV	V	Dealer
Qty. (units)	1,74,000	1,62,000	1,50,000	1,38,000	1,25,000	1,80,000
	96.67%	90.00%	83.33%	76.67%	**69.44%**	100%
Selling Price p.u. (₹)	36	38	40	42	44	32
	₹	₹	₹	₹	₹	₹
Sales	62,64,000	61,56,000	60,00,000	57,96,000	55,00,000	57,60,000
Less: Variable Cost	43,50,000	40,50,000	37,50,000	34,50,000	31,25,000	41,40,000
Total Contribution	19,14,000	21,06,000	22,50,000	23,46,000	23,75,000	16,20,000
Less: Fixed Cost	12,60,000	12,60,000	12,60,000	12,60,000	12,60,000	12,60,000
Profit (₹)	6,54,000	8,46,000	9,90,000	10,86,000	11,15,000	3,60,000
Profit (% on total cost)	11.66%	15.93%	19.76%	23.06%	**25.43%**	6.67%

Advice

(i) Taking the above calculation and analysis into account, the company should produce and sell 1,25,000 units (i.e. near to 70% of budgeted production) at Rs.44. At this price RK will not only be able to achieve its desired mark up of 25% on the total cost but can earn maximum contribution as compared to other even higher selling price.

(ii) Sell to wholesale dealer is not a financially viable option. RK will get only 6.67% margin on cost which is substantially lower than the desired level of mark up. However, this option will utilize the entire production. Instead RK may explore other opportunities to utilize additional capacity i.e.30%, for example, international expansion through e – commerce website or outsource the unutilized capacity to others to earn additional revenue.

(10 Marks)

Answer 6(A)

Environment Cost Allocation

Allocation of environment costs incurred by the company can be allocated to products using (i) Input-Out analysis (ii) Flow Cost Accounting (iii) Life cycle costing and (iv) Activity Based Costing

Environment costs can be allocated to Chemicals SX and ZX using Activity Based Costing.

S. No.	Type of Environment cost	Allocation Basis	Cost Allocation Rs		
			Chemical SX	Chemical ZX	Total
1	Packing Material Costs	Packing Materials(kg.) SX 80,000 kg. ZX 40,000 kg.	2,40,000	1,20,000	3,60,000
2	Energy Cost	Energy Usage (KWH) SX 60,000 kwh ZX 30,000 kwh	64,000	32,000	96,000
3	Fines for Release of Toxins into Air	Toxins Released (Pounds into air) SX 200,000 pounds ZX 40,000 pounds	40,000	8,000	48,000
4	Operating Costs of Pollution Control Equipment	Pollution Control Machine Hours SX 32,000 hrs ZX 8,000 hrs	89,600	22,400	1,12,000
5	Total Cost Allocation	Sum of Steps 1 to 4	4,33,600	1,82,400	6,16,000
6	Units Produced (kg.)		6,00,000	15,00,000	21,00,000
7	Environment Cost per unit produced (Step 5 / Step 6)		Rs.**0.7227**	Rs.**0.1216**	Rs.0.2933

The environment cost allocation per kilogram for Chemical SX is Rs.0.72 per kg and Chemical ZX is Rs.0.12 per kg.

The average environment cost per kg for overall production is Rs.0.2933 per kg.

(5 Marks)

Answer 6(B)

Triple Bottom Line

Identification of initiatives undertaken by XYZ Ltd. into categories it would impact based on the Triple Bottom Line Model – People, Planet or Profit.

Reduced the amount of plastic usage in peanut butter jars.	Planet
Provided financial support to hospital run by local authority in the vicinity of the factory	People
Constructed solar powered warehouse	Planet
Generated profit for the company's shareholders	Profit
Started child care unit for the benefit of women employees as well as for the neighboring community	People

(5 Marks)

Answer 6(C)

(i) Calculation of Actual Machine Hours

Efficiency Variance = Rs.48,000 (F) given

= Standard Variable Overhead Rate per Hour × (Standard Hours – Actual Hours)

Rs.48,000(F) = Rs.80 × (11,500 hrs. – Actual Hours)

Actual Hours = **10,900 hrs.**

(ii) Budgeted Machine Hours

Volume Variance = Rs.1,00,000 (F)

= Standard Fixed Overhead Rate per Hour × (Standard Hours – Budgeted Hours)

Rs.1,00,000 (F) = Rs.125 × (11, 500 hrs. – Budgeted Hours)

Budgeted Hours = **10,700 hrs.**

(iii) Total Fixed Production Overhead*

Fixed Production Overhead = Standard Fixed Overhead Rate per Hour × Budgeted Hours

= Rs.125 × 10, 700 hrs.

= Rs.**13,37,500**

* Assumed Budgeted

(iv) Applied Manufacturing Overhead

= Standard Overhead Rate per Hour × Standard Hours

= Rs.205 × 11, 500 hrs.

= Rs.**23,57,500**

ALTERNATIVE (iii) & (iv)

(iii) Total Fixed Production Overhead

Expenditure Variance = Fixed Production Overhead (Budgeted) + Budgeted Variable Overheads for Actual Hours – Actual Overheads

Rs.94,000 (A) = Fixed Production Overhead + 10,900 hrs. × Rs.80 – Rs.18,00,000

Fixed Production Overhead = Rs.**8,34,000**

(iv) Applied Manufacturing Overhead

= Actual Overhead Incurred + Total Variance

= Rs.18,00,000 + Rs.54,000

= Rs.**18,54,000**

Working Notes

Total Variance = Expenditure Variance + Efficiency Variance + Volume Variance

= Rs.94,000 (A) + Rs.48,000 (F) + Rs.1,00,000 (F)

= Rs.54,000 (F)

(10 Marks)