**P 15 : Business Strategy & Strategic Cost Management**

**Full Marks: 100** **Time : 3 hours**

**Section A**

**Question No. 1 & 2 are compulsory. Answer any two questions from the rest.**

**1. Hassan is one of the India's leading detergent manufacturing companies. The firm has more than twenty-five product types. These have been developed over a period of its ten year existence. Some products are very successful while others have not performed well. The challenge for the board has been the formulation of strategy policy in the way the company manages the portfolio of products.**

**As a newly recruited qualified Cost Accountant, your advice is being sought to address the following questions the Product manager has prepared as input into his paper to the Board.**

**(a) Describe the Boston Consulting Group (BCG) growth vector matrix.**

**(b) Explain what strategic options are available to Hassan in accordance to the BCG Matrix.**

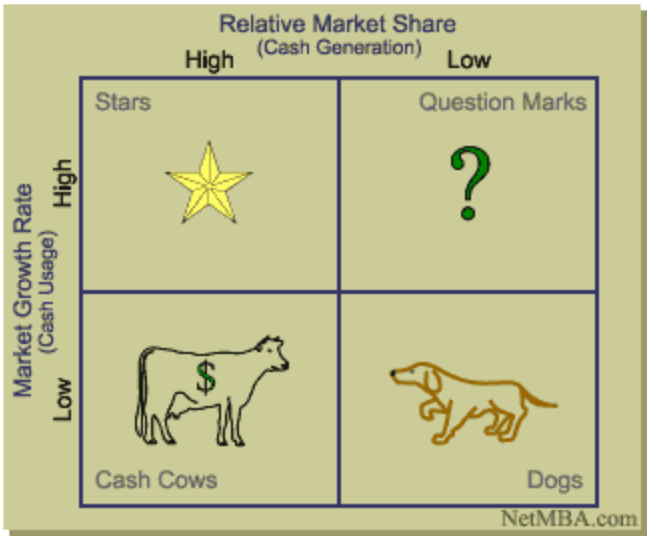
**(c) Outline what limitations the model poses to the Product Manager as he prepares his paper to the Board. (10+2+3=15)**

**Answer.**

**(a)** The BCG Matrix is a model used to analyze the portfolio of strategic business units, investments and products according to their cash generating capabilities whose function is relative market share and market growth rate. This results into 4 categories being: question marks (future potential earners), stars (increasing good positive cash flow), cash cows (cash rich) and dogs (declining cash flows).

The BCG Growth-Share Matrix is a portfolio planning model developed by Bruce Henderson of the Boston Consulting Group in the early 1970's. It is based on the observation that a company's business units can be classified into four categories based on combinations of market growth and market share relative to the largest competitor, hence the name "growth-share". Market growth serves as a proxy for industry attractiveness, and relative market share serves as a proxy for competitive advantage. The growth-share matrix thus maps the business unit positions within these two important determinants of profitability.

BCG Growth-Share Matrix



This framework assumes that an increase in relative market share will result in an increase in the generation of cash. This assumption often is true because of the experience curve; increased relative market share implies that the firm is moving forward on the experience curve relative to its competitors, thus developing a cost advantage. A second assumption is that a growing market requires investment in assets to increase capacity and therefore results in the consumption of cash. Thus the position of a business on the growth-share matrix provides an indication of its cash generation and its cash consumption.

Henderson reasoned that the cash required by rapidly growing business units could be obtained from the firm's other business units that were at a more mature stage and generating significant cash. By investing to become the market share leader in a rapidly growing market, the business unit could move along the experience curve and develop a cost advantage. From this reasoning, the BCG Growth-Share Matrix was born.

The four categories are:

- Dogs - Dogs have low market share and a low growth rate and thus neither generate nor consume a large amount of cash. However, dogs are cash traps because of the money tied up in a business that has little potential. Such businesses are candidates for divestiture.
- Question marks - Question marks are growing rapidly and thus consume large amounts of cash, but because they have low market shares they do not generate much cash. The result is a large net cash comsumption. A question mark (also known as a "problem child") has the potential to gain market share and become a star, and eventually a cash cow when the market growth slows. If the question mark does not succeed in becoming the market leader, then after perhaps years of cash consumption it will degenerate into a dog when the market growth declines. Question marks must be analyzed carefully in order to determine whether they are worth the investment required to grow market share.
- Stars - Stars generate large amounts of cash because of their strong relative market share, but also consume large amounts of cash because of their high growth rate; therefore the cash in each direction approximately nets out. If a star can maintain its large market share, it will become a cash cow when the market growth rate declines. The portfolio of a diversified company always should have stars that will become the next cash cows and ensure future cash generation.
- Cash cows - As leaders in a mature market, cash cows exhibit a return on assets that is greater than the market growth rate, and thus generate more cash than they consume. Such business units should be "milked", extracting the profits and investing as little cash as possible. Cash cows provide the cash required to turn question marks into market leaders, to cover the administrative costs of the company, to fund research and development, to service the corporate debt, and to pay dividends to shareholders. Because the cash cow generates a relatively stable cash flow, its value can be determined with reasonable accuracy by calculating the present value of its cash stream using a discounted cash flow analysis.

Under the growth-share matrix model, as an industry matures and its growth rate declines, a business unit will become either a cash cow or a dog, determined soley by whether it had become the market leader during the period of high growth.

While originally developed as a model for resource allocation among the various business units in a corporation, the growth-share matrix also can be used for resource allocation among products within a single business unit. Its simplicity is its strength - the relative positions of the firm's entire business portfolio can be displayed in a single diagram.

**(b)** Hassan has four strategic choices when we look at the BCG Matrix. They include:
Build - this is where Hassan uses funds from other products to invest in question marks or stars. These funds are usually harvested from cash cows. This is about moving excess cash around various product lines especially those with potential for growth but lacking own funds for reinvestments.

Hold - this is where funds are ploughed back or profits reinvested. This is applicable to question marks and stars.

Harvest - this is where funds are milked out of cash cows and used to build question marks and stars.

Divest - this is applicable in cases where Hassan discontinues operations of product lines that are no longer profitable.

**(c)** The limitations include:

(i) Market information regarding aggregate demand and market shares held by competing firms may not be readily available or too expensive to obtain.
(ii) Too simplistic by assuming that cash flow is affected by only market growth rate and relative market share.
(iii) Assumes that only longer staying firms in the market can build competitive edge. In modern business environments, this is not possible. We have seen new entrants easily overtaking long established firms.

**2. Taifa Bank, a subsidiary of an International Bank has experienced a serious decline in its business performance. The deposits are down, the loan portfolio has a lot of bad debts and head office is planning to slash the level of investment in the bank.**

**Use Porter's Five Forces of Competition Model to establish the impact of competition on the overall performance of the bank.**

**Explain how Taifa Bank can use Porter's Five Forces Model in evaluating why there has been a decline in performance. (9+6=15)**

**Answer.**
The Five Forces model can provide useful information in regard to the decline in performance of the bank. It is worth assuming that forces in the market such as competition has resulted in declining profits, inability to attract quality clients and general poor reaction to competitive moves in the market.

Michael Porter's 5 forces analysis is a framework for industry analysis and business strategy development developed by Michael Porter of Harvard Business School in 1979. It uses concepts developed in Industrial Organization (IO) economics to derive 5 forces that determine the competitive intensity and therefore attractiveness of a market. Porter referred to these forces as the microenvironment, to contrast it with the more general term macroenvironment. They consist of those forces close to a company that affect its ability to serve its customers and make a profit. A change in any of the forces normally requires a company to re-assess the marketplace.

Strategy consultants use Porter's five forces framework when making a qualitative evaluation of a firm's strategic position. The framework is textbook material for modern business studies and therefore widely known.

Porter's Five Forces include three forces from 'horizontal' competition: threat of substitute products, the threat of established rivals, and the threat of new entrants; and two forces from 'vertical' competition: the bargaining power of suppliers, bargaining power of customers.

Each of these forces has several determinants


**The Bargaining power of suppliers**

Every organization has suppliers of services which are used to produce the final services and porter suggested that the suppliers are more powerful when; there are only a few suppliers, there are no substitute for the products supplied, when suppliers price form a great part of the total cost of the organization, (Richard lynch 2003.). The major suppliers of fund to Taifa bank are the depositors. The customers' deposit form a huge part of the banks working capital, however the bank has investment in overseas countries with a competitive advantage of sourcing for funds from overseas. In order to increase its customers deposit and maintain its sustainability there is a need to offer higher interest rate to its customers, and maintain its tenacity in the corporate world.

**The Bargaining power of buyers**

Buyers' bargaining power increases in situations where; there are higher concentration of buyers than suppliers, there is ability to easily switch to undifferentiated substitute products, availability of market information to the buyer. The customers have more bargaining power due to higher concentration and market knowledge, however Taifa bank should have an advantage in term of product offered; free credit cards along with e-banking and insurance services, which are different from what is offered by its competitors making it uneasy for buyers to switch.

**The threat of potential new entrants**

According to (John L Thompson 2002) "where barriers to entry are high new entrants are likely to be deterred", however he also stated that, "if there is an attempted entry there are likely to be reaction from existing competitors." Barriers to entry can be caused by the following factors; economies of scale, product differentiation, capital requirement, switching cost. There are statutory capital requirement to entry into the banking sector which stands as barrier to new firm entering the industry, also over the years the Taifa bank has invested huge funds from its years of operation to build a huge capital base, which new entrants would find very difficult to meet.

However microfinance banks can pose a threat to Taifa bank by targeting the low income earners and the small business owners which Taifa could not reach due to high transaction cost.

**The Threats of Substitute**

If there are close substitutes, demand for a particular brand will increase or decrease as its price move upwards and downwards relative to competitors, (John L Thompson 2002). Furthermore, (Richard lynch 2003), is of the opinion that substitutes do not entirely replace existing products, but may limit the profit in an industry by keeping prices down. Key issues analysed are; the possible threat of obsolescence, the ability of customers to switch to the substitute, the cost of providing some added services to prevent customers switching. Taifa bank operates in an environment where competitors offer identical products, for Taifa to be ahead of its competitors it offers different products, which ranges from; insurance, mutual funds or fixed income securities. However the presence of non-banking financial institution providing the same services poses a great threat to the sustainability of Taifa bank.

**The extent of competitive rivalry**

Competition among companies may take the form of price competition, innovations, advertising and promotions, or value added services. However before deciding upon competitive actions firms must attempt to predict how their competitors will react. (John L Thompson 2002). The intensity of competition, according to (John L Thompson 2002), depends on; the number of competitors and degree of concentration, the rate of growth in the industry, degree of differentiation, the extent of which competitors are aware of the strategies of their rivals and exit barriers.

The analysis of the competitive advantage of Taifa bank shows that;
The bargaining power of the suppliers is high;
The bargaining power of the buyers is high;
The threats of potential new entrants are medium;
The threat of substitutes is high;
The extent of competitive rivalry is high.

Useful information that the Bank can derive is as follows:

**Statistical Analysis**

1.The Five Forces Analysis allows determining the attractiveness of an industry. The decline in profitability may be due to the industry becoming less attractive.

2. It provides insights on profitability. The model can assist determine how the forces have driven the costs up or reduced turnover that the bank can make.

3. Thus, it supports decisions about entry to or exit from an industry or a market segment. This is helpful for the bank in the context of whether it has been easy for new firms to enter or difficult for other banks to leave. The combination intensifies competition that may impact on the performance of the bank.

4. Moreover, the model can be used to compare the impact of competitive forces on their own organization with their impact on competitors. Taifa bank must evaluate the extent to which the forces have impacted on their operations in relation to competitors.

5. Competitors may have different options to react to changes in competitive forces from their different resources and competences. A comparison of how the bank has developed strategic options in response to the forces can be helpful.

**Dynamical analysis**

In combination with a PEST – Analysis, which reveals drivers for change in an industry, Five Forces analysis can reveal insights about the potential future attractiveness of the industry. Expected Political, Economical, Socio-demographical and Technological change can influence the five competitive forces and thus have impact on industry structures.

**Analysis of Options**

With the knowledge about intensity and power of competitive forces, organizations can develop options to influence them in a way that improves their own competitive position. The result could be a new strategic direction, e.g. a new positioning, differentiation for competitive products of strategic partnerships.

This, Porters model of five competitive Forces allows a systematic and structured analysis of market structure and competitive situation. The model can be applied to particular companies, market segments, industries or regions. Therefore, it is necessary to determine the scope of the market to be analysed in a first step. Following all relevant forces for this market are identified and analysed. Hence, it is not necessary to analyse all elements of all competitive forces with the same depth.

The five forces Model is based on microeconomics. It takes into account supply and demand, complementary products and substitutes, the relationship between volume of production and cost of production, and market structures like monopoly, oligopoly or perfect competition.

**3. What are the steps involved in formulating diversification strategy ? (10)**

**Answer.**

**The following steps are entailed in the development of diversification strategy:**

**Awareness of Diversification Opportunity:** This is the first step of diversification strategy. Top managers generally become aware of or sense a need for diversification planning when they find inconsistencies between the enterprise's current position and its objectives based on some perception of its future environment. A firm is assumed to have a level of performance - in Ansoffs case based on rate of return on capital invested - and if it now appears that this cannot be achieved on the basis of existing activities, then the firm has two options. The first is to accept a lowered target; the second is to assess the gap and then to proceed to cover this by changed tactics in existing activities and markets, and also by diversification. Thus, the trigger for diversification operates when there is a threat of under-achievement. Diversification strategy may, at times, be pursued in order to avoid current instability in sales and profits. Sometimes, the need to achieve higher utilisation of resources motivates the management to diversify the current product-market combinations of the firm.

Once the rationale of the diversification move has been established, the next issue before the management is to delineate the major areas for diversification. This requires penetrating search of new business opportunities which are usually derived from market needs. These needs change due to technological, economic, political and social developments and variations in attitudes and preferences of customers. Thus, diversification must start in the business environment, with special attention to any observable novel trends and exceptional growth areas.

A detailed environmental appraisal may result in a number of diversification opportunities which may be closely related to the firm's present technology, ethos and market contact or which may be sharply divergent. Thus, a firm may have before it a large number of options clustering around vertical diversification, horizontal diversification, concentric and conglomerate diversification.

**Selecting the Most Promising Opportunities:** For selecting the most promising diversification opportunities, top managers must examine first of all the product life cycle. Diversification into an already mature market will hold very limited promise of success because of the already depressed profit margins and the vigorous defence of the market shares held by the already established firms. Furthermore, certain criteria will have to be established so as to screen identified alternatives and select a handful of the most promising portfolios. One such criterion could be entry into a new market, whether at home or abroad. An enterprise considering

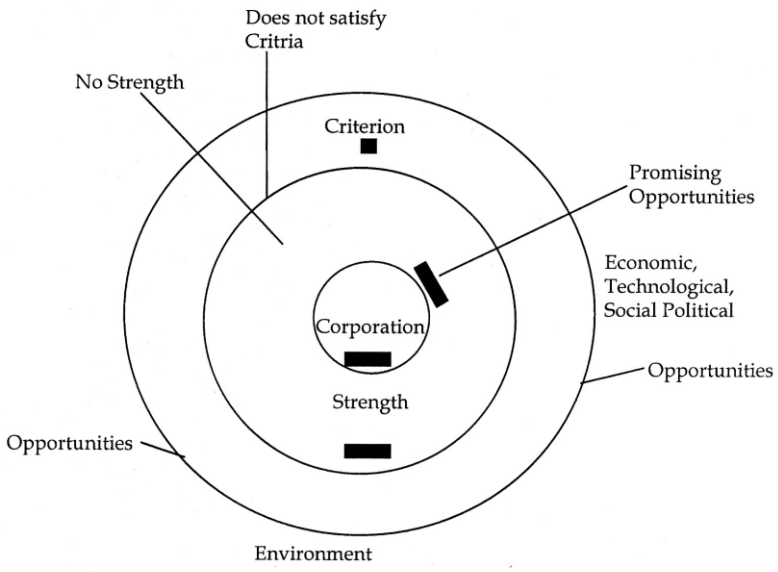
diversification into a new product line must prognosticate the potential value of that market, opportunity for the company's product taking into account design, performance, price, availability, etc. and the cost of the minimum scale of entry that appears necessary if any impact is to be made. Critical mass is another important criterion which aids in limiting a large number of options to a handful of the most promising ones. Thus, alternatives promising larger than critical mass are picked up for further feasibility testing. The management must also determine the maximum investment for purposeful entry and maximum time needed from the decision stage to the first order.

Profitability is another important condition which a diversification opportunity must fulfill. Besides, there are some other criteria such as acceptable geographical markets, allowable kinds and volume of needed R and D, acceptable license arrangements, maximum allowable influence on physical environment, and maximum numbers of skilled workers to be needed and minimum estimated time for product line to reach maturity. Once the opportunities have been selected, it may also be desirable to place weights on the more significant factors.

**Feasibility Testing of Chosen Opportunities:** Once a handful of diversification opportunities are chosen, their feasibility study must be made in detail. Feasibility test of alternatives is done by matching their resource requirements with the resources available with the enterprise. Such a study will decide in what direction the contemplated product-market posture will diversify - internal development or acquisition. Strategic requirements of each move should be compared with the existing financial, technological, marketing and managerial resources of the firm. In general, preconditions for any type of diversification are solid financial situation, flexible ownership structure, rich marketing experience and good customer relations in given areas, production flexibility in some plants, well developed management systems of certain kinds, experienced R and D personnel in special sciences, availability of raw materials at cheaper rate, transportation facilities, etc.

Thus, the choice of any diversification move must be made taking into consideration its strategic requirements and strengths. Consideration of synergistic factor further helps in making a useful choice. An alternative promising greater scope of synergistic advantage has an edge over others. Thus, vertical and horizontal types of diversification will have synergistic advantages since the enterprise continues to sell through established marketing channels and hence should be preferred to conglomerate diversification. However, it must be noted that both vertical and horizontal diversification contribute little toward improvement of stability of the enterprise.
A firm planning to diversify its current operations for the sake of minimisation of instability is very sensitive to instabilities and will offer less assurance of flexibility. In fact, by putting more eggs into the same end-product basket, vertical diversification increases the firm's dependence on a particular segment of economic demand. Thus, both vertical and horizontal diversification vectors offer only a limited potential for objectives. Their contribution to flexibility and stability objectives is limited. They will be making useful contribution to the profitability objective if the present economic environment of the firm is healthy and growing.

As regards the concentric and conglomerate diversification, both have the potential for meeting all of the objectives of the firms if the firm has the requisite resources. However, a concentric path, which is comparable to a conglomerate diversification in economic prospects and flexibility, will usually be more profitable and less risky because of synergy. While this is true that conglomerate diversification does not offer any synergistic advantage, a well-planned and developed conglomerate strategy does have a sense of direction expressed through competitive advantage, product-market scope and objectives.




**Selection of Promising diversification opportunities**

The above process of selection of promising opportunities has been exhibited in above figure. In this figure an attempt has been made to portray the interplay between new business opportunities, corporate strengths and diversification criteria.

Since the above strategic decision is being made under the conditions of partial ignorance, a risk analysis must be made, particularly for the one involving large investment. For each of the strategic variables (total market potential within chosen geographic area, the market share, net price per unit, raw marketing cost per unit, production cost per unit, marketing cost per unit, total overhead and total investments) uncertainty ranges are estimated on the basis of the best judgment available, and probabilities are assigned to each range on a subjective basis. Different opportunities, of course, result in differing profitability ranges. The most probable centre value is then calculated for each of them. The one promising the highest profitability value is chosen.

**4. (a) What is 'synergy'? Explain its significance in strategy making ? (5)**

**(b) What do you understand by "Corporate Reconstructing"? Specify and discuss about Corporate Level Restructuring Strategies. (5)**

**Answer.**

**(a)** 'Synergy' is a measure of the firm's ability to make good on a new product - market entry. Usually it is explained by the term "two plus two equals five". Synergistic advantages emerge because of operating economies which can be achieved through the elimination of duplicate facilities and consolidation of marketing, purchasing and other operations.

Synergy is the powerful ally of international strategic planning and must receive special attention of top management before making any decision regarding new product market entry or acquisition of a new firm in host country. The whole concept of synergy is based on the promise that the compatibility of the existing product - market with the new product market will help an

organisation to achieve its objective much more profitably than that achieved by firms independently.

Synergies invariably result in more exports, with the transnational source, finished products and components from its Indian operation. Analysis of synergistic effects of alternatives is very useful because of their far - reaching consequences. The major thrust of the analysis is on the measurement of synergistic effects upon the operations of the organisation. This effect can be measured in terms of cost economies to the organisation from a joint operation or in terms of increase in net revenue for a given level of investment or in terms of decreased investment requirements for a given level of earnings. According to Ansoff, synergistic effects should be measured in terms of start-up economies and operating economies. Structure must follow synergy. This calls for willingness and dynamism on the part of the management of the acquiring firm to adjust themselves in consonance with the changing situations. However, in the real world this is not usually found because of apathy of most of the managers particularly those brought up in internally oriented skills and those who are conservative and believe in maintaining the status quo to go for any change from the present product market complexion.

**(b)** Corporate restructuring refers to the process by means of which a firm makes an assessment and evaluation of itself at a point of time and refocuses itself to specific tasks of performance for improvements. It looks upon every activity as a green field project and question the firm's basic premise in order to engineer radical change rather than aim for just incremental gains. The concept is sometimes referred to as business process re-engineering as it involves consideration of at least: business portfolio revaluation; financial engineering; and organisational redesign.

Corporate level restructuring strategies can be thought of from two aspects: hardware and software.

Hardware restructuring involves redefining and/or modifying the structure of the organisation so as to make it more efficient in decision-making, responsiveness and intra-organisational communication etc. Some suggested strategies are:

- Identification of core competency and portfolio pruning
- Flattening of organisational layer
- Downsising
- Creation of self directed teams
- Benchmarking.

Corporate restructuring is the process of redesigning one or more aspects of a company. The process of reorganizing a company may be implemented due to a number of different factors, such as positioning the company to be more competitive, survive a currently adverse economic climate, or poise the corporation to move in an entirely new direction. Here are some examples of why corporate restructuring may take place and what it can mean for the company.

Restructuring a corporate entity is often a necessity when the company has grown to the point that the original structure can no longer efficiently manage the output and general interests of the company. For example, a corporate restructuring may call for spinning off some departments into subsidiaries as a means of creating a more effective management model as well as taking advantage of tax breaks that would allow the corporation to divert more revenue to the production process. In this scenario, the restructuring is seen as a positive sign of growth of the company and is often welcome by those who wish to see the corporation gain a larger market share.

However, financial restructuring may take place in response to a drop in sales, due to a sluggish economy or temporary concerns about the economy in general. When this happens, the corporation may need to reorder finances as a means of keeping the company operational through this rough time. Costs may be cut by combining divisions or departments, reassigning responsibilities and eliminating personnel, or scaling back production at various facilities owned by the company. With this type of corporate restructuring, the focus is on survival in a difficult market rather than on expanding the company to meet growing consumer demand.

Corporate restructuring may take place as a result of the acquisition of the company by new owners. The acquisition may be in the form of a leveraged buyout, a hostile takeover, or a merger of some type that keeps the company intact as a subsidiary of the controlling corporation. When the restructuring is due to a hostile takeover, corporate raiders often implement a dismantling of the company, selling off properties and other assets in order to make a profit from the buyout. What remains after this restructuring may be a smaller entity that can continue to function, albeit not at the level possible before the takeover took place.

In general, the idea of corporate restructuring is to allow the company to continue functioning in some manner. Even when corporate raiders break up the company and leave behind a shell of the original structure, there is still usually the hope that what remains can function well enough for a new buyer to purchase the diminished corporation and return it to profitability.

**5. Dramatic cost advantages can emerge from finding innovative ways to restructure processes and tasks, cut frills and provide the basics more economically**

**(i) List the primary ways by which companies can achieve a cost advantage by reconfiguring their value chains.**

**(ii) Explain the way a cost leadership strategy can help a firm in handling the five competitive forces.**

**(iii) Identify the elements in the marketing mix that would be particularly relevant to a manufacturer of domestic washing machine. (3+4+3=10)**

**Answer.**

(i) Cost advantages by reconfiguring value chains:

Dramatic cost advantages can emerge form finding innovative ways to restructure processes and tasks, cut out frills, and provide the basics more economically. The primary ways companies can achieve a cost advantage by reconfiguring their value chains include:

Simplifying the product design

Stripping away the extras and offering only a basic, non-frills product or service, thereby cutting out activities and cost associated with multiple features and potions.

Re-engineering core business processes to cut out needless work step, and low-value added activities.

Shifting to a simpler, less capital-intensive or more streamlined technological process.

Finding ways to bypass the use of high-cost raw materials or component parts.

Using direct-to-end-user sales and marketing approaches that cut out large costs and margins of wholesalers and retailers.

Relocating facilities closer to suppliers, customers or both to curtail inbound & outbound logistical costs.

Achieving a more economical degree of forward or backward vertical integration, relative to competitors.

Dropping the something for everyone approach and focussing on a limited product/ service to meet a special, but important, need of the target buyer, thereby eliminating activities and costs associated with numerous product versions.

**(b)** Cost leadership strategy in handling five competitive forces:

Being the low-cost provider in an industry, a firm can provide some attractive defences against the five competitive forces:

In meeting the challenges of rival competitors, the low cost firm is in the bet position to compete offensively on the basis of price, to defend against price war conditions, to use the appeal of lower price to grab sales (and market share) from rivals, and to earn above-average profits (based on bigger profit margins or greater sales volume). Low cost is a powerful defence in markets where price competition thrives.

In defending against the power of buyers, low costs provide a company with partial profit margin proaction since powerful customers are rarely able to bargain price down past the survival level of the next most cost-efficient seller.

In countering the bargaining leverage of suppliers, the low-cost producer is more insulated than competitors from powerful suppliers if the primary source of itscost advantage in greater internal efficiency.

As regards potential entrants, the low-cost leader can use price-cutting to make it harder for a new rival to win customers; the pricing power of the low-cost provider acts as a barrier for new entrants.

In competing against substitutes, a low-cost leader is better positioned to use low prices as a defence against companies trying to gain market inroads with a substitute product or service.

**(c)** Elements in the Marketing Mix: A manufacturer of domestic washing machine is a supplier of consumer durables to the consumer market. Here, the marketing mix has to be consumer-oriented, so that the main principles behind the marketing mix and the smaller sales mix must be such that the arrangement and the allocation of resources maximise returns per unit of outlay washing machines are bought for use, and also for personal satisfaction, and individual buyers purchase them in single units.

Product: With a consumer capital good like a washing machine, the product itself will be important. The consumer will want quality, a wider variety of features and a well-known name with good reliable service backup and guarantees. Packing may be important, but technological specifications will certainly be. Under Place, ready availability, good service cover and prompt delivery will be important.

Promotion: An individual buys washing machine infrequently (e.g. motor car). So, promotion is necessary. The customer will look at all promotional literatures, want demonstration and possibly consult an adviser.

Price: It is an expensive product. Price discounts, trade-in allowances and bonuses will be important Credit terms and payment periods will also be important.

Software restructuring involves cultural and process changes required to create collaborative environment for a firm's growth. Suggested steps are:

- Business strategy communication

- Co-ordination
- Trust
- Stretch
- Empowering people
- Industry foresight
- Training.

**Section B**
**Question No 6 is Compulsory. Answers any two questions from the rest.**

**6.** Five Swimmers are eligible to compete in a relay team that should have four swimmers swimming different styles- backstroke, breaststroke, free style and butterfly. The time taken for the five swimmers - Anand, Balu, Chandru, Deepak and Eswar – to cover a distance of 100 metres in various swimming styles are given below in minutes: seconds. Anand swims backstroke in 1:09, breaststroke in 1:15 and has never competed in free style or butterfly. Balu is a free style specialist averaging 1:01 for 100 metres but can also swim breaststroke in 1:16 and butterfly in 1:20. Chandru swims all styles, backstroke 1:10, breaststroke 1:12, free style 1:05 and butterfly 1:20. Deepak swims only butterfly at 1:11 while Eswar swims backstroke 1:20, breaststroke 1:16, free style 1:06 and butterfly 1:10. Which swimmers should be assigned to which swimming style? Who will not be in the team? (10)

**Solution:**

**I. The Time taken matrix is first derived (in seconds)**

| Swimmers | Backstroke | Breaststroke | Freestyle | Butterfly |
|---|---|---|---|---|
| Anand | 69 | 75 | - | - |
| Balu | - | 76 | 61 | 80 |
| Chandru | 70 | 72 | 65 | 80 |
| Deepak | - | - | - | 71 |
| Eswar | 80 | 76 | 66 | 70 |

The objective is minimization of time taken. The combinations not available for assignment are indicate by M where M = infinity. A dummy column is introduced in the above matrix.

**II. Inserting Dummy Column**

| | | | | |
|---|---|---|---|---|
| 69 | 75 | M | M | 0 |
| M | 76 | 61 | 80 | 0 |
| 70 | 72 | 65 | 80 | 0 |
| M | M | M | 71 | 0 |
| 80 | 76 | 66 | 70 | 0 |

**III. Row and Column Operations**

| | | | | |
|---|---|---|---|---|
| ~~0~~ | ~~3~~ | ~~M~~ | ~~M~~ | ~~0~~ |
| ~~M~~ | ~~4~~ | ~~0~~ | ~~10~~ | ~~0~~ |
| ~~1~~ | ~~0~~ | ~~4~~ | ~~10~~ | ~~0~~ |
| M | M | M | 1 | 0 |
| ~~11~~ | ~~4~~ | ~~5~~ | ~~0~~ | ~~0~~ |

**IV. Inserting Dummy Column**

| | | | | |
|---|---|---|---|---|
| **0** | 3 | M | M | ~~0~~ |
| M | 4 | **0** | 10 | ~~0~~ |
| 1 | **0** | 4 | 10 | ~~0~~ |
| | | | | **0** |

M M M 1

11 4 5 **0**

**Answer**: Total Time taken will be 272 seconds or 4 min and 32 seconds.

| Swimmer | Anand | Balu | Chandru | Deepak | Eswar |
|---|---|---|---|---|---|
| Style | Backstroke | Freestyle | Breaststroke | Dummy - will not be in the race. | Butterfly |
| Time Taken | 69 | 61 | 72 | | 70 |

**7. (a) SOLID Company manufactures a product whose standard Cost is as under -**

| | | |
|---|---|---|
| **Direct Materials** | **- 5 units at ₹3** | **15** |
| **Direct Labour** | **- 5 hours at ₹5** | **25** |
| **Production Overheads** | **- 5 hours at ₹4** | **20** |

Profit margin is at 25% on sale price. A budgeted sale for the period is ₹39,200.

For a period, the actual sales were ₹35,000 while actual material and labour cost were ₹8,000 and ₹12,000 respectively. The analysis of variances for this period is as follows –

| | | | |
|---|---|---|---|
| Direct Materials | Price | 800A | - |
| | Usage | - | 405F |
| Direct Labour | Rate | - | 975F |
| | Efficiency | 300A | - |
| Production OH | Expenditure | 200A | - |
| | Volume | - | 340F |

Assume that there is no change in stock and that there are no other overheads.

**You are required to compute the following from the above details—**

- Actual Production
- Actual Profit
- Actual Hours worked
- Budgeted Hours
- Production Overhead Efficiency Variance
- Production Overhead Capacity Variance
- Sales Price Variance
- Sales Volume Profit Variance

Also, prepare a reconciliation statement. (2x5)

**Solution:**

**1. Sales Variances**

| BQ x BP (1) | AQ x AP (2) | AQ x BP (3) | Sales Variances |
|---|---|---|---|
| 490 x 80 = 39,200 | 507 **x** **69.03** = 35,000 | 507 x 80 = 40,560 | Total (1)- (2) = 4,200A<br>Price (3) - (2) = 5,560A<br>Volume (1) - (3) =1,360F |

**2. Materials Variances**

| SQ x SP (1) | AQ x AP (2) | AQ x SP (3) | Material Variances |
|---|---|---|---|
| | | | Cost (1) - (2) = 395 A |

| | | | |
|---|---|---|---|
| ( **507** **x** 5) x 3<br>= 7,605 | 2400 x **3.33**<br>= 8,000 | **2,400** **x** 3<br>= 7,200 | Price (3)-(2) = 800A<br>Usage (1)-(3) = 405F |

**3. Labour Variances**

| SH x SR | AH x AR | AH x SR | Labour Variances |
|---|---|---|---|
| (507 x 5) **x** 5<br>= 12,675 | 2,595 x **4.62**<br>= 12,000 | **2.595** **x 5**<br>= 12,975 | Cost (1) - (2) = 675F<br>Rate (3) - (2) = 975F<br>Efficiency (1) - (3) =300A |

**4. FOH Variances:** Since Production OH Volume Var. is stated in the question, POH is fixed in nature.

**(Note:** Expenditure Var. is common to VOH and FOH. However, Volume Variance is applicable for FOH only.)

| AO x SR (1) | AFOH (2) | BFOH (3) | AH x SR (4) |
|---|---|---|---|
| 507x20=10,140 | 10,000 | 490 x 20 = 9,800 | 2,595 x 4 = 10,380 |

**FOH variances**

**Cost (1) – (2) = 140F**

Expenditure (3) – (2) = 200A

Volume (1) – (3) = 340F

Capacity (4) – (3) = 580F

Efficiency (1) – (4) = 240A

**Working Notes:**

**a.** Profit = 25% on Sale Price = 1/4 on Sales = 1/3 on Cost = 1/3 on (15 + 25 + 20) = **₹20 per unit.**

**b.** Selling Price = Cost + Profit = ₹60 + ₹20 = **₹80 per unit.**

**c.** Since Budgeted Sales = ₹39,200, Budgeted Quantity (BQ) = 39,200 ÷ 80 = **490 units.**

**d.** Material Price Variance = (3) - (2) = 800A
(3) - 8,000 = - 800. Hence, **(3)** = **7,200.** On balancing, **AQ of Materials = 2400 units.**

**e.** Materials Usage Variance = (1) - (3) = 405F
(1) - 7,200 = 405. Hence, **(1)** = **7,605.** On balancing, **Actual Output (AO) = 507 units.**

**f.** Labour Rate Variance = (3) - (2) = 975F
(3) - 12,000 = 975. Hence, **(3)** = **12,975.** On balancing, **AH** = **2,595 hours.**

**g.** FOH Expenditure Variance = (3) - (2) = 200A. So, 9,800 - (2) = - 200. Hence, **(2)** = **10,000**

**PV Ratio =** (80 - 15 - 25) ÷ 80 **= 50%, Net Profit Ratio =** 20 ÷ 80 **= 25% (given)**

**5. Operating Statement/Reconciliation Statement:**(any one method may be adopted in exam situations)

| Method | 1 | 2 | 3 |
|---|---|---|---|
| Profit Route | Budgeted to Actual Profit | Budgeted to Actual Profit | Standard to Actual Profit |
| Costing Method | Marginal Costing | Absorption Costing | Absorption Costing |
| **Budgeted / Std Profit** | **490 x 20 = 9,800** | **490 x 20 = 9,800** | **507 x 20 = 10,140** |
| **Effect of Variances:** | | | |
| Materials - Price | (800) | (800) | (800) |
| Materials - Usage | 405 | 405 | 405 |
| Labour - Rate | 975 | 975 | 975 |
| Labour - Efficiency | (300) | (300) | (300) |
| FOH - Expenditure | (200) | (200) | (200) |
| FOH - Capacity | Not Applicable | 580 | 580 |
| FOH - Efficiency | Not Applicable | (240) | (240) |
| Sales - Price | (5,560) | (5,560) | (5,560) |
| Sales - Volume | 1,360x50% = 680 | 1,360 x 25% = 340 | Not Applicable |
| **Actual Profit** | **5,000** | **5,000** | **5,000** |

**Answers:**

- Actual Production = 507 units
- Actual Profit = Sales - Cost = ₹5,000 (35,000 - 8,000 - 12,000 - 10,000)
- Actual hours worked = 2595 hours
- Budgeted hours worked = 490 x 5 = 2,450
- Production OH Efficiency Variance = ₹240A
- Production OH Capacity Variance = ₹580F
- Sales Price Variance = SPV = SMPV = ₹5,560A
- Sales Volume Profit Variance = SMVV = SVV x NP Ratio = 1,360 x 25% =₹340F

**(b)** Domestic political trouble in the country of an overseas supplier is causing concern in your company because it is not known when further supplies of raw material 'x' will be received. The current stock held of this particular raw material is 17,000 kgs., which costs ₹1,36,000.

Based on raw material 'x', your company makes five different products and expected demand for each of these, for the next three months, is given below together with relevant information.

| Product Code | Kilogram of raw material 'x'/units of finished product (kg.) | Direct labour hours/unit of finished product (Hrs.) | Selling price/unit (₹) | Expected demand over three months (units) |
|---|---|---|---|---|
| 701 | 0.7 | 1.0 | 26 | 8,000 |
| 702 | 0.5 | 0.8 | 28 | 7,200 |
| 821 | 1.4 | 1.5 | 34 | 9,000 |
| 822 | 1.3 | 1.1 | 38 | 12,000 |
| 937 | 1.5 | 1.4 | 40 | 10,000 |

The direct wages rate/hour is ₹5 and production overhead is based on direct wages cost. The variable overhead absorption rate being 40% and the fixed overhead absorption rate being 60%. Variable selling costs, including sales commission are 15% of selling price.
Budget fixed selling and administration costs are ₹3,00,000 per annum. Assume that the fixed production overhead incurred will equal the absorbed figure.

**You are required to:**

1. Show what quantity of the raw material on hand ought to be allocated to which products in order to maximize profits for the forthcoming three months.
2. Present a brief statement showing contribution and profit for the forthcoming three months, if your suggestion in (1) is adopted. (5+5)

**Solution:**

**Statement showing computation of contribution/kg of material and determination of priority for profitability:**

**(₹)**

| **Product Code** | **701** | **702** | **821** | **822** | **937** |
|---|---|---|---|---|---|
| **(i)** Selling Price (₹) | 26.00 | 28.00 | 34.00 | 38.00 | 40.00 |
| **(ii) Variable Cost** | | | | | |
| **(a)** Direct Material | 5.60 | 4.00 | 11.20 | 10.40 | 12.00 |
| **(b)** Labour | 5.00 | 4.00 | 7.50 | 5.50 | 7.00 |
| **(c)** Production overheads | 2.00 | 1.60 | 3.00 | 2.20 | 2.80 |
| **(d)** Selling expenses | 3.90 | 4.20 | 5.10 | 5.70 | 6.00 |
| | 16.50 | 13.80 | 26.80 | 23.80 | 27.80 |
| **(iii)** Contribution (i)-(ii) | 9.50 | 14.20 | 7.20 | 14.20 | 12.20 |
| **(iv)** Raw material Qty/kg/unit | 0.70 | 0.50 | 1.40 | 1.30 | 1.50 |
| **(v)** Contribution/kg of material (iii/v) | 13.57 | 28.40 | 5.14 | 10.90 | 8.13 |
| **(vi)** Ranking | II | I | V | III | IV |

**Statement showing Optimum Mix under given conditions and computation of Profit at that mix:**

| **Product Code** | **701** | **702** | **821** | **822** | **937** | **Total** |
|---|---|---|---|---|---|---|
| No. of units | 8,000 | 7,200 | ------- | 6,000 | ------- | |
| Contribution/unit | 9.50 | 14.20 | ------- | 14.20 | ------- | |
| Total Contribution | 76,000 | 1,02,240 | ------- | 85,200 | -------- | 2,63,440 |
| Fixed Cost | | | | | | 1,36,080 |
| Profit | | | | | | 1,27,360 |

**Working Notes:**

**Computation of material apportioned on the basis of priority:**

| | |
|---|---|
| Available material | 17,000 |
| **Less:** Used for 702 (7,200x0.50) | 3,600 |
| | 13,400 |
| **Less:** Used for 701 (8,000x0.7) | 5,600 |
| | 7,800 |
| Therefore no. of units of 822 to be produced from the remaining material (7,800/1.3)=6,000 units | |

| **Fixed Cost:** | ₹ |
|---|---|
| Selling and Administration overheads B[(30,000/12)x3] | 75,000 |
| Factory overhead [(8,000x5x60%) + (7,200x4x60%) + (6,000x5.5x60%)] | 61,080 |
| | 1,36,080 |

| **Computation of Fixed Costs for 3 months:** | | |
|---|---|---|
| Selling & Admn. Costs | =(₹3,00,000/12)x3 | =₹75,000 |

| **Factory Overhead:** | | | | | |
|---|---|---|---|---|---|
| **Prodn. Code** | **%** | **Rate (₹)** | **Units** | ₹ | |
| 702 | 60 | 4.00 | 7,200 | 17,280 | |
| 701 | 60 | 5.00 | 8,000 | 24,000 | |
| 822 | 60 | 5.50 | 6,000 | 19,800 | ₹61.080 |
| | | | | | ₹1,36,080 |

**8. (a)**Titan Engineering is operating at 70% capacity and presents the following information:

Break-even point ₹200 core
P/V ratio 40%
Margin of safety ₹50 core.

Titan's management has decided to increase production to 95% capacity level with the following modifications:

**(i)** The selling price will be reduced by 8%
**(ii)** The variable cost will be reduced by 5% on sales
**(iii)** The fixed cost will increase by ₹20 crore, including depreciation on additions but excluding interest on additional capital.
**(iv)** Additional capital of ₹50 crore will be needed for capital expenditure and working capital.

**Required:**

**(a)** Indicate the sales figures, with the working, that will needed to earn ₹10 crore over and above the present profit and also meet 20% interest on the additional capital. (5)

**(b)** What will be the revised
**(i)** Break-even point
**(ii)** P/V ratio
**(iii)** Margin of safety? (1+1+1=3)

**Solution:**

[**Working notes:**

Total sales = Break–even sales + margin of safety

= ₹ 200 cr + ₹50 cr = ₹250 cr.

P/V ratio = 40%

Variable cost = 60% of sales = ₹250 x 60% = ₹150 cr.

Fixed cost = Break–even sales x P/V ratio 40% = ₹80 Cr.

Profit = Total sales – Total cost = ₹250 cr. – ₹230 cr. = [₹20 cr.]

Interest @ 20% on additional capital of ₹50 cr = ₹10 cr.

Assuming the present selling price to be ₹100, the revised selling price will be ₹92 and the variable cost will be 55% of ₹92 or ₹50.60, giving the revised contribution of ₹41.40. The new P/V ratio will then be (₹41.40/₹92.00) x 100 = 45%.

In this context, the company wants sufficient sales that will cover the revised fixed cost and yield a profit of ₹30 (Present 20 plus additional 10) cr.

Hence, the revised sales for the company should be ₹ (110 + 30) ÷ 45% = ₹311.11 cr.

**(b) (ii)** the revised P/V ratio, as worked under (a) above = 45%;

**(i)** the revised Break – even point = ₹110 cr ÷ 45% = ₹244.44 cr.;

**(iii)** the revised margin of safety = ₹311.11 – ₹244.44 = ₹66.67 cr.

**(b)** Discuss different types of Bench-marking? (4)

**Answer: Types of Benchmarking:**

The different types of Benchmarking are:

- **(i)** Product Benchmarking
- **(ii)** Competitive Benchmarking
- **(iii)** Process Benchmarking
- **(iv)** Internal Benchmarking
- **(v)** Strategic Benchmarking
- **(vi)** Global Benchmarking

**(i) Product Benchmarking (Reverse Engineering):** is an age old practice product oriented reverse engineering. Every organization buys its rival's products and tears down to find out how the features and performances etc., compare with its products. This could be the starting point for improvement.

**(ii) Competitive Benchmarking:** This has moved beyond product-oriented comparisons to include comparisons of process with those of competitors. In this type, the process studied may include marking, finance, HR, R & D etc.

**(iii) Process Benchmarking:** is the activity of measuring discrete performance and functionality against organization through performance in excellent analogous business processes eg., for supply chain management-the best practice would be that of Mumbai Dubbawallas.

**(iv) Internal Benchmarking:** is an application of process benchmarking, within an organization by comparing the performance of similar business units or business processes.

**(v) Strategic Benchmarking:** differs from operational benchmarking in its scope. It helps to develop a vision of the changed organizations. It will develop core competencies that will help sustained competitive advantage.

**(vi) Global Benchmarking:** is an extension of Strategic Benchmarking to include benchmarking partners on a global scale. Eg., Ford Co. of USA benchmarked it's A/cs Payable functions with that of Mazda in Japan and found to its astonishment the entire function was managed by 5 persons as again 500 in Ford.

**(c)** Choco Chips produces two brands of chocolate chip cookies: Chippo and Choco. Choco Chip's cookies are produced from two ingredients: Chocolate chips and cookie dough. Chippo is 50% chips and 50% dough, whereas choco is 25% chips and 75%dough.

Package of either brand weigh 1 kg. Choco Chip's master budget projects sale of 5,00,000 packages of each product in 2013.According to the master budget, estimated selling prices are ₹30 per package for each product. Forecasted 2013 ingredients costs are as follows: 1 kg of chocolate will cost ₹20, and 1 kg of cookie dough will cost ₹10. A total of 5,000 direct manufacturing labour-hour-2,000 hours for chippo and 3,000 hours for choco- are budgeted at the hourly rate of₹20 per hour. Indirect manufacturing costs are expected to be ₹16,00,000. The indirect manufacturing costs are allocated equally between chips and choco on the basis of packages produced in 2013.

**Required:**

- **(i)** Use the preceding information to calculate Choco Chip's budgeted gross margins for 2013.
- **(ii)** By working with suppliers, Choco Chips was able to reduce the purchase cost of ingredients by 3%. Calculate Choco Chip's revised gross margin for 2013.
- **(iii)** Assume that in addition to the 3% reduction in the purchase cost of ingredients mention in requirement 2, Choco Chips plans a 1% cost reduction in direct manufacturing labour-hours and a 2% cost reduction in the indirect manufacturing costs from the original data. These revisions to the original budget resulted from an analysis of all activities by a cross

functional team as a part of Choco Chip's efforts towards continuous improvement. Compute Choco Chip's revised gross margin of 2013 under these assumptions.

[3+3+2]

**Solution:**

**1. Computation of budgeted gross margin for 2013:**

| | Chippo | Choco | Total |
|---|---|---|---|
| **Revenues** | | | |
| Chippo, ₹30x5,00,000 | ₹1,50,00,000 | -------- | ₹1,50,00,000 |
| Choco, ₹30x5,00,000 | --------- | ₹1,50,00,000 | 1,50,00,000 |
| | ₹1,50,00,000 | ₹1,50,00,000 | ₹3,00,00,000 |
| **Cost of goods sold** Chocolate chips (₹20x2,50,000[a], ₹20x 1,25,000[b]) | 501,00,000 | 25,00,000 | 75,00,000 |
| Cookie dough (₹10x2,50,000[a], ₹10x 3,75,000[b]) | 25,00,000 | 37,50,000 | 62,50,000 |
| Direct manufacturing labour (₹20x20,000, ₹20x30,000) | 4,00,000 | 6,00,000 | 10,00,000 |
| Indirect manufacturing costs (50%x₹16,00,000, 50%x₹16,00,000) | 8,00,000 | 8,00,000 | 16,00,000 |
| Cost of goods sold | 87,00,000 | 76,50,000 | 1,63,50,000 |
| Gross margin | ₹63,00,000 | ₹73,50,000 | ₹1,36,50,000 |

[a]Chippo:5,00,000x0.50=2,50,000 kgs chocolate chips; 5,00,000x.50=2,50,000 kgs cookie dough
[b]Choco:5,00,000x0.25=1,25,000kgs chocolate chips; 5,00,000x0.75=3,75,000 kgs cookie dough

**2. Computation of revised gross margin for 2013:**

| | Chippo | Choco | Total |
|---|---|---|---|
| **Revenue** | | | |
| Chippo, ₹30x5,00,000 | ₹1,50,00,000 | -------- | ₹1,50,00,000 |
| Choco, ₹30x5,00,000 | ------ | ₹1,50,00,000 | 1,50,00,000 |
| | ₹1,50,00,000 | ₹1,50,00,000 | ₹3,00,00,000 |
| **Cost of goods sold** | | | |
| Chocolate chips (₹19.40x2,50,000, ₹19.40x1,25,000) | 48,50,000 | 24,25,500 | 72,75,000 |
| Cookie dough (₹9.70x2,50,000, ₹9.70x 3,75,000) | 24,25,000 | 36,37,500 | 60,62,500 |
| Direct manufacturing labour (₹20x20,000, ₹20x30,000) | 4,00,000 | 6,00,000 | 10,00,000 |
| Indirect manufacturing costs (50%x₹16,00,000, 50%x₹16,00,000) | 8,00,000 | 8,00,000 | 16,00,000 |
| | 84,75,000 | 74,62,500 | 1,59,37,500 |
| Gross margin | 65,25,000 | 75,37,500 | 1,40,62,500 |

**3. Computation of revised gross margin**

| | Chippo | Choco | Total |
|---|---|---|---|
| **Revenue** | | | |
| Chippo, ₹30x5,00,000 | ₹1,50,00,000 | ---------- | ₹1,50,00,000 |
| Choco, ₹30x5,00,000 | --------- | ₹1,50,00,000 | ₹1,50,00,000 |
| | ₹1,50,00,000 | ₹1,50,00,000 | ₹3,00,00,000 |
| **Cost of goods sold** | | | |
| Chocolate chips (₹19.40x2,50,000, ₹19.40x1,25,000) | 48,50,000 | 24,25,500 | 72,75,000 |

| | | | |
|---|---|---|---|
| Cookie dough (₹9.70x2,50,000, ₹9.70x3,75,000) | 24,25,000 | 36,37,500 | 60,62,500 |
| Direct manufacturing labour (₹20x19,800, ₹20x29,700) | 3,96,000 | 5,94,000 | 9,90,000 |
| Indirect manufacturing costs (50%x₹15,68,000, 50%x₹15,68,000) | 7,84,000 | 7,84,000 | 15,68,000 |
| | 84,55,000 | 74,40,000 | 1,58,95,500 |
| Gross margin | ₹65,45,000 | ₹75,59,500 | ₹1,41,04,500 |

**9. (a)** Why is Lean Accounting Needed? [4]

**Answer:** There are positive and negative reasons for using Lean Accounting. The positive reasons include the issues addressed in the "Vision for Lean Accounting" shown above. Lean Accounting provides accurate, timely and understandable information that can be used by managers, sales people, operations leaders, accountants, lean improvement teams and others. The information gives clear insight into the company's performance; both operational and financial. The Lean accounting reporting motivates people in the organization to move lean improvement forward. It is often stated that "What you measure is what will be improved." Lean accounting measures the right things for a company that wants to drive forward with lean transformation.

Lean Accounting is also itself lean. The information, reports, and measurements can be provided quickly and easily. It does not require the complex systems and wasteful transactions that are usually used by manufacturing Companies. The simplicity of lean Accounting frees up the time of the financial people and the operational people so that they can become more actively involved in moving the Company forward towards its strategic goals. The role of the financial professional moves away from bookkeeper and reporter and towards strategic partnering with the Company leaders.

At a deeper level Lean accounting matches the cultural goals of a lean organization. The simple and timely information empowers people at all levels of the organization. The financial and performance measurement information is organized around Value streams and thereby honors the lean principle of Value stream management. The emphasis on Customer Value is also derived from the principles of lean thinking. The way a Company accounts and measures its business is deeply rooted in the culture of organization. Lean Accounting has an important role to play in developing a lean culture within an organization.

**(b)** A company manufactures two products using its maximum capacity of 30,000 machine hours. The price and cost data relating to the two products are as under:

| | **Product A** | **Product B** |
|---|---|---|
| Selling price | ₹/unit 400 | 560 |
| Material cost | ₹/unit 160 | 200 |
| Variable conversion cost | ₹/unit 40 | 120 |
| Maximum sales Potential (units) | 75,000 | 35,00 |
| Production per machine hour (units) | 3.125 | 2.5 |
| Total fixed overheads | ₹84 lac | |

As the company uses just-in-time system, the stocks of work-in-process and finished goods are negligible.

**Required:**

**(i)** Determine the optimal product mix using marginal costing.

**(ii)** Calculate the throughput accounting ratio for each product and rank the products for manufacture.

**(iii)** Based on the concept of throughput accounting, compute the product mix to yield maximum profit. For this purpose, use the total variable costs as calculated on the basis of the product mix obtained by using the marginal costing method in (i) above.

(6+6+4)

**Solution:**

**(i) Optimal product mix using marginal costing:**

**Requirement of machine hours for the maximum sales potential:**

| Product | Maximum sales Units | Production /Machine hour | Machine hours needed |
|---|---|---|---|
| A | 75,000 | 3.125 | 24,000 |
| B | 35,000 | 2.50 | 14,000 |
| **Total ₹** | | | **38,000** |

With 30,000 hours available, shortage=8,000 hours

Contribution by key factor (machine hour) and Ranking:

| | Products | | | |
|---|---|---|---|---|
| **(a)** Ranking by return per factory hour: | | | | |
| | | | **A (₹)** | **B (₹)** |
| Selling price per unit | | | 400 | 560 |
| **Variable cost per unit:** | **A** | **B** | | |
| Materials | 150 | 200 | | |
| Conversion | 40 | 120 | 200 | 320 |
| Contribution per unit | | | 200 | 240 |
| Production: Units per hour | | | 3.125 | 2.50 |
| Contribution per hour | | | ₹625 | ₹600 |
| Rank, based on marginal contribution | | | I | II |
| Machine Hours required per unit of output: | A 1/3.125=0.32 | | B 1/2.50=0.40 | |
| **Optimal product mix using marginal costing:** | | | | |
| **A** | 75,000 (max. sales potential)x0.32 | | =24,000 hours | |
| **B** | 15,000 (constrained by hours)x 0.40 | | =6,000 balance hrs. | |
| Total available machine hours | | | =30,000 | |
| Contribution from this product mix | =A, 75,000x₹200+B, 15,000x ₹240 | | | |
| | | | =₹1,86,00,000 | |
| With fixed overheads of ₹84,00,000, profit | | | =₹1,02,00,000 | |

**(ii) Ranking Products based on throughput accounting ratio:**

| | | Product | |
|---|---|---|---|
| | | **A** | **B** |
| Selling price | ₹/unit | 400 | 560 |
| Material cost | ₹/unit | 160 | 200 |
| Return | ₹/unit | 240 | 360 |
| Hours required | Per unit | 0.32 | 0.40 |
| Return per hour | | ₹750 | ₹900 |
| Rank | | II | I |

**(b)** Since under this method, all costs other material and components are treated as fixed costs, the total of fixed costs (as per the question) = Conversion costs+ fixed costs= A 75,000x₹40+ B 15,000x₹120+₹84, 00,000=₹1,32,00,000.

Therefore, fixed costs per bottleneck hour =₹1,32,00,000÷30,000 hrs.=₹440.

**(c)** Throughput accounting ratio [Value added per time period/Conversion cost per time period]:

| | **A** | **B** |
|---|---|---|
| ₹750/₹440, ₹900/₹440 | 1.70 | 2.05 |
| Rank | II | I |

**(iii) Product mix based on throughput accounting ratio**:

| **Product** | **Units** | **Hours used** | **Throughput return** | **Balance hours left** |
|---|---|---|---|---|
| | | | ₹ L | |
| B | 35,000 | 14,000 | 1,26,00,000 | 16,000 |
| A | 50,000* | 16,000 | 1,20,00,000 | nil |
| | | | ∑ 2,46,00,000 | |
| | | | 1,32,00,000 | |
| Less: Total fixed costs | | | ₹1,14,00,000 | |
| Operational profit | | | ₹1,14,00,000 | |

*limited by available machine hours.