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**SUGGESTED SOLUTION**

**CA FINAL**

**SUBJECT- SCM AND P.E**

**Test Code – FNJ 7315**

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## **ANSWER – 1**

### **(i) The Various Primary Activities of Audio Tech in its Value Chain Analysis**

Michael Porter describes the value chain as “internal processes or activities a company performs to design, produce, market, deliver and support its product.” Rather than looking at costs as per accounting cost pools, the value chain model focuses on the work flow of an organization in the form of discrete set of activities that are linked to each other. The value chain model is a generic model that examines activities as Primary Activities and Secondary Activities. Passing through each activity, the product or service gains some value. The idea is to (a) eliminate non-value adding activities and (b) identify product differentiating or cost leadership opportunities among the value adding activities.

Individual activities reflect the company’s strategy, implementation of its strategy and underlying economics of the activities themselves.

Profit margin for the company = Value created less the cost of creating that value

Primary activities are those activities that enable inputs (raw material) to be transformed into output (finished goods) or in the provision of service. Primary activities as per Porter’s model are:

#### **Inbound Logistics**

Activities related to receiving, storing and distributing the inputs (raw materials) to the production process.

Audio Tech has its materials and components needed to manufacture audio equipment delivered to its godown at the factory premises. These materials are stored until needed for production and assembling at the factory. These are the inbound logistics related activities.

#### **Operations**

Activities involved in transforming raw materials into final products. These would include machining, packaging, testing and equipment maintenance.

Audio Tech’s work flow activities related to manufacturing of the audio equipment and components need to be considered here. In addition, the testing of equipment using ipad application, bass sweep test as also sound quality check after assembly into the car, are operations related activities.

#### **Outbound Logistics**

Activities involved in collecting, storing and distributing the products from the assembly line to the end user customers. This includes finished goods warehousing, delivery vehicle operation, order processing and scheduling.

Some of the activities that would be classified here are:

- (a) Storage of Audio Tech’s finished goods within factory premises and at its distribution centre.
- (b) Scheduling and dispatch of goods using trucks to retail outlets and distribution centres.

- (c) Activities related to order taking from retail outlets as well as direct orders on the company's website.

### **Marketing and Sales**

Activities such as advertising, promotion, distribution channel selection, sales force management, pricing policy and such other activities that make the customer aware of the product would be listed here.

All of Audio Tech's activities that relate to the above list of activities whereby it aims to spread customer awareness would be classified here. It aims to build customer loyalty by offering quality products.

### **Service**

Activities related to after sales service such as installation, repair and part replacement would be classified here.

Audio Tech has a separate department to handle customer complaints. Customers can return the product if quality specifications are not met. Also, any activity relating to after sale service would be classified here.

### **Below are certain measures that Audio Tech can implement to Reduce Costs**

Just in Time raw material procurement system: Procure input materials and components only when needed for production and handling. This would reduce inventory holding costs. Less inventory on hand could also result in savings in storage and material insurance costs. Before implementation, the company needs to consider the risk of loss incurred on account of stock-outs. It needs to develop close relationships with its suppliers to ensure streamlined delivery of inputs. At the same time inputs should meet the required quality standards.

- (a) Company's trucks deliver the finished goods to retail outlets as per a fixed schedule each week, irrespective of the load they carry. This indicates that there may be possibilities of dis-economies of cost. If there is a pile up of inventory due to lesser number of truck delivery runs, it could lead to high inventory holding cost. Conversely, if delivery runs are scheduled even if the trucks are not loaded to full capacity, dis-economies of delivery cost would creep in. Therefore, the production and truck delivery schedule should be streamlined efficiently and economically.
- (b) Audio Tech lays importance in the quality of the product to ensure customer satisfaction. Lower the defects higher the customer satisfaction. It has extensive testing and inspection processes in place. This preventive step should be assessed to find out if it is effective in reducing the cost of poor quality – internal failure cost as well as external failure costs. Internal failure costs (repair, scrap, rework) are associated with defects found after the production but before delivery to the customer. This can be avoided, if quality inspection is done throughout the production work-flow rather than just at the end of production. External failure costs (repairs and servicing, sale returns, warranty claims, complaints) are incurred when the customer finds the product defective and returns it. External failure costs can severely impact customer loyalty and should be minimized.

Therefore, Audio Tech should invest in preventive and appraisal costs to ensure good quality in order to balance out the cost of poor quality. Preventive costs would include quality planning and assurance, error proofing quality improvements, education and

training. Appraisal costs could be inspection, quality audits, supplier rating etc. Total Quality Management (TQM) and Six Sigma could be effective tools to ensure efficient good quality production that would minimize cost of poor quality.

(10 marks)

(ii) **Alternate Performance Measurement Mechanism considering all Stakeholders**

Audio Tech uses Balanced Scorecard to measure performance. Balanced Scorecard focuses on the financial, customer, business, and innovation perspectives. It is given that the company is doing well on financial and customer satisfaction parameters. Market capitalization has also increased over the years, the company is on a growth trajectory. However, the company is facing issues in the form of high employee turnover and dissatisfaction among truck drivers who deliver the goods.

An alternate performance measurement mechanism can be **Performance Prism**. This is a second-generation performance management framework conceptualized by Andy Neely and Chris Adams. The reasons why it would be an effective replacement for models like Balanced Scorecard are:

- (a) Balanced scorecard focuses on just two of the stakeholders – Investors and Customers. Performance measurement of other stakeholders like employees, suppliers, government etc. have not been considered. The other stakeholders play an important role in the growth of the company's business. Hence, performance measures are needed to monitor both their contribution to the company as well as their overall satisfaction with the company.
- (b) Most of the performance measurement models do not focus on the changes that need to be made to strategies and processes. Balanced Scorecard assumes that once the strategies are implemented, measuring a relevant set of metrics of performance will ensure that the rest of the business also functions properly. However, this is not true. In the case of Audio Tech, both customers and shareholders are happy with the company's performance. Yet even in a growing business, the drivers of growth, namely other stakeholders like employees and suppliers are not satisfied. Neither is their contribution nor their satisfaction is captured under the Balanced Scorecard performance measurement.
- (c) A company has a "Quid Pro Quo" relationship with all its stakeholders. Stakeholders contribute to the company's business while they also derive benefits from it. For example, employees perform their functions well, this is their contribution to Audio Tech's growth. In return, employees would want good working condition and pay to remain motivated and loyal to the company.

Therefore, Performance Prism can be an alternate performance measurement mechanism that considers metrics related to a broader set of stakeholders of an organization, not limited to just customers and shareholders alone.

**Five Interrelated Facets of the Performance Prism**

**Stakeholder Satisfaction**

"Identify the organizations set of stakeholders and their needs"

Unlike a balanced scorecard, the performance prism focuses on all the stakeholders of a company. Audio Tech has satisfied investors and customers, but dissatisfied employees and truck operators. The company must likewise identify all its stakeholders and

determine the relative importance of each of the stakeholders. It can use **Mendelow's Matrix** to identify key shareholders in terms of power and interest of stakeholders. A stakeholder group with higher power and high interest (say a trade union) must be kept satisfied.

The main stakeholders of a company are:

- Investors - They want return on investment.
- Customers - They want good quality products at reasonable prices.
- Suppliers - They want better price for procurements or service.
- Government - They want revenues and development.
- Society at large - They want employment opportunities.

After identification of the stakeholders, the company must identify the requirement of each of the stakeholder group. What must the company do to ensure stakeholder satisfaction?

Audio Tech has to ensure that it improves employee satisfaction in order to reduce its employee turnover. It should also address the issues faced by truck drivers and involve them in a dialogue. If they are not satisfied, the company might suffer financially in the longer run.

Performance Measure: Employee turnover ratio, average employment duration of employees, number of strikes by truck drivers etc.

### **Stakeholder Contribution**

“What the organization expect the stakeholders to contribute and deliver?”

In the second facet, the company has to identify the contribution required from each stakeholder group and must define ways to measure contribution of stakeholders. In turn the company will have something to offer the stakeholders. This is the “Quid Pro Quo” relationship. For example, Audio Tech provides quality products to its customers. The customers in turn contribute towards the profits of the company, they pay a price for the value Audio Tech offers.

Audio Tech should provide for better working conditions to its employees. Motivated employees will perform better and remain loyal to the company. They would drive the growth of the company. Similarly, dialogue with truck drivers would be needed to provide better pay, retirement benefits and good working conditions. Truck drivers in turn need to ensure timely and safe delivery of goods to retail outlets.

Performance Measure: Efficiency of employees, productivity, on time delivery by truck drivers.

### **Strategies**

“What strategies should an organization adopt that derives stakeholder contribution while reciprocating by ensuring their satisfaction?”

The organization should identify strategies that ensure that:

- The wants and needs of the stakeholders are satisfied.
- Stakeholders contribute to the organizations objectives.

Performance measures must be put in place to confirm that the strategies are working. Effective implementation depends on appropriate communication of strategies, implementation by managers and continuous evaluation of appropriateness of strategies.

Audio Tech has to roll out strategies to retain employees by means of better pay, working conditions and growth opportunities within the company. The strategy will be effective when the employee turnover is reduced following these initiatives. Similarly, the issues faced by truck drivers need to be addressed by taking appropriate strategic decisions. The absence of strikes will indicate that these decisions have been effective.

Performance Measures: Employee turnover after implementation of new strategy, efficiency of deliveries after issues with truck drivers have been resolved.

### **Processes**

“What are the necessary processes to satisfy the above strategies?”

Processes ensure successful implementation of strategies. Each process could have sub-process. Process owners have to be identified to assign responsibility of functioning of the process.

Processes require continuous evaluation. Instead of evaluating all at once, the company has to identify important processes that are critical to the business. Porter’s Value Chain Analysis can be used to identify and evaluate various processes in the organization.

Audio Tech should have well defined processes to hire appropriately skilled personnel for the job, transparent pay structure etc. This process may be owned by the Human Resource Manager. The working condition of truck drivers can be improved by providing sufficient training and better working conditions.

Performance Measures: Number of personnel hired at various skill levels, average payout for each of these skilled groups, hours of employee training, maintenance log of trucks etc.

### **Capabilities**

“What resources should an organization need to effectively operate these processes?”

The company must have the right capabilities in order to support the process. Capabilities could include resources, technology, and infrastructure for a particular process to work.

Audio Tech may decide to increase pay/salaries, however it should have sufficient financial resources to make these payments.

Performance Measures: Amount spent of new recruitments and training etc.

### **Conclusion**

“Manage these interlinked facets to cater to all stakeholders”

While meeting targets as defined by performance measures should be emphasized, the performance measurement system should be dynamic and flexible to allow the stakeholders to voice their opinions and expectations as well. Taking their requirements into consideration, along with managing capabilities and processes, Audio Tech can implement effective strategies that will cater to the needs of all stakeholders.

**ANSWER – 2**

**ANSWER – A**

**(i) Sales Analysis of Division B**

Total annual capacity and actual production of Division B is 100,000 units of components. Zero inventory implies that sales for the year was also 100,000 units of components. Sales to external customers was Rs.20 crores, at Rs.4,000 per unit. Therefore, units sold to external customers would be 50,000 units this year (Rs.20 crores sales / Rs.4,000 per unit sale price).

Therefore, internal sales can be derived to be 50,000 units for the year (annual sales 100,000 units less external sales 50,000 units). For the year, value of sales made to Division A is Rs.16 crore ( Division B's total sales of Rs.36 crore less external sales of Rs.20 crores).

Had there been no extra demand, opportunity cost for Division B would have been nil. Therefore, transfer price would only be the variable cost of Rs.2,750 per unit of component, However, given in the problem, that there was excess demand for 18,000 units of components from external customers, that could not be met since Division B had to give priority to internal demand. Had these sales been made Division B would have earned Rs.1,250 per unit contribution (Sale price Rs.4,000 per unit less variable cost Rs.2,750 per unit). This lost contribution of Rs.1,250 per unit is the opportunity cost per unit for Division B. Due to company's policy of giving priority to internal demand, Division B lost a profit of Rs.2.25 crore during the year. (18,000 units × contribution of Rs.1,250 per unit).

Therefore, internal sales comprises of two parts:

32,000 units of components transferred at variable cost of Rs.2,750. This amounts to Rs.8.8 crores. 18,000 units of components transferred factoring any opportunity cost = variable cost + contribution per unit = external sale price = Rs.4,000 per unit. This amounts to Rs.7.2 crores.

Therefore, internal sales = Rs.8.8 crores + Rs.7.2 crores = Rs.16 crores.

**Summarizing**

External sales are 50,000 units amounting to Rs.20 crores annual sales value. Internal sales are 50,000 units amounting to Rs.16 crores annual sales value. Transfer price for 32,000 units is at variable cost of Rs.2,750 per unit while for 18,000 units is at external sales price of Rs.4,000 per unit.

(4 marks)

**(ii) Transfer Price Range for Divisions A and B**

Division A procures its entire demand of 50,000 units from Division B. Out of this, 18,000 units at market price of Rs.4,000 per unit while 32,000 units are procured at a lower rate of Rs.2,750 per unit. Had Division A procured 32,000 units from the market, the additional cost of procurement would be Rs.4 crores {(External price of Rs.4,000 per unit less internal transfer price at variable cost of Rs.2,750 per unit) × 32,000 units}.

Only Division A currently enjoys this benefit of lower procurement cost. Financials of Division B show no profit from such internal transfers. This may skew the performance assessment of the divisions, if it is based primarily on financial metrics of each division. In order, promote goal congruence, some portion of this benefit can be shared with Division B.

Division B will at the minimum want to recover its variable cost of Rs.2,750 per unit, while Division A will be ready to pay only up to external market price of Rs.4,000 per unit. Therefore, transfer price range can be set between Rs.2,750 - Rs.4,000 per unit. Division A enjoys lower procurement rate while Division B financial reflect some benefit of transferring components internally to Division A.

(4 marks)

**(iii) Impact of External Demand on Transfer Price**

As per the company's transfer pricing policy, Division B gives priority to demand from Division A. The division has a production capacity of 100,000 units annually. If there is *no external market* for Division B's components, then transfer price for the entire internal transfer would be the variable cost of Rs.2,750 per unit plus portion of the fixed cost (if any). This is the minimum cost that Division B would like to recover from Division A.

When there is an *external market*, transfer price would depend on whether Division B had to incur any opportunity in the form of lost sales. When total demand (internal and external) is within production capacity of 100,000 units, the entire demand can be met. There would be *no lost sales* for Division B, no opportunity cost. Therefore, transfer price for the entire internal transfer would be the variable cost of Rs.2,750 per unit. This is the minimum cost that Division B would like to recover from Division A.

When there is an *external market*, such that total demand (internal and external) is more than production capacity of 100,000 units, due to priority given to internal transfer, some portion of the external demand might not be met. This would be *lost sales* for Division B, opportunity cost would be the contribution lost from such sales at Rs.1,250 per unit. This opportunity cost would be passed onto Division A. As explained in part (ii) above, transfer price range will be from Rs.2,750 - Rs.4,000 per unit. More lost sales for Division B would keep the average transfer price higher towards Rs.4,000 per unit. Lesser lost sales for Division B would keep the average transfer price towards the lower bound of Rs.2,750 per unit. Therefore, the proportion of external demand that could not be catered to, would determine the average transfer price. Higher the demand from external customers would drive up the average transfer price within the company.

(4 marks)

**ANSWER – B**

**(i) Statement Showing 'Total Quality Costs'**

Particulars of Costs	Rs.
<b>Prevention Costs</b>	
Supplier Review	1,25,000
<b>Appraisal Costs</b>	

Equipment Testing (Rs.18 × 1,600 hrs.)	28,800
<b>Internal Failure Costs</b>	
Down Time	7,70,000
Manufacturing Rework (Rs.228 × 3,200 bikes)	7,29,600
<b>External Failure Costs</b>	
Customer Complaints (Rs.35 × 2,000 hrs.)	70,000
Warranty Repair (Rs.1,560 × 2,600 bikes)	40,56,000
<b>Total Quality Costs</b>	<b>57,79,400</b>

(3 marks)

- (ii) The reporting of quality costs highlights the *cost of quality activities* at H. The total quality costs statement clearly displays the relationship between conformance costs (prevention and appraisal costs) and non-conformance costs (internal failure and external failure costs) and the drivers of a reduction in the overall spending on quality. Statement indicates that only 2.16% of the total quality cost is the cost of preventing quality problems while 0.50% is the cost of appraisal activities. Thus, prevention and appraisal costs make up only 2.66% of total quality costs. In contrast, 97.34% of quality control costs are incurred for internal and external failure costs. Following two measures can be used to reduce non-conformance cost:

**Total Productive Maintenance (TPM)** is a system of maintaining and improving the integrity of production and quality system through *keeping all equipment in top working condition* so as to avoid breakdowns and delays in manufacturing processes. It involves identifying machines in every division (including planning, manufacturing, maintenance) and then planning & executing a maintenance programme covering their entire useful life.

In this scenario, TPM will help in reducing internal failure cost (i.e. downtime and manufacturing rework cost), which constitutes 25.95% of total quality cost, by keeping all equipment in good working conditions so that there is no downtime or machine breakdown and ensuring that all equipment run smoothly. If machines work properly, the chances of rework will reduce, ultimately will also reduce chances of warranty repair and customer complaints (comprising 71.39% of total quality cost which is the major part of total quality cost).

**Total Quality Management (TQM)** aims at improving the quality of organisational output, including goods and services, through *continual improvement* of internal practices. Its objective is to eradicate waste and increase efficiency without compromising with the quality. It requires that company maintain this quality standards in all aspects of business by ensuring that things are done right the first time so that defects and waste are eliminated from operation.

It appears that H is not a TQM company at present due to *huge disparity between conformance costs and non-conformance costs*. In order to make H to be successful,

all staff at H must be engaged in the improvement process and share in the continuous improvement ethos. In order to establish a reputation as a high- quality bike manufacturer H must ensure staff are focused on quality *and* attitudes changed toward the importance of conformance activities, for instance, H can conduct third party inspection of raw material at supplier’s workplace leading to maintenances of quality standards.

**Overall**, while applying above two measures, in the H, consideration must therefore be given to the *optimum balance* between the costs of conformance and the costs of non-conformance.

(7 marks)

### ANSWER – 3

(a) (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**.

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  $\times$  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:

$P = a - bx$

$= 1,500 - 0.50 \times (480)$

$= 1,500 - 240$

$=$  Rs.1,260

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

### **Alternative**

*Hours after production of Product 'Comfort'  $(3,500 - 1,150 \times 2) = 1,200$  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".*

**(5 marks)**

(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:

- a. 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.
- b. Due to its *innovative feature*, the customers would not mind paying a

premium for the unique product offering. Demand would be inelastic.

- c. The market demand is unknown. Initial capital outlay to produce this product may be high, resulting in *high cost of production*.
- d. 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.
- e. 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:

- a. Demand for the product is *elastic*, more demand when prices are low.
- b. Large scale production of the product yields *economies of scale*.
- c. *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:

- a. Competitors offering similar product would take away the uniqueness feature of “Ethnic”.
- b. 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:

- a. Increased production would result in increased material procurement from suppliers.  
*Bulk purchasing discounts* can be negotiated with them to lower cost of production.
- b. *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.
- c. *Larger production batches* due to increase in scale of operations will reduce the unit variable overhead cost.
- d. *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

- a. 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.
- b. 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.
- c. 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 – 4**

**ANSWER – A**

**(a) (i) Traditional  
Variances**

$$\begin{aligned}\text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times \text{Rs. } 15.00 \\ &= \text{Rs. } \mathbf{12,000 (A)}\end{aligned}$$

$$\begin{aligned}\text{Price Variance} &= (\text{Rs. } 15.00 - \text{Rs. } 16.40) \times 12,800 \text{ lt.} \\ &= \text{Rs. } \mathbf{17,920 (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= \text{Rs. } 12,000 (A) + \text{Rs. } 17,920 (A) \\ &= \text{Rs. } 29,920 (A)\end{aligned}$$

**Operational Variances**

$$\begin{aligned}\text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times \text{Rs. } 16.00 \\ &= \text{Rs. } \mathbf{12,800 (A)}\end{aligned}$$

$$\begin{aligned}\text{Price Variance} &= (\text{Rs. } 16.00 - \text{Rs. } 16.40) \times 12,800 \text{ lt.} \\ &= \text{Rs. } \mathbf{5,120 (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= \text{Rs. } 12,800 (A) + \text{Rs. } 5,120 (A) \\ &= \text{Rs. } 17,920 (A)\end{aligned}$$

**Planning Variances**

$$\begin{aligned}\text{Controllable Variance} &= (\text{Rs. } 15.40 - \text{Rs. } 16.00) \times 12,000 \text{ lt.} \\ &= \text{Rs. } \mathbf{7,200 (A)}\end{aligned}$$

$$\begin{aligned}\text{Uncontrollable Variance} &= (\text{Rs. } 15.00 - \text{Rs. } 15.40) \times 12,000 \text{ lt.} \\ &= \text{Rs. } \mathbf{4,800 (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= \text{Rs. } 7,200 (A) + \text{Rs. } 4,800 (A) \\ &= \text{Rs. } 12,000 (A)\end{aligned}$$

$$\begin{aligned}\text{Reconciliation} &= \text{Rs. } 17,920 (A) + \text{Rs. } 12,000 (A) \\ &= \text{Rs. } 29,920 (A)\end{aligned}$$

(6 marks)

- (ii) Traditional variance analysis is applied based on the assumption that whole of the variance is due to operational deficiencies and the planning associated with setting the original standard is perfectly correct. But this assumption is not practical. When the conditions are volatile and dynamic, traditional variances need to be analysed into planning and operational variances. Planning variances try to explain the extent to which the original standard needs to be adjusted to reflect changes in operating conditions between the current situation and that imagined when the standard was originally derived. Planning variances are generally *not controllable and may need to revise to cater the changes due to environmental/ technological changes* at a later stage. In certain situation planning variances can be considered *controllable* as well. Whereas operational variances explain the extent to which adjusted standards have been achieved. Operational variances are calculated after the planning variances have been established and are thus a realistic way of assessing performance. So, it indicates a reality check of traditional variance analysis.

In GRV, as per traditional approach total variances are Rs. 29,920 (adverse), out of which Rs. 17,920 (adverse) accounts for total operational variance and Rs. 12,000 (adverse) is for total planning variance. It is necessary to analyse planning variances further. The planning variance of Rs. 12,000 (adverse) can be divided into an *uncontrollable* adverse variance of Rs. 4,800 and a *controllable* adverse variance of

Rs. 7,200. Similarly, total operational variance can be sub classified as adverse price variance of Rs. 5,120 and adverse usage variance of Rs. 12,800. This analysis gives a clearer indication of the inefficiency of the purchasing function by the concerned department. Performance of the staff of the purchasing department should be evaluated/rewarded/ based on variances which are *controllable*. If an adverse *uncontrollable* variance of Rs. 4,800 is reported in the performance reports this is likely to lead to dysfunctional motivation effects to the purchase department.

(2 marks)

- (iii) In today's cutthroat competition managers must react quickly and accurately to the changes in technology, price fluctuation, consumer tastes, laws and regulations, economic conditions, political conditions, and international conditions etc. which are changing rapidly and dramatically. Accordingly, management accountant should be able to provide necessary inputs by a proper analysis of the things that pertains to his/her area like effect of changes in price. The unique features of advanced variance analysis are that, it considers *different market conditions and changes in the dynamic environment*.

Moreover, advanced variances classify variances into *controllable* and *uncontrollable* variances and helps the management to find out reasons for adverse variances so that corrective action can be taken. Similarly, if any adverse variances have arrived, because of changes in the market condition like inflation, it has to be differentiated from the other variances.

GRV is a type of organization where management of performance can be done only through advanced variance analysis. Advanced variance analysis of GRV shows that it has adverse planning variance as well as adverse operational variance. Further, the emergence of *controllable* and *uncontrollable* variances makes it a perfect case of

advance variance analysis in GRV. In GRV, sharp price changes which lead to the choice of expensive alternative and efficiency of purchase department need to be analyzed, reported, and dealt separately by the joint effort of the management accountant and the top management. Hence, advanced variance analysis in GRV is an absolute necessity.

(2 marks)

**ANSWER – B**

(i) **Statement Showing “M’s Life Cycle Cost (80,000 units)”**

Particulars	Amount (Rs.)
Costs of Design and Development of Molds, Dies, and Other Tools	8,25,000
Manufacturing Costs (Rs.125 × 80,000 units)	1,00,00,000
Selling Costs (Rs.100 × 80,000 units + Rs.12,500 × 4)	80,50,000
Administration Costs (Rs.50,000 × 4)	2,00,000
Warranty (80,000 units / 25 units × 5 parts × Rs.10)	1,60,000
(80,000 units / 500 units × 1 visit × Rs.500)	80,000
<b>Total Cost</b>	<b>1,93,15,000</b>

(5 marks)

(ii) Following ways are suggested to maximize “M” lifecycle return:

**R&D Costs**

Often significant part of cost is incurred at the R&D phase of new product, hence M&D should carefully plan and design its new product “M” as it will determine the number of parts, production process to be used etc. M&D can apply **value engineering** here. It involves improving product quality, reducing product costs, fostering innovation, eliminating unnecessary and costly design elements, ensuring efficient investment in product, and developing implementation procedures. Value engineering is most successful when it is performed early in product development stage. A value engineering study should be performed within the first 25-30% of the design effort prior to selecting the final design alternative. Here, it is also important that R&D team should work as a part of cross functional team i.e. (participate in a group of people from different functional areas), to minimise lifecycle cost and the production cycle time in new development.

**Speed up the Product Launch**

In cut throat competitions, it is important for M&D to get new product ‘M’ launch into the market as soon as possible since this will give “M” a **long stay** in the market place *without competition* in the market. Competitor always try to launch a rival product as quickly as possible in order to gain ‘competitive edge’. M&D may lose overall profitability if it delays

in launching of Product 'M'. It is usually worthwhile incurring extra costs to keep the launch on schedule or to speed up the launch.

(5 marks)

**ANSWER – 5**

**ANSWER – A**

(i) **Statement Showing “Pareto Analysis of Total Parts”**

Parts	No. of Items	% of Total Items	Cumulative Total
Motor	30	35.29	35.29%
Trimmer	20	23.53	58.82%
Track	17	20.00	78.82%
Door	8	9.41	88.23%
T-Lock	6	7.06	95.29%
Miscellaneous	4	4.71	100.00%

(3 marks)

(ii) **Statement Showing “Pareto Analysis of Type of Services (Motor)”**

Type of Services	No. of Items	% of Total Items	Cumulative Total
Adjust	16	53.33	53.33%
Lube	9	30.00	83.33%
Install	3	10.00	93.33%
Replace	2	6.67	100.00%
	30		

(2 marks)

(iii) Pareto Analysis is a rule that recommends focus on most important aspects of the decision making in order to simplify the process of decision making. The very purpose of this analysis is to direct attention and efforts of management to the product area where best returns can be achieved by taking appropriate actions.

Pareto Analysis is based on the 80/20 rule which implies that 20% of the products account for 80% of the revenue. But this is not the fixed percentage rule. In general business sense, it means that a few of the products, goods or customers may make up most of the value for the firm.

The present case stands in a difference to 80/20 rule. Because the company installs doors, they sometimes have multiple service calls to install each door piece by piece. They may have to install, replace, adjust, or lubricate some part to get the door working properly. They work with five main parts: door, motor, track, trimmer and t- lock. The service calls with reference to motors are heavy and accounted for as much as 35.29% of the number of calls attended. Motor together with trimmer accounted for 58.82%. So, these two parts are to be considered as key parts and ABC enterprises must be ever ready to cater to all provisional requirements for attending these classes without any inordinate delay. Any delay in service these calls is likely to damage its service rendering reputation within a very short span of time. Further, the second level Pareto Analysis on motors has revealed a particular reference to the service problems related to motors. Adjustments and Lubrication issues cover up 83.33% of the total service problems exclusively connected to Motors. So, ABC Enterprise must direct its best efforts and develop specific expertise to solve these problems in the best interest of the customers.

**(5 marks)**

*Or*

**Pareto Analysis is generally applicable in the following business situations.**

#### **Pricing of a Product**

In the case of a *firm dealing with multi products*, it would not be possible for it to analyse cost-profit- price -volume relationships for all of them. In practice, in case of such firm approximately *20% of products may account for about 80% of total sales revenue*. Pareto Analysis is used for analysing the firm's estimated sales revenues from various products and it might indicate that approximately 80% of its total sales revenue is earned from about 20% of its products.

#### **Customer Profitability Analysis**

Instead of analysing products, *customers can be analysed* for their relative profitability to the organisation. Again, it is often found that approximately *20% of customers generate 80% of the profit*. There will always be some customers who are less profitable than others, just as some products are less profitable than others. Such an analysis is useful tool for evaluation of the portfolio of customer profile and decision making such as whether to continue serving a same customer group, what is the extent of promotion expenses to be incurred.

#### **ABC Analysis- Stock Control**

Another application of Pareto analysis is in *stock control* where it may be found that only a few of the goods in stock make up most of the value. In practice, approximately *20% of the total quantity of stock may account for about 80% of its value*. The outcome of such analysis is that by concentrating on small proportion of stock items that jointly accounts for 80% of the total value, a firm may well be able to control most of monetary investment in stocks.

#### **Application in Activity Based Costing**

In Activity Based Costing it is often said that *20% of an organisation cost drivers are responsible for 80% of the total cost*. By analysing, monitoring and *controlling those cost drivers that cause most cost*, a better control and understanding of overheads will be obtained.

### Quality Control

Pareto analysis seeks to discover from an *analysis of defect report or customer complaints* which “vital few” causes are responsible for most of the reported problems. Often, *80% of reported problems can usually be traced to 20% of the various underlying causes*. By concentrating one’s efforts on rectifying the vital 20%, one can have the greatest immediate impact on product quality.

### ANSWER – B

#### B. Steels Balanced Scorecard Report For the year ended March 31, 2019

Perspective	Objective	KPI	Goal	Actual	Goal Achieved (Yes or No)
Financial	Increase Gross Margin	Gross margin growth percentage	15%	16%	Yes
	Increase Profitability of Core Product Line	Core product line profit as a percentage of core product line sales	5%	4.4%	No
Customer	Increase number of customers	Number of Customers	15,000	15,600	Yes
	Increase customer retention	Percentage of repeat customers	83%	81%	No
Internal Business Process	Improve post sales service	Average replacement time (number of days)	2.0	1.5	Yes
	Increase plant safety	Number of plant accidents	0	2	No
Learning and Growth	Improve employee job satisfaction	Employees satisfaction rating (1-5, with 1 being the most satisfied)	1	1.2	No
	Improve employee morale	Employee turnover rate (Number of employees leaving/ Average number of	2%	3%	No

		total employees)			
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(5 marks)

(ii) “**Triple Bottom Line**” concept encourages companies to measure not only their *financial profits*, but also the impact that its operations have on the *society* and *environment*. Therefore, this framework measures the full cost of doing business by measuring the following bottom lines (i) Profit (ii) People and (iii) Planet.

Diminishing non-renewable resources have forced businesses to focus on *sustainable manufacturing*. This term refers to managing manufacturing processes such that they *minimize any negative impact on the environment* by conserving energy and natural resources. In many instances, improved operational efficiency not only reduces waste (thereby costs) but also improves product safety, it strengthens the *brand’s reputation* and builds *public’s trust* about the company a long- term strategy, this improves *business viability* and provides a *competitive edge* to the company. This concept is the “**Planet Bottom Line**” within the Triple Bottom Line framework. Metrics on the following aspects may be investigated to find out the *environment impact* of business operations:

- Material consumption
- Energy consumption
- Water utilization
- Emissions, treatment of effluents and waste (include emissions affecting air, water, and land)
- Fuel consumption by tracking freight and transportation costs
- Land utilization
- Recyclability and disposal of product

“Corporate Social Responsibility” enables the company to become conscious of the impact its operations has on the society. CSR programs, through philanthropy and volunteer efforts can forge a stronger bond between *itself, its employees*, and the *wider community*. Again, this improves both the *brand image* as well as builds *public’s trust* about the company. This concept is the “**People Bottom Line**” of the Triple Bottom Line framework. Metrics on the following aspects maybe investigated to find out the *social impact* of business operations:

- Work place environment and labour relations
- Occupational health and safety, accident rates
- Human rights practices – child labour, employee work-place security policies
- Training and education
- Equal opportunity employer – diversity of workforce and opportunities available for employees’ growth
- Suppliers – local sourcing versus sourcing from external markets

- Philanthropy and volunteer programs organized
- Product safety in terms of customer health and safety
- Pricing of essential products to enable wider reach within the society
- Transparent and ethical business practices

B. Steels can study these aspects, determine the relevant metrics, and prepare periodic KPI reports that can help in measuring responsibilities towards sustainability and social impact.

(5 marks)

**ANSWER – 6**

**(a) Product Wise Profitability as per Original Allocation Methodology**

(Figures in Rs. per unit of leather produced)

Particulars	Product A	Product B	Total
Selling Price	620	420	1,040
Direct Material (Refer Table 1)	286	174	460
Direct Labour (Refer Table 1)	186	114	300
Overheads (allocated equally)	115	115	230
Total Expenses	587	403	990
Profit	33	17	50
Profitability (%)	5.32%	4.05%	×

**Workings**

**Table 1 Cost Allocation to the Products**

(Figures in Rs. per unit of leather produced)

Particulars	Tanning			Dyeing			Finishing			Total		
	A	B	Total	A	B	Total	A	B	Total	A	B	Grand Total
Direct Material	98	42	140	90	90	180	98	42	140	286	174	460
Direct Labour	63	27	90	60	60	120	63	27	90	186	114	300

(2 marks)

**(b)** Product wise profitability based on activity based costing using *environment driven costs* requires the following steps:

- Breakdown of overhead cost of Rs. 230 per unit into treatment cost of harmful gases, wastewater treatment cost, cost of planting trees and

other overhead costs. Refer Table 2 for the breakup.

- Treatment cost of harmful gases, wastewater treatment cost need to be individually allocated to various processes based on relevant cost drivers. Refer Table 3 for cost allocation to process.
- The overheads mentioned in point 2 thus allocated to the various processes, will be further allocated to products based on the specific ratios given in the problem. Refer Table 4 for cost allocation to products.

**Product Wise Profitability Statement based on ABC using *environment driven costs***

(Figures in Rs. per unit of leather produced)

Particulars	Product A	Product B	Total
Selling Price	620	420	1,040
Direct Material (Refer Table 1)	286	174	460
Direct Labour (Refer Table 1)	186	114	300
Allocation of Overheads			
Treatment Cost of Harmful Gases (Refer Table 4)	50	30	80
Wastewater Treatment Cost (Refer Table 4)	62	38	100
Cost of Planting Trees (shared equally)	10	10	20
Other Overhead Cost (shared equally)	15	15	30
Total Expenses	609	381	990
Profit	11	39	50
Profitability %	1.77%	9.29%	×

**Workings**

**Table 2: Breakdown of General Overheads *per unit***

Overhead	Amount (Rs.)	Allocation basis between products
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)

Wastewater Treatment Cost	100	Wastewater Generated (litres per week)
Cost of Planting Trees	20	Equally <i>between</i> Products A and B
Other Overheads (balancing figure)	<b>30</b>	Equally <i>between</i> Products A and B
Total General Overheads <i>per unit</i>	230	

**Table 3: Allocation of Treatment Cost to various process**

**Process Wise Information**

Overhead	Amount (Rs.)	Allocation Basis Between Products	Tanning	Dyeing	Finishing	Total
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)	400cc	300cc	100cc	800cc
Wastewater Treatment Cost	100	Wastewater Generated (ltr. per week)	900lt.	600lt.	---	1,500lt

**Cost Allocation to Process**

Overhead	Amount (Rs.)	Allocation Basis Between Products	Tanning (Rs.)	Dyeing (Rs.)	Finishing (Rs.)	Total (Rs.)
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)	40	30	10	80
Wastewater Treatment Cost	100	Wastewater Generated (litres per week)	60	40	0	100

**Table 4: Allocation of Treatment Cost to Product A and B**

Overhead	Tanning	Dyeing	Finishing	Total
<b>Treatment Cost of Harmful Gases</b>	Rs.40	Rs.30	Rs.10	Rs.80
Cost Allocation % to Product A	70%	50%	70%	×
Cost Allocation % to Product B	30%	50%	30%	×
Cost Allocation to Product A	Rs.28	Rs.15	Rs.7	Rs.50
Cost Allocation to Product B	Rs.12	Rs.15	Rs.3	Rs.30
<b>Wastewater Treatment Cost</b>	Rs.60	Rs.40	---	Rs.100
Cost Allocation % to Product A	70%	50%	70%	×
Cost Allocation % to Product B	30%	50%	30%	×
Cost Allocation to Product A	Rs.42	Rs.20	---	Rs.62
Cost Allocation to Product B	Rs.18	Rs.20	---	Rs.38

(5 marks)

**(c) Analysis of the difference in product profitability as per both the methods**

In the first method, general overhead costs are allocated to the products A and B, irrespective of the environment costs that each product incurs. General overhead costs are to each product equally. The resultant product profitability shows that Product A yields 5.32% and Product B yields 4.05% profitability. Therefore, the Excel Ltd. would conclude that Product A is more profitable.

In the next method, general overhead costs are bifurcated to identify “hidden” environment costs that are incurred on account of manufacturing these products. Environment costs are first traced to the process that generates harmful gases and wastewater, for which treatment is done. It can be seen that Tanning process, followed by Dyeing and Finishing process generates the maximum amount of waste. Therefore, by proportioning the cost based on the waste generated, more cost is allocated to Tanning the process. Similarly, Dyeing and Finishing are allocated lesser cost since they do not generate as much waste. It is further given that 70% of the cost of Tanning relates to Product A. This is much higher than the 50% that was allocated to the Product as per the first method.

*Accordingly, the revised workings show that Product A yields 1.77% and Product B yields 9.29% profitability. The reason being, Product A generates more environment driven costs as compared to Product B.*

Excel Ltd. would therefore increase the selling price of Product A if it wants to maintain profitability as per the original method. However, the more sustainable approach would be find out ways of reducing wastewater and harmful gases the manufacturing process produces. This would in turn result in reduction of environment driven costs such as wastewater treatment and treatment of harmful gases. This would sustain profits in the long run.

**(d) Four Techniques for the *identification* and *allocation* of Environmental Costs**

**Input-Output Analysis:** This technique *monitors the material input with the output that is produced*. For example, if 100kg of material have been bought and input in the process resulting in 80kg output material, the 20kg must be accounted in some way. Some part of this may say 10% (2kgs) may have been sold as scrap while the remaining 90% (18kgs) of it may be waste. Possibly scrap can be reused therefore may have neutral environment impact. The company can then concentrate on minimizing waste generation.

**Flow Cost Accounting:** This technique uses not only material flows but also the organizational structure. Classic material flows are recorded as well as material losses incurred at various stages of production. Flow cost accounting makes material flows transparent. It tracks:

- (i) quantities (physical data);
- (ii) costs (monetary data) and
- (iii) values = (quantities × costs).

Material flows are divided into three categories: material, system, and delivery/disposal.

- (i) The *material values and costs* apply to the materials which are involved in the various processes.
- (ii) The *system values and costs* are the in-house handling costs, which are incurred inside the company for the purpose of maintaining and supporting material throughput. Example personnel costs or depreciation.
- (iii) The *delivery and disposal values and costs* refer to the costs of flows leaving the company for example transport costs or cost of disposing waste.

The focus of flow cost accounting is on reducing the quantities of materials, which leads to increased ecological efficiency.

**Life Cycle Costing:** This technique considers the costs and revenues of a product over its *whole life rather than one accounting period*. Therefore, the full environmental cost of producing a product will be taken into account. In order to *reduce lifecycle costs, an organization may adopt a TQM approach*. Good environmental management is increasingly recognized as an essential component of TQM. Such organizations pursue objectives that may include zero complaints, zero spills, zero pollution, zero waste and zero accidents. Information systems need to be able to support such environmental objectives via provision of feedback of the organizational efforts in achieving such objectives.

**Activity Based Costing (ABC):** ABC allocates internal costs to cost centres and cost drivers on the basis of the activities that give rise to the costs. *Environment-related costs* can be attributed to joint cost centers and environment-driven costs are hidden on general overheads. *Environment-driven costs* are removed from general overheads and traced to products or services. The cost drivers are determined on environment impact that activities have and costs are charged accordingly. This should give a good

attribution of environmental costs to individual products that should result in better control of costs.

**(8 marks)**

**(e) Reasons why environmental costs is becoming important in organizations**

- (i) “Carbon footprint” measures the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product. People are now becoming aware about the carbon footprint and recycling. Several companies have initiated CSR committees as they feel that portraying themselves as environmentally responsible makes them popular among their consumers.
- (ii) Environmental costs are becoming huge for some companies particularly those operating in highly industrialized sectors such as oil production. Such significant costs need to be managed.
- (iii) Regulation is increasing worldwide at a rapid pace, with penalties for *non-compliance* also increasing accordingly.

**(3 marks)**