

2

Decision Making using Cost Concepts and CVP Analysis

Basic Concepts

| | |
|--|---|
| Absorption Costing* | Assigns direct costs and all or part of overhead to cost units using one or more overhead absorption rates. |
| Absorbed Overhead* | Overhead attached to products or services by means of an absorption rate, or rates. |
| Allocate* | To assign a whole item of cost, or of revenue, to a single cost unit, centre, account or time period. |
| Apportion* | To spread indirect revenues or costs over two or more cost units, centres, accounts or time periods. This may also be referred to as <i>indirect allocation</i> . |
| Application of Incremental / Differential Cost Techniques in Managerial Decisions | <p>The areas in which the above techniques of cost analysis can be used for making managerial decisions are:</p> <ul style="list-style-type: none"> (i) Whether to process a product further or not. (ii) Dropping or adding a product line. (iii) Making the best use of the investment made. (iv) Acceptance of an additional order from a special customer at lower than existing price. (v) Opening of new sales territory and branch. (vi) Make or Buy decisions. (vii) Submitting tenders (viii) Lease or buy decisions (ix) Equipment replacement decision. |
| Avoidable Cost* | Specific cost of an activity or sector of a business that would be avoided if the activity or sector did not exist. |
| Bottleneck* | Facility that has lower capacity than prior or subsequent facilities and restricts output based on current capacity. |
| Breakeven Point* | Level of activity at which there is neither profit nor loss. |
| Cost* | As a noun – The amount of cash or cash equivalent paid or |

| | |
|---|--|
| | the fair value of other consideration given to acquire an asset at the time of its acquisition or construction. |
| Cost-Benefit Analysis* | Comparison between the costs of the resources used plus any other costs imposed by an activity. |
| Cost Centre* | Production or service location, function, activity or item of equipment for which costs are accumulated. |
| Common Cost* | Cost relating to more than one product or service. |
| Committed Cost* | Cost arising from prior decisions, which cannot, in the short run, be changed. Committed cost incurrence often stems from strategic decisions concerning capacity with resulting expenditure on plant and facilities. Initial control of committed costs at the decision point is through investment appraisal techniques. |
| Conversion Cost* | Cost of converting material into finished product, typically including direct labour, direct expense and production overhead. |
| Cost Classification* | Arrangement of elements of cost into logical groups with respect to their nature (fixed, variable, value adding), function (production, selling) or use in the business of the entity. |
| Cost Elements* | Constituent parts of costs according to the factors upon which expenditure is incurred, namely material, labour and expenses. |
| Cost Management* | Application of management accounting concepts, methods of data collection, analysis and presentation in order to provide the information needed to plan, monitor and control costs. |
| Cost Object* | For example a product, service, centre, activity, customer or distribution channel in relation to which costs are ascertained. |
| Cost Pool* | Grouping of costs relating to a particular activity in an activity-based costing system. |
| Cost-Volume-Profit Analysis | Cost-Volume-Profit Analysis (as the name suggests) is the analysis of three variable viz., cost, volume and profit. Such an analysis explores the relationship existing amongst costs, revenue, activity levels and the resulting profit. It aims at measuring variations of cost with volume. In the profit planning of a business, cost-volume-profit (C-V-P) relationship is the most significant factor. |
| Differential / Incremental Cost* | Difference in total cost between alternatives. This is calculated to assist decision making. |
| Direct Cost* | Expenditure that can be attributed to a specific cost unit, for example material that forms part of the product. |

2.3 Advanced Management Accounting

| | |
|---------------------------------------|--|
| Distribution costs | Cost of warehousing saleable products and delivering them to customers. These costs are reported in the income of statement. |
| Discretionary Cost* | Cost whose amount within a time period is determined by a decision taken by the appropriate budget holder. Marketing, research and training are generally regarded as discretionary costs. Also known as managed or policy costs. |
| Efficiency* | Achievement of either maximum useful output from the resources devoted to an activity or the required output from the minimum resource input. |
| Expand or Contract Decision | Whenever a decision is to be taken as to whether the capacity is to be expanded or not, consideration should be given to the following points: (i) Additional fixed expenses to be incurred. (ii) Possible decrease in selling price due to increase in production. (iii) Whether the demand is sufficient to absorb the increased production. |
| Export v/s Local Sale Decision | When the firm is catering to the needs of the local market and surplus capacity is still available, it may think of utilising the same to meet export orders at price lower than that prevailing in the local market. This decision is made only when the local sale is earning a profit, i.e., where its fixed expenses have already been recovered by the local sales. In such cases, if the export price is more than the marginal cost, it is preferable to enter the export market. Any reduction in the price prevailing in the local market to fulfil surplus capacity may have adverse effect on the normal local sales. Dumping in the export market at a lower price will not, however, have any such adverse effect on local sales. |
| Features of CVP Analysis | Features of CVP Analysis are as follows: (i) It is a technique for studying the relationship between cost volume and profit. (ii) Profit of an undertaking depends upon a large number of factors. But the most important of these factors are the cost of manufacture, volume of sales and selling price of products. (iii) In words of Herman C. Heiser, 'the most significant single factor in profit planning of the average business is the relationship between volume of business, cost and profits'. (iv) The CVP relationship is an important tool used for profit planning of a business. |

| | |
|---------------------------------|---|
| Fixed Cost* | Cost incurred for an accounting period, that, within certain output or turnover limits, tends to be unaffected by fluctuations in the levels of activity (output or turnover). |
| Joint Cost* | Cost of a process which results in more than one main product. |
| Long-term Variable Cost* | All costs are variable in the long run. Full unit costs may be surrogates for long-term variable costs if calculated in a manner which utilises long-term cost drivers, for example activity-based costing. |
| Make or Buy Decision | Very often management is faced with the problem as to whether a part should be manufactured or it should be purchased from outside market. Under such circumstances two factors are to be considered: (i) Whether surplus capacity is available, and (ii) The marginal cost. |
| Marginal Cost* | Part of the cost of one unit of product or service that would be avoided if the unit were not produced, or that would increase if one extra unit were produced. |
| Marginal Costing | According to CIMA, Marginal costing is the system in which variable costs are charged to cost units and fixed costs of the period are written off in full against the aggregate contribution. Marginal costing is not a distinct method of costing like job costing, process costing, operating costing, etc. but a special technique used for managerial decision making. Marginal costing is used to provide a basis for the interpretation of cost data to measure the profitability of different products, processes and cost centre in the course of decision making. It can, therefore, be used in conjunction with the different methods of costing such as job costing, process costing, etc., or even with other technique such as standard costing or budgetary control. |
| Marginal Revenue* | Additional revenue generated from the sale of one additional unit of output. |
| Normal Loss* | Expected loss, allowed for in the budget, and normally calculated as a percentage of the good output from a process during a period of time. Normal losses are generally either valued at zero or at their disposal values. |
| Notional Cost* | Cost used in product evaluation, decision making and performance measurement to reflect the use of resources that |

| | |
|--|---|
| | have no actual (observable) cost. For example, notional interest for internally generated funds or notional rent for use of space. |
| Opportunity Cost* | The value of the benefit sacrificed when one course of action is chosen in preference to an alternative. The opportunity cost is represented by the foregone potential benefit from the best rejected course of action. |
| Outsourcing* | Use of external suppliers as a source of finished products, components or services. This is also known as contract manufacturing or subcontracting. |
| Overhead/Indirect Cost* | Expenditure on labour, materials or services that cannot be economically identified with a specific saleable cost unit. |
| Period Cost* | Cost relating to a time period rather than to the output of products or services. |
| Post-Purchase Cost* | Cost incurred after a capital expenditure decision has been implemented and facilities acquired. May include training, maintenance and the cost of upgrades. |
| Pricing Decisions-Special Circumstances | <p>If goods were sold in the normal circumstances under normal business conditions, the price would cover the total cost plus a margin of profit. Selling prices are not always determined by the cost of production. They may be determined by market conditions but in the long run they tend to become equal to the cost of production of marginal firm. Therefore, a business cannot continue to sell below the total cost for a long period. Occasionally, a firm may have to sell below the total cost.</p> <p>The problem of pricing can be summarised under three heads:</p> <ul style="list-style-type: none"> (i) Pricing in periods of recession, (ii) Differential selling prices and (iii) Acceptance of an offer and submission of a tender. |
| Prime Cost* | Total cost of direct material, direct labour and direct expenses. |
| Product Cost* | Cost of a finished product built up from its cost elements. |
| Production Cost* | Prime cost plus absorbed production overhead. |
| Product Mix Decision | Many times the management has to take a decision whether to produce one product or another instead. Generally decision is made on the basis of contribution of each product. Other things being the same the product which yields the highest contribution is best one to produce. But, if there is |

| | |
|---------------------------------------|--|
| | shortage or limited supply of certain other resources which may act as a key factor like for example, the machine hours, then the contribution is linked with such a key factor for taking a decision. |
| Price-Mix Decision | When a firm can produce two or more products from the same production facilities and the demand of each product is affected by the change in their prices, the management may have to choose price mix which will give the maximum profit, particularly when the production capacity is limited. In such a situation, the firm should compute all the possible combinations and select a price-mix which yields the maximum profitability. |
| Re-apportion* | The re-spread of costs apportioned to service departments to production departments. |
| Relevant Costs / Revenues* | Costs and revenues appropriate to a specific management decision. These are represented by future cash flows whose magnitude will vary depending upon the outcome of the management decision made. If stock is used, the relevant cost, used in the determination of the profitability of the transaction, would be the cost of replacing the stock, not its original purchase price, which is a sunk cost. Abandonment analysis, based on relevant cost and revenues, is the process of determining whether or not it is more profitable to discontinue a product or service than to continue it. |
| Replacement Cost* | Cost of replacing an asset. This is important in relevant costing because if, for example, material that is in constant use is needed for a product or service, the relevant cost of that material will be its replacement cost. Replacement cost has also been proposed as an alternate to historic cost accounting and it can, therefore, be an important concept with relevance to accounting for inflation or measuring performance where the value of assets is important. |
| Semi-Variable Cost* | Cost containing both fixed and variable components and thus partly affected by a change in the level of activity. |
| Shut Down or Continue Decision | Very often it becomes necessary for a firm to temporarily close down the factory due to trade recession with a view to reopening it in the future. In such cases, the decision should be based on the marginal cost analysis. If the products are making a contribution towards fixed expenses or in other words if selling price is above the marginal cost, it is preferable to continue because the losses are minimised. By |

2.7 Advanced Management Accounting

| | |
|--|--|
| | suspending the manufacture, certain fixed expenses can be avoided and certain extra fixed expenses may be incurred depending upon the nature of the industry, say, for example, extra cost incurred in protecting the machinery. So the decision is based on as to whether the contribution is more than the difference between the fixed expenses incurred in normal operation and the fixed expenses incurred when the plant is shut down. |
| Standard Cost* | Planned unit cost of a product, component or service. The standard cost may be determined on a number of bases. The main uses of standard costs are in performance measurement, control, stock valuation and in the establishment of selling prices. |
| Sunk Cost* | Cost that has been irreversibly incurred or committed and cannot therefore be considered relevant to a decision. Sunk costs may also be termed irrecoverable costs. |
| Under / Over Absorbed Overhead* | The difference between overhead incurred and overhead absorbed, using an estimated rate, in a given period. If overhead absorbed is less than that incurred there is under-absorption, if overhead absorbed is more than that incurred there is over-absorption. Over- and under-absorptions are treated as period cost adjustments. |
| Unit Cost* | Unit of product or service in relation to which costs are ascertained. |
| Variable Cost* | Cost that varies with a measure of activity. |

(*) Source- CIMA's Official Terminology

SECTION - A

CVP Analysis / Cost Concepts/ Decision Making

Question-1

Explain, how Cost Volume Profit (CVP) - based sensitivity analysis can help managers cope with uncertainty.



Answer

Sensitivity analysis focuses on how a result will be changed if the original estimates or the underlying assumptions change.

Cost Volume Profit (CVP) – based sensitivity analysis can help managers to provide answers to the following questions to cope with uncertainty.

- What will be the profit if the sales mix changes from that originally predicted?
- What will be the profit if fixed costs increase by 10% and variable costs decline by 5%?

The use of spreadsheet packages has enabled managers to develop CVP computerised models which can answer the above questions. Managers can now consider alternative plans by keying the information into a computer, which can quickly show changes both graphically and numerically. Thus managers can study various combinations of changes in selling prices, fixed costs, variable costs and product mix, and can react quickly without waiting for formal reports from the accountant. In this manner the use of CVP based sensitivity analysis can help managers to cope up with uncertainty.

Question-2

Explain briefly the concepts of Opportunity costs and Relevant costs.



Answer

- (i) **Opportunity Cost-** Opportunity cost is a measure of the benefit of opportunity forgone when various alternatives are considered. In other words, it is the cost of sacrifice made by alternative action chosen. For example, opportunity cost of funds invested in business is the interest that could have been earned by investing the funds in bank deposit.
- (ii) **Relevant Cost-** Expected future costs which differ for alternative course. It is not essential that all variable costs are relevant and all fixed costs are irrelevant. Fixed, or

2.9 Advanced Management Accounting

variable costs that differ for various alternatives are relevant costs. Relevant costs draw our attention to those elements of cost which are relevant for the decision.

Example-

Direct Labour under alternative I – ₹10/ hour; Direct Labour under alternative II – ₹20/hour; Then, Direct Labour is Relevant Cost.

Question-3

Comment on the use of opportunity cost for the purpose of:

- (i) *decision-making and*
- (ii) *cost control*



Answer

- (i) **Decision Making-** Opportunity costs apply to the use of scarce resources, where resources are not scarce; there is no sacrifice from the use of these resources. Where a course of action requires the use of scarce resources, it is necessary to incorporate the lost profit which will be foregone from using scarce resources. If resources have no alternative use only the additional cash flow resulting from the course of action should be included in decision making as relevant cost.
 - (ii) **Cost Control-** The conventional variance analysis will report an adverse usage variance and adverse sales volume variance. However, the failure to achieve the budgeted optimum level of output may be due to inefficient usage of scarce resources. The foregone contribution should therefore be charged to the manager responsible for controlling the usage of scarce resources and not to the sales manager because the failure to achieve the budgeted sales is due to the failure to use scarce resources efficiently. Thus if resources are scarce, the usage variance should reflect the acquisition cost plus budgeted contribution per unit of the scarce resources. If the lost sales are made good in subsequent periods, the real opportunity cost will consist of lost interest arising from delay in receiving the net cash-flows and not the foregone contribution.
-

Question-4

Distinguish between "Marginal cost" and "Differential Cost".

 Answer

Marginal Cost represents the increase or decrease in total cost which occurs with a small change in output say, a unit of output. In Cost Accounting variable costs represent marginal cost.

Differential Cost is the change (increase or decrease) in the total cost (variable as well as fixed) due to change in the level of activity, technology or production process or method of production.

In other words, it can be defined as the cost of one unit of product or service which would be avoided if that unit was not produced or provided.

The main point which distinguishes marginal cost and differential as that change in fixed cost when volume of production increases or decreases by a unit of production. In the case of differential cost variable as well as fixed cost. i.e. both costs change due to change in the level of activity, whereas under marginal costing only variable cost changes due to change in the level of activity.

Question-5

Explain the concept of discretionary costs. Give three examples.

 Answer

Discretionary Costs can be explained with the help of following two important features-

- They arise from periodic (usually yearly) decisions regarding the maximum outlay to be incurred.
- They are not tied to a clear cause and effect relationship between inputs and outputs.

Examples of Discretionary Costs

Advertising, public relations, executive training, teaching, research, health care and management consulting services. The noteworthy feature of discretionary costs is that managers are seldom confident that the “correct” amounts are being spent.

Question-6

Discuss how control may be exercised over discretionary costs.

 Answer

To control Discretionary Costs control points/parameters may be established. But these points need to be devised individually. For research and development function to control discretionary costs, data may be established for submitting major reports to management. For advertising and sales promotion, such costs may be controlled by pre-setting targets. In the case of employees benefits, discretionary costs may be controlled by calling a meeting of employees union and making them aware that the company would meet only the fixed costs and the variable costs should be met by them.

Question-7

What is meant by incremental Revenue?

 Answer

Incremental Revenue is the additional revenue that arise from the production or sale of a group of additional units. It is one of the two basic concepts the other being incremental cost which go together with differential cost analysis. Incremental cost in fact is the added cost due to change either in the level of activity or in the nature of activity.

Question-8

What are the applications of incremental cost techniques in making managerial decisions?

 Answer

Incremental Cost Technique- It is a technique used in the preparation of ad-hoc information in which only cost and income differences between alternative courses of action are taken into consideration.

The essential pre-requisite for making managerial decisions by using incremental cost technique, is to compare the incremental costs with incremental revenues. So long as the incremental revenue is greater than incremental costs, the decision should be in favour of the proposal.

Applications of Incremental Cost Techniques in making Managerial Decisions- The important areas in which incremental cost analysis could be used for managerial decision making are as under-

- Introduction of a new product.
- Discontinuing a product, suspending or closing down a segment of the business.

- Whether to process a product further or not.
 - Acceptance of an additional order from a special customer at lower than existing price.
 - Opening of new sales territory and branch.
 - Optimizing investment plan out of multiple alternatives.
 - Make or buy decisions.
 - Submitting tenders.
 - Lease or buy decisions.
 - Equipment replacement decisions.
-

Question-9

“Sunk cost is irrelevant in decision-making, but irrelevant costs are not sunk costs”. Explain with example.

 Answer

Sunk Costs are costs that have been created by a decision made in the past and that cannot be changed by any decision that will be made in the future. For example, the written down value of assets previously purchased are sunk costs. Sunk costs are not relevant for decision making because they are past costs.

But not all irrelevant costs are sunk costs. For example, a comparison of two alternative production methods may result in identical direct material costs for both the alternatives. In this case, the direct material cost will remain the same whichever alternative is chosen. In this situation, though direct material cost is the future cost to be incurred in accordance with the production, it is irrelevant, but, it is not a sunk cost.

Question-10

Explain the concept of relevancy of cost by citing three examples each of relevant costs and non-relevant costs.

 Answer

Relevant costs are those costs which are pertinent to a decision. In other words, these are the costs which are influenced by a decision. Those costs which are not affected by the decision are not relevant costs.

Examples of Relevant Costs

- All variable costs are relevant costs.

2.13 Advanced Management Accounting

- Fixed Costs which vary with the decision are relevant costs.
- Incremental costs are relevant costs.

Examples of Non-Relevant Costs

- All fixed costs are generally non-relevant.
 - Variable costs which do not vary with the decision are not relevant costs.
 - Book value of the asset is not relevant.
-

Question-11

Mention any four important factors to be considered in Marginal Costing Decisions.

 Answer

Important factors to be considered in “Marginal Costing Decisions” are as follows:

- Whether the product or production makes a contribution,
 - In the selection of alternatives, additional fixed costs if any should be considered.
 - The continuity of demand after expression and its impact on selling price are to be considered.
 - Non-cost factors such as the need to keep labour force intact and governmental attitude are also to be taken into account.
-

Question-12

“Cost is not the only criterion for deciding in favour of shut down” – Briefly explain.

 Answer

Cost is not only criterion for deciding in the favour of *shut down*. Non-Cost Factors worthy of consideration in this regard are as follows:

- Interest of workers, if the workers are discharged, it may become difficult to get skilled workers later, on reopening of the factory. Also shut-down may create problems.
 - In the face of competition it may difficult to re-establish the market for the product.
 - Plant may become obsolete or depreciate at a faster rate or get rusted. Thus, heavy capital expenditure may have to be incurred on re-opening.
-

Question-13

State the relative economics of the “makes vs. buy” decision in management control.

 Answer

Generally for taking a Make vs. Buy Decision comparison is made between the supplier's price and the marginal cost of making plus the opportunity cost. Make vs. buy decision is a strategic decision, and, therefore, both short-term as well as long-term thinking about various cost and other aspects needs to be done.

A company generally buy a component instead of making it under following situations:

- If it costs less to buy rather than to manufacture it internally;
 - If the return on the necessary investment to be made to manufacture is not attractive enough;
 - If the company does not have the requisite skilled manpower to make;
 - If the concern feels that manufacturing internally will mean additional labour problem;
 - If adequate managerial manpower is not available to take charge of the extra work of manufacturing;
 - If the component shows much seasonal demand resulting in a considerable risk of maintaining inventories;
 - If transport and other infrastructure facilities are adequately available;
 - If the process of making is confidential or patented;
 - If there is risk of technological obsolescence for the component such that it does not encourage capital investment in the component.
-

Question-14

State the non-cost factors to be considered in make/buy decisions.

 Answer**Non-Cost Factors in Make / Buy Decisions**

- Possible use of released production capacity and facility as a result of buying instead of making.
- Sources of supply should be reliable and they are capable of meeting un-interruptedly the requirement of the concern.
- Assurance about the quality of goods supplied by outside supplier.
- Reasonable certainty, from the side of supplier about, meeting the delivery dates.
- The decision of buying the product / component from outside suppliers should be discouraged, if the technical know-how used is highly secretive.

2.15 Advanced Management Accounting

- The decision of buying from outside sources should not result in the laying off of workers and create industrial relation problems. In fact, on buying from outside the resources freed should be better utilised elsewhere in the concern.
 - The decision of manufacturing product / component should not adversely affect the concern's relationship with suppliers.
 - Ensure that more than one supplier of product/component is available to reduce the risk of outside buying.
 - In case the necessary technical expertise is not available internally then it is better to buy the requirements from outside.
-

Question-15

Enumerate the factors involved in decisions relating to expansion of capacity.

 Answer

The factors involved in decisions relating to *expansion of capacity* are enumerated as below:

- Additional fixed overheads involved should be considered.
 - Possible decrease in selling price due to increased production capacity.
 - Whether the demand is sufficient to absorb the increased production.
-

Question-16

Discuss the role of costs in product-mix decisions.

 Answer

Role of Costs in Product Mix Decisions- All types of cost involved in cost accounting system are useful in decision making. The cost which plays a major role in product mix decision is the relevant cost. Costs to be relevant should meet the following criteria:

- The costs should be expected as future costs.
- The costs differ among the alternatives course of action.

While making decision about product mix using the facilities and other available resources, the end results should always aim at profit maximisation. Variable costs are relevant costs in product mix decisions and consequently contribution plays a major role in maximisation of profit. In addition to the relevancy of costs, the other factors and costs that should be taken into account at the time of deciding the products mix are:

- The available production capacity
- The limiting factor (s)
- Contribution per unit of the limiting factor

- Market demand for the products.
 - Opportunity costs
-

Question- 17

What are the major areas of decision-making in which differential costing is used?

 Answer

Differential Costing can be used for all short, medium and long term decisions. When two levels of activities are being considered, or while choosing between competing alternatives differential cost analysis is essential. The differential cost is useful for decision making in the following areas:

- Capital Expenditure Decisions.
 - Make or Buy Decision
 - Production Planning
 - Sales Mix Decision
 - Production or Product Decision
 - Change in Level or Nature of an Activity.
-

Question- 18

State any 5 Qualitative Factors relevant for decision making.

 Answer

Qualitative Factors may include:

- (i) The liquidity risk;
 - (ii) The state of the economy, and its levels of inflation;
 - (iii) Effect of new technological breakthroughs;
 - (iv) Effect of a decision on employee morale, motivation, leadership and so on;
 - (v) Effect of a decision on long-term future profitability;
 - (vi) Effect of a decision on a company's public image and the reaction of customers.
-

Question-19

"The use of Absorption costing method in decision-making process leads to anomalies." Discuss.

 Answer

In absorption costing, fixed overheads are assigned to products by establishing overhead absorption rates based on budgeted or normal output. By using absorption costing principles, it is possible for profit to decline when sales volume increases. If the stock levels fluctuate significantly, profits may be distorted because stock changes will significantly affect the amount of fixed overheads allocated to a period. If profits are measured on monthly or quarterly or on periodical basis, seasonal variations in sales may cause significant fluctuations in profits. Internal profit statements on monthly or quarterly basis are used for measuring the managerial performance. In the circumstances, managers may deliberately alter inventory levels to influence profit, if absorption costing is used. When sales are less and the closing inventory increases, a part of the fixed overheads contained in the value of the closing stock is reduced from the fixed costs allocated to production for the period. Thus, if sales are reduced, inventories will increase and absorption cost will post higher profits. Similarly, if sales are increased as compared to production, inventories will be reduced and absorption costing will return lower profits.

SECTION - B

CVP Analysis

Problem-1

A manufacturing company produces Ball Pens that are printed with the logos of various companies. Each Pen is priced at ₹5. Costs are as follows:

| Cost Driver | Unit Variable Cost (₹) | Level of Cost Driver |
|-------------------|------------------------|----------------------|
| Units Sold | 2.5 | - |
| Setups | 225 | 40 |
| Engineering hours | 10 | 250 |

Other Data

Total Fixed Costs (conventional)..... ₹ 48,000

Total Fixed Costs (ABC)..... ₹ 36,500

Required

- (i) Compute the break-even point in units using activity-based analysis.
- (ii) Suppose that company could reduce the setup cost by ₹ 75 per setup and could reduce the number of engineering hours needed to 215. How many units must be sold to break even in this case?



Solution

Break Even Units

1.
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$

$$= \frac{[36,500 + (\text{₹ } 225 \times 40) + (\text{₹ } 10 \times 250)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$

$$= 19,200 \text{ units}$$
2.
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$

$$= \frac{[36,500 + (\text{₹ } 150 \times 40) + (\text{₹ } 10 \times 215)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$

$$= 17,860 \text{ Units}$$

Problem-2

M.K. Ltd. manufactures and sells a single product X whose selling price is ₹ 40 per unit and the variable cost is ₹ 16 per unit.

2.19 Advanced Management Accounting

- (i) If the Fixed Costs for this year are ₹ 4,80,000 and the annual sales are at 60% margin of safety, calculate the rate of net return on sales, assuming an income tax level of 40%
- (ii) For the next year, it is proposed to add another product line Y whose selling price would be ₹ 50 per unit and the variable cost ₹ 10 per unit. The total fixed costs are estimated at ₹ 6,66,600. The sales mix of X : Y would be 7 : 3. At what level of sales next year, would M.K. Ltd. break even? Give separately for both X and Y the break even sales in rupee and quantities.

Solution

- (i) Contribution *per unit* = Selling price – Variable cost
 = ₹40 – ₹16
 = ₹24
- Break-even Point = $\frac{₹4,80,000}{₹24}$
 = 20,000 units
- Percentage Margin of Safety = $\frac{\text{Actual Sales} - \text{Break - even Sales}}{\text{Actual Sales}}$
- Or, 60% = $\frac{\text{Actual Sales} - 20,000\text{units}}{\text{Actual Sales}}$
- ∴ Actual Sales = 50,000 units

| | (₹) |
|--|-----------|
| Sales Value (50,000 units × ₹40) | 20,00,000 |
| Less: Variable Cost (50,000 units × ₹16) | 8,00,000 |
| Contribution | 12,00,000 |
| Less: Fixed Cost | 4,80,000 |
| Profit | 7,20,000 |
| Less: Income Tax @ 40% | 2,88,000 |
| Net Return | 4,32,000 |

$$\text{Rate of Net Return on Sales} = 21.6\% \left(\frac{₹4,32,000}{₹20,00,000} \times 100 \right)$$

- (ii) Products

| | X (₹) | Y (₹) |
|-------------------------------|-------|-------|
| Selling Price <i>per unit</i> | 40 | 50 |

| | | |
|--|---|---|
| Variable Cost <i>per unit</i> | 16 | 10 |
| Contribution <i>per unit</i> | 24 | 40 |
| Individual Product's Contribution Margin | 60% | 80% |
| | $\left(\frac{₹24}{₹40} \times 100\right)$ | $\left(\frac{₹40}{₹50} \times 100\right)$ |

Contribution Margin (X & Y)

$$60\% \times \frac{7}{10} + 80\% \times \frac{3}{10} = 66\%$$

$$\text{Break-even Sales} = ₹10,10,000 \left(\frac{₹6,66,600}{66\%} \right)$$

Break-even Sales Mix

$$X - 70\% \text{ of } 10,10,000 = ₹7,07,000 \text{ i.e. } 17,675 \text{ units.}$$

$$Y - 30\% \text{ of } 10,10,000 = ₹3,03,000 \text{ i.e. } 6,060 \text{ units.}$$

Alternative

If it is assumed that sales mix is based on quantity, the following will be the computations:

| | (₹) |
|--|-------|
| Sales Price : | |
| X : $\left(₹40 \times \frac{7}{10} \right)$ | 28.00 |
| Y : $\left(₹50 \times \frac{3}{10} \right)$ | 15.00 |
| Variable Cost: | |
| X : $\left(₹16 \times \frac{7}{10} \right)$ | 11.20 |
| Y : $\left(₹10 \times \frac{3}{10} \right)$ | 3.00 |
| Contribution | 28.80 |

$$\text{Break-even Sale} = 23,146 \text{ units} \left(\frac{₹6,66,600}{₹28.80} \right)$$

Break-even Sales Mix:

$$X (23,146 \text{ units} \times 70\%) = 16,202 \text{ units}$$

2.21 Advanced Management Accounting

| | | |
|------------------------|---|-------------|
| Or | = | ₹6,48,080 |
| Y (23,146 units × 30%) | = | 6,944 units |
| Or | = | ₹3,47,200 |

Problem-3

X Ltd. supplies spare parts to an air craft company Y Ltd. The production capacity of X Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B:

| Per unit | Part A | Part B |
|------------------------------|-----------------------|-----------------------|
| Alloy usage..... | 1.6 kgs. | 1.6 kgs. |
| Machine Time: Machine A..... | 0.6 hrs. | 0.25 hrs. |
| Machine Time: Machine B..... | 0.5 hrs. | 0.55 hrs. |
| Target Price (₹)..... | 145 | 115 |
| Total hours available:..... | Machine A 4,000 hours | Machine B 4,500 hours |

Alloy available is 13,000 kgs. @ ₹ 12.50 per kg.

*Variable overheads per machine hours:..... Machine A: ₹ 80
Machine B: ₹ 100*

Required

- Identify the spare part which will optimize contribution at the offered price.*
- If Y Ltd. reduces target price by 10% and offers ₹ 60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?*



Solution

(i)

| | Part A | Part B |
|---|--------|--------|
| Machine "A" (4,000 hrs) | 6,666 | 16,000 |
| Machine "B" (4,500 hrs) | 9,000 | 8,181 |
| Alloy Available (13,000 kg.) | 8,125 | 8,125 |
| Maximum Number of Parts <i>to be manufactured</i> | 6,666 | 8,125 |

| | (₹) | (₹) |
|--|----------|----------|
| Material (₹12.5 × 1.6 kg.) | 20.00 | 20.00 |
| Variable Overhead: Machine "A" | 48.00 | 20.00 |
| Variable Overhead: Machine "B" | 50.00 | 55.00 |
| Total Variable Cost <i>per unit</i> | 118.00 | 95.00 |
| Price Offered | 145.00 | 115.00 |
| Contribution <i>per unit</i> | 27.00 | 20.00 |
| Total Contribution <i>for units produced</i> ... (I) | 1,79,982 | 1,62,500 |

Spare Part A will optimize the contribution.

(ii)

| | Part A |
|---|----------|
| Parts to be manufactured numbers | 6,666 |
| Machine A : to be used | 4,000 |
| Machine B : to be used | 3,333 |
| Underutilized Machine Hours (4,500 hrs. – 3,333 hrs.) | 1,167 |
| Compensation for unutilized machine hours (1,167hrs. × ₹60) ... (II) | 70,020 |
| Reduction in Price by 10%, Causing fall in Contribution of ₹14.50 <i>per unit</i> (6,666 units × ₹14.5) ... (III) | 96,657 |
| Total Contribution ... (I + II – III) | 1,53,345 |

Problem-4

The profit for the year of R.J. Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

| | |
|-------------------------|------------|
| Sales..... | ₹ 5,00,000 |
| Direct Materials..... | ₹ 2,50,000 |
| Direct Labour..... | ₹ 1,00,000 |
| Variable Overheads..... | ₹ 40,000 |
| Capital Employed..... | ₹ 4,00,000 |

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

2.23 Advanced Management Accounting

Required

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

Solution

Statement Showing "Cost and Profit for the Next Year"

| Particulars | Existing Volume, etc. | Volume, Costs, etc. after 10% Increase | Estimated Sale, Cost, Profit, etc. * |
|-------------------------------|--------------------------|---|---|
| | (₹) | (₹) | (₹) |
| Sale | 5,00,000 | 5,50,000 | 5,72,000 |
| Less: Direct Materials | 2,50,000 | 2,75,000 | 2,69,500 |
| Direct Labour | 1,00,000 | 1,10,000 | 1,07,800 |
| Variable Overheads | 40,000 | 44,000 | 43,120 |
| Contribution | 1,10,000 | 1,21,000 | 1,51,580 |
| Less: Fixed Cost [#] | 60,000 | 60,000 | 58,800 |
| Profit | 50,000 | 61,000 | 92,780 |

(*) for the next year after increase in selling price @ 4% and overall cost reduction by 2%.

(#)

$$\begin{aligned}\text{Fixed Cost} &= \text{Existing Sales} - \text{Existing Marginal Cost} - 12.5\% \text{ on } ₹4,00,000 \\ &= ₹5,00,000 - ₹3,90,000 - ₹50,000 \\ &= ₹60,000\end{aligned}$$

Percentage Profit on Capital Employed equals to 23.19% $\left(\frac{₹92,780}{₹4,00,000} \times 100 \right)$

Since the Profit of ₹92,780 is more than 23% of capital employed, the proposal of the Sales Manager can be adopted.

Problem-5

You have been approached by a friend who is seeking your advice as to whether he should give up his job as an engineer, with a current salary of ₹14,800 per month and go into business on his own assembling and selling a component which he has invented. He can procure the parts required to manufacture the component from a supplier.

It is very difficult to forecast the sales potential of the component, but after some research, your friend has estimated the sales as follows:

- (i) Between 600 to 900 components per month at a selling price of ₹250 per component.
- (ii) Between 901 to 1,250 components per month at a selling price of ₹220 per component for the entire lot.

The costs of the parts required would be ₹140 for each completed component. However if more than 1,000 components are produced in each month, a discount of 5% would be received from the supplier of parts on all purchases.

Assembly costs would be ₹60,000 per month up to 750 components. Beyond this level of activity assembly costs would increase to ₹70,000 per month.

Your friend has already spent ₹30,000 on development, which he would write – off over the first five years of the venture.

Required

- (i) Calculate for each of the possible sales levels at which your friend could expect to benefit by going into the venture on his own.
- (ii) Calculate the 'Break – Even Point' of the venture for each of the selling price.
- (iii) Advise your friend as to the viability of the venture.



Solution

The salary of ₹14,800 per month is a benefit foregone by going into business. It should therefore be considered as a minimum profit which must be earned p.m. from the new venture in order to be not worse – off than before.

Sum of ₹30,000 spent on the development work of the new venture cannot be recovered irrespective of the decision and thus it should be ignored.

| | |
|--|------|
| At a Selling Price of | ₹250 |
| Contribution <i>per unit</i> (₹250 – ₹140) | ₹110 |

Minimum Sales (units) to recover *assembly costs* of ₹60,000 p.m. and earn a *profit* of ₹14,800 p.m. (Break – even Sales Level)

$$\frac{₹60,000 + ₹14,800}{₹110} = 680 \text{ units}$$

Note that at 600 units and up to 679 units i.e. units below the break-even level the loss would be ₹110/- per unit. From 680 units up to 750 units i.e. on additional 70 units the total profit would be ₹7,700 (70 units × ₹110).

Minimum Sales (units) to recover *assembly cost* of ₹70,000 p.m. and earn a *profit* of ₹14,800 p.m. (Break – even Sales Level)

$$\frac{₹70,000 + ₹14,800}{₹110} = 770.909 \text{ units}$$

2.25 Advanced Management Accounting

If the sales units are more than 770.909 units and up to 900 units, profit would be made. The total amount of profit comes to ₹14,200 [(900 units – 770.909 units) × ₹110]

It is not worthwhile to proceed if the demand of components is less than 680 units or between 750 to 770.909 units.

At a Selling Price of ₹220

Minimum Sales (units) to recover *assembly cost* of ₹70,000 p.m. and earn a *profit* of ₹14,800 p.m. (Break even – Sales Level)

$$\frac{₹70,000 + ₹14,800}{₹220 - ₹140} = 1,060 \text{ units}$$

Minimum Sales (units) to recover *assembly cost* of ₹70,000 p.m. and earn a profit of ₹14,800 p.m.; after availing a discount of 5% on the purchases of all parts.

$$\frac{₹70,000 + ₹14,800}{₹220 - \left(₹140 - \frac{5}{100} \times ₹140 \right)} = 974.712 \text{ units}$$

Or 975 units

Conclusion

It is not worthwhile to sell between 900 and 1,000 units when no discount is available. Also, it is worthwhile selling at ₹220 if sales units are in excess of 1,000 units and a discount of 5% is available on the purchase of all components–parts.

Profit on the Sale (1,250 units) ₹23,950 (1,250 units × ₹87 – ₹84,800)

Advice on the viability of the venture

At a selling price of ₹250 he will not be at a loss if the demand of the component exceeds 680 units to 750 units and 770.909 units to 900 units.

At a selling price of ₹220, it is not worthwhile to sell if the demand is less than 1,000 components without availing a discount of 5%.

Problem-6

Mr. Rajesh is quite displeased and frustrated as despite his and his staff's best efforts, although the sales are increasing, the profits are declining over the last three years. He supplies you with the following information:

(₹ in '000's)

| | 2011 – 12 | 2012 – 13 | 2013 – 14 |
|--------------------------|-----------|-----------|-----------|
| Sales (At ₹ 20 per unit) | 1,000 | 1,100 | 1,200 |

| | | | |
|--|------|-----|------|
| <i>Cost of Production:</i> | | | |
| <i>Variable</i> | 260 | 240 | 160 |
| <i>Fixed (Applied)</i> | 390 | 360 | 240 |
| <i>Opening Inventory (Added)</i> | 50 | 200 | 250 |
| <i>Closing Inventory (Deducted)</i> | 200 | 250 | 50 |
| | 500 | 550 | 600 |
| <i>Adjustment for Overheads Applied</i> | (30) | --- | 120 |
| <i>Actual Cost of Goods Sold</i> | 470 | 550 | 720 |
| <i>Gross Profit</i> | 530 | 550 | 480 |
| <i>Less: Selling Expense (Semi - Variable)</i> | 490 | 530 | 570 |
| <i>Net Profit / (Loss)</i> | 40 | 20 | (90) |

Actual productions for the last three years were 65,000, 60,000 and 40,000 units respectively. 5,000 units were in stock at the beginning of 2011 - 12. Fixed manufacturing overheads are applied to production based on planned activity of 60,000 units every year. Actual overheads were ₹ 10,80,000 for past three - year period and were evenly incurred.

Required

Analyse the Profitability of each year.



Solution

Working Notes

| | 2011 - 12 | 2012 -13 | 2013 -14 |
|--|---|---|---|
| 1. Units Sold | 50,000 | 55,000 | 60,000 |
| $\left(\frac{\text{Sales}}{\text{₹20}} \right)$ | $\left(\frac{\text{₹10,00,000}}{\text{₹20}} \right)$ | $\left(\frac{\text{₹11,00,000}}{\text{₹20}} \right)$ | $\left(\frac{\text{₹12,00,000}}{\text{₹20}} \right)$ |
| 2. Variable Expenses per unit | ₹4 | ₹4 | ₹4 |
| $\left(\frac{\text{Variable Cost}}{\text{Output}} \right)$ | $\left(\frac{\text{₹2,60,000}}{65,000} \right)$ | $\left(\frac{\text{₹2,40,000}}{60,000} \right)$ | $\left(\frac{\text{₹1,60,000}}{40,000} \right)$ |
| 3. Variable Selling Expenses per unit (High - Low method) | | | |
| | = | $\frac{\text{₹5,30,000} - \text{₹4,90,000}}{55,000 \text{ units} - 50,000 \text{ units}}$ | |
| | = | ₹8 per unit | |

2.27 Advanced Management Accounting

| | |
|---------------------------------|------------------------------------|
| 4. Fixed Manufacturing Expenses | = ₹10,80,000 / 3 years |
| | = ₹3,60,000 p.a. |
| Fixed Selling Expenses | = ₹4,90,000 – (50,000 units × ₹ 8) |
| | = ₹90,000 p.a. |
| Total Fixed Costs | = ₹3,60,000 + ₹90,000 |
| | = ₹4,50,000 p.a. |
| 5. Contribution <i>per unit</i> | = ₹20 – ₹4 – ₹8 |
| | = ₹8 |

Statement Showing "Profit for Three Years" (Under Variable Costing)

(₹ in '000)

| | | 2011-12 | 2012-13 | 2013-14 |
|--------------------------------|----------|---------|---------|---------|
| Units Sold (in units) | (W.N.-1) | 50,000 | 55,000 | 60,000 |
| Sales | | 1,000 | 1,100 | 1,200 |
| <i>Less: Variable Costs:</i> | | | | |
| Manufacturing, ₹ 4 per unit | (W.N.-2) | 200 | 220 | 240 |
| Selling Expenses, ₹ 8 per unit | | 400 | 440 | 480 |
| Contribution | | 400 | 440 | 480 |
| <i>Less: Fixed Costs</i> | (W.N.-4) | 450 | 450 | 450 |
| Net Profit / (Loss) | | (50) | (10) | 30 |

$$\begin{aligned} \text{Break – even Sales} &= \frac{\text{₹ 4,50,000}}{\text{₹ 8}} \\ &= 56,250 \text{ units} \end{aligned}$$

The above statement shows that in 2011 – 2012 and 2012 –13 sales were below the break–even point. Due to which loss occurred during this period. It is only in 2013 – 14 that sales exceeded break–even point resulting in profit. The increasing sales trend really supports Mr. Rajesh's efforts. He need not feel frustrated but should continue the present sales trend.

Production during 2011–12 was of 65,000 units. This fell down to 60,000 units in 2012 – 13 and to 40,000 units in 2013 –14. The opening and closing inventories were valued by him at ₹ 10 per unit (including fixed cost of production) for arriving at the results shown under the given statement. This valuation of Mr. Rajesh was based on absorption costing method due to which book profits emerged during 2011–12 and 2012–13.

Mr. Rajesh should adjust his production in such a manner so that the net sales exceed the break – even point of 56,250 units per annum to increase his profits.

Problem-7

Gourmet Food Products is a new entrant in the market for chocolates. It has introduced a new product—Sweetee. This is a small rectangular chocolate bar. The bars are wrapped in aluminium foil and packed in attractive cartons containing 50 bars. A carton, is therefore, considered the basic sales unit. Although management had made detailed estimates of costs and volumes prior to undertaking this venture, new projections based on actual cost experience are now required.

Income Statements for the last two quarters are each thought to be representative of the costs and productive efficiency we can expect in the next few quarters. There were virtually no inventories on hand at the end of each quarter. The income statements reveal the following:—

| | First Quarter (₹) | Second Quarter (₹) |
|----------------------------------|----------------------|-----------------------|
| Sales : | | |
| 50,000 × ₹ 24 | 12,00,000 | — |
| 70,000 × ₹ 24 | — | 16,80,000 |
| Less: Cost of Goods Sold | 7,00,000 | 8,80,000 |
| Gross Margin | 5,00,000 | 8,00,000 |
| Less: Selling and Administration | 6,50,000 | 6,90,000 |
| Net Income / (Loss) before Taxes | (1,50,000) | 1,10,000 |
| Less: Tax | (60,000) | 44,000 |
| Net Income / (Loss) | (90,000) | 66,000 |

The firm's overall marginal and average income tax rate is 40%. This 40% figure has been used to estimate the tax liability arising from the chocolate operations.

Required

- (i) *Management would like to know the breakeven point in terms of quarterly carton sales for the chocolates.*
- (ii) *Management estimates that there is an investment of ₹ 30,00,000 in this product line. What quarterly carton sales and total revenue are required in each quarter to earn an after tax return of 20% per annum on investment?*
- (iii) *The firm's marketing people predict that if the selling price is reduced by ₹ 1.50 per carton (₹ 0.03 off per chocolate bar) and a ₹ 1,50,000 advertising campaign among school children is mounted, sales will increase by 20% over the second quarter sales. Should the plan be implemented?*

 Solution

- (i) Estimation of the Fixed and Variable Costs.

Variable Manufacturing Cost per carton:

$$\begin{aligned} &= \frac{\text{Change in Costs}}{\text{Change in Activity}} \\ &= \frac{\text{₹8,80,000} - \text{₹7,00,000}}{70,000 - 50,000} \\ &= \frac{\text{₹1,80,000}}{20,000} \\ &= \text{₹9 per carton} \end{aligned}$$

Fixed Manufacturing Costs:

$$\begin{aligned} \text{Costs of Goods Sold} &= \text{Fixed Manufacturing Cost} + \text{Variable Manufacturing Cost} \\ \text{₹7,00,000} &= \text{Fixed Manufacturing Cost} + (50,000 \text{ Cartons} \times \text{₹9}) \\ \text{Fixed Manufacturing Cost} &= \text{₹7,00,000} - \text{₹4,50,000} \\ &= \text{₹2,50,000} \end{aligned}$$

Variable Selling and Administration Cost per unit:

$$\begin{aligned} &= \frac{\text{₹6,90,000} - \text{₹6,50,000}}{70,000 - 50,000} \\ &= \frac{\text{₹40,000}}{20,000} \\ &= \text{₹2 per unit} \end{aligned}$$

Fixed Selling & Administration Costs:

$$\begin{aligned} \text{Total Selling \& Admn. Costs} &= \text{Fixed Selling \& Admn. Cost} + \text{Variable Selling \& Admn. Costs} \\ \text{₹6,50,000} &= \text{Fixed Selling \& Admn. Costs} + (50,000 \text{ Cartons} \times \text{₹2}) \\ \text{Fixed Selling \& Admn. Cost} &= \text{₹6,50,000} - \text{₹1,00,000} \\ &= \text{₹5,50,000} \end{aligned}$$

So the Total Variable Costs *per unit* are ₹11 *per unit* (₹9 + ₹2).

Total Fixed Costs are ₹8,00,000 *per quarter* (₹2,50,000 + ₹5,50,000).

Given Sale Price of ₹24 *per carton* and Variable Costs of ₹11 *per carton*, the Contribution *per carton* is ₹13 (₹24 – ₹11).

Breakeven Point (in terms of carton units)

$$\begin{aligned}
 &= \frac{\text{Fixed cost (per quarter)}}{\text{Contribution per Carton}} \\
 &= \frac{\text{₹8,00,000}}{\text{₹13}} \\
 &= 61,539 \text{ Cartons}
 \end{aligned}$$

- (ii) To earn an After Tax Return of 20% on ₹30,00,000, the Desired Annual After Tax Net Income is ₹6,00,000 (₹30,00,000 × 20%). The Quarterly After Tax Net Income will be ₹1,50,000. Given the Tax Rate of 40%, the Pre-tax Return will be ₹2,50,000 (₹1,50,000 × 100/60).

$$\begin{aligned}
 \text{Quarterly Sales (units)} &= \frac{\text{Fixed Cost} + \text{Desired Return}}{\text{Contribution per unit}} \\
 &= \frac{\text{₹(8,00,000 + 2,50,000)}}{\text{₹13}} \\
 &= \frac{\text{₹10,50,000}}{\text{₹13}} \\
 &= 80,769 \text{ Cartons}
 \end{aligned}$$

$$\text{Quarterly Sales Revenue} = \text{₹19,38,456 (80,769 Cartons} \times \text{₹24)}$$

- (iii) The proposal involves reducing Selling Price from ₹24 *per carton* to ₹22.50 *per carton*. Hence the Contribution *per carton* will be ₹11.50 (₹22.50 – ₹11.00).

The increase in Advertising Costs will push Fixed Costs up by ₹1,50,000 to ₹9,50,000.

A 20% increase over second quarter's Sales would increase Sales from 70,000 cartons to 84,000 cartons.

The Expected Earnings Before Taxes will be ₹ 16,000 [(84,000 Cartons × ₹11.50) – ₹9,50,000].

After deducting Tax at 40%, the Net Income will be ₹9,600 (₹16,000 – ₹6,400).

Earning has reduced from ₹66,000 to ₹9,600, accordingly this plan should not be implemented.

Problem-8

Electro Life Ltd. is a leading Home Appliances manufacturer. The company uses just-in-time manufacturing process, thereby having no inventory. Manufacturing is done in batch size of 100 units which cannot be altered without significant cost implications. Although the products are manufactured in batches of 100 units, they are sold as single units at the market price. Due to fierce competition in the market, the company is forced to follow market price of each product. The following table provides the financial results of its four unique products:

| | Alpha | Beta | Gamma | Theta | |
|---------------------|-----------|------------|-----------|------------|------------|
| Sales (units) | 2,00,000 | 2,60,000 | 1,60,000 | 3,00,000 | Total |
| | (₹) | (₹) | (₹) | (₹) | (₹) |
| Revenue | 26,00,000 | 45,20,000 | 42,40,000 | 32,00,000 | 145,60,000 |
| Less: Material Cost | 6,00,000 | 18,20,000 | 18,80,000 | 10,00,000 | 53,00,000 |
| Less: Labour Cost | 8,00,000 | 20,80,000 | 12,80,000 | 12,00,000 | 53,60,000 |
| Less: Overheads | 8,00,000 | 7,80,000 | 3,20,000 | 12,00,000 | 31,00,000 |
| Profit / (Loss) | 4,00,000 | (1,60,000) | 7,60,000 | (2,00,000) | 8,00,000 |

Since, company is concerned about loss in manufacturing and selling of two products so, it has approached you to clear picture on its products and costs. You have conducted a detailed investigation whose findings are below:

The overhead absorption rate of ₹ 2 per machine hour has been used to allocate overheads into the above product costs. Further analysis of the overhead cost shows that some of it is caused by the number of machine hours used, some is caused by the number of batches produced and some are product specific fixed overheads that would be avoided if the product were discontinued. Other general fixed overhead costs would be avoided only by the closure of the factory. Numeric details are summarized below:

| | | |
|----------------------------------|-----------------|-----------------|
| | ₹ | ₹ |
| Machine hour related..... | | 6,20,000 |
| Batch related | | 4,60,000 |
| Product specific fixed overhead: | | |
| Alpha..... | 10,00,000 | |
| Beta..... | 1,00,000 | |
| Gamma..... | 2,00,000 | |
| Theta..... | <u>1,00,000</u> | 14,00,000 |
| General fixed overheads..... | | <u>6,20,000</u> |
| | | 31,00,000 |

The other information is as follows:-

| | Alpha | Beta | Gamma | Theta | Total |
|---------------|----------|----------|----------|----------|-----------|
| Machine Hours | 4,00,000 | 3,90,000 | 1,60,000 | 6,00,000 | 15,50,000 |
| Labour Hours | 1,00,000 | 2,60,000 | 1,60,000 | 1,50,000 | 6,70,000 |

Required

- Prepare a profitability statement that is more useful for decision making than the profit statement prepared by Electro Life Ltd.
- Calculate the break-even volume in batches and also in approximate units for Product 'Alpha'.



Solution

- Statement Showing "Profitability of Electro Life Ltd"

| | Products (Amount in ₹) | | | | |
|----------------------------------|------------------------|-----------|-----------|-----------|-------------|
| | Alpha | Beta | Gamma | Theta | Total |
| Sales | 26,00,000 | 45,20,000 | 42,40,000 | 32,00,000 | 1,45,60,000 |
| Direct Materials | 6,00,000 | 18,20,000 | 18,80,000 | 10,00,000 | 53,00,000 |
| Direct Wages | 8,00,000 | 20,80,000 | 12,80,000 | 12,00,000 | 53,60,000 |
| Overheads (W.N.2): | | | | | |
| Machine Related | 1,60,000 | 1,56,000 | 64,000 | 2,40,000 | 6,20,000 |
| Batch Related | 1,00,000 | 1,30,000 | 80,000 | 1,50,000 | 4,60,000 |
| Contribution | 9,40,000 | 3,34,000 | 9,36,000 | 6,10,000 | 28,20,000 |
| Product Specific Fixed Overheads | 10,00,000 | 1,00,000 | 2,00,000 | 1,00,000 | 14,00,000 |
| Gross Profit | (60,000) | 2,34,000 | 7,36,000 | 5,10,000 | 14,20,000 |
| General Fixed Overheads | | | | | 6,20,000 |
| Profit | | | | | 8,00,000 |

- Break-even Point

| | | |
|--|---|-------------|
| Total Sale Value of Product 'Alpha' | = | ₹ 26,00,000 |
| Total Contribution of Product 'Alpha' | = | ₹ 9,40,000 |
| Specific Fixed Overheads (Product Alpha) | = | ₹ 10,00,000 |

2.33 Advanced Management Accounting

$$\begin{aligned}
 \text{Break-even Sales (₹)} &= \frac{\text{Specific Fixed Cost}}{\text{Total Contribution}} \times \text{Total Sales Value} \\
 &= \frac{₹ 10,00,000}{₹ 9,40,000} \times ₹ 26,00,000 \\
 &= ₹ 27,65,957.45 \\
 \text{Break-even Sales (units)} &= \frac{₹ 27,65,957.45}{₹ 13.00} \\
 &= 2,12,766 \text{ units}
 \end{aligned}$$

However, production must be done in batches of 100 units. Therefore, 2,128 batches are required for break even. Due to the production in batches, 34 units (2,128 batches × 100 units – 2,12,766 units) would be produced extra. These 34 units would add extra cost ₹ 282.20 (34 units × ₹ 8.3*). Accordingly, break-even units as calculated above will increase by 22 units $\left(\frac{₹ 282.20}{₹ 13.00}\right)$.

$$(*) \left(\frac{₹ 6,00,000 + ₹ 8,00,000 + ₹ 1,60,000 + ₹ 1,00,000}{2,00,000 \text{ units}} \right)$$

Break-even units of product 'Alpha' is 2,12,788 units (2,12,766 units + 22 units).

Workings

W.N.-1

Calculation Showing Overhead Rates

| Overhead's Related Factors | Overhead Cost (₹) [a] | Total No. of Units of Factors [b] | Overhead Rate (₹) [a] / [b] |
|----------------------------|--------------------------|--------------------------------------|--------------------------------|
| Machining Hours | 6,20,000 | 15,50,000 hrs. | 0.40 |
| Batch Production | 4,60,000 | 9,200 batches | 50.00 |

W.N.-2

Statement Showing - Overhead Costs Related to Product

| Particulars | Alpha | Beta | Gamma | Theta |
|----------------------------------|--|--|--|--|
| Machining hrs. related overheads | ₹ 1,60,000 (4,00,000 hrs × ₹ 0.40) | ₹ 1,56,000 (3,90,000 hrs × ₹ 0.40) | ₹ 64,000 (1,60,000 hrs × ₹ 0.40) | ₹ 2,40,000 (6,00,000 hrs × ₹ 0.40) |

| | | | | |
|-------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|
| Batch related overheads | ₹1,00,000 (2,000 batches × ₹50) | ₹1,30,000 (2,600 batches × ₹50) | ₹80,000 (1,600 batches × ₹50) | ₹1,50,000 (3,000 batches × ₹50) |
|-------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|

Opportunity Cost

Problem-9

A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year.

Relevant information about the products for the next year is given below.

| | X | Y | Z |
|----------------------------|--------|-------|-------|
| Selling Price (₹ / unit) | 10 | 12 | 12 |
| Variable Costs (₹ / unit) | 6 | 9 | 7 |
| Market Demand (unit) | 3,000 | 2,000 | 1,000 |
| Production Capacity (unit) | 2,000 | 3,000 | 900 |
| Fixed Costs (₹) | 30,000 | | |

Required

Compute the opportunity costs for each of the products.



Solution

| | X | Y | Z |
|---|-------|-------|-------|
| I. Contribution per unit (₹) | 4 | 3 | 5 |
| II. Units (Lower of Production / Market Demand) | 2,000 | 2,000 | 900 |
| III. Possible Contribution (₹) [I × II] | 8,000 | 6,000 | 4,500 |
| IV. Opportunity Cost* (₹) | 6,000 | 8,000 | 8,000 |

(*)

Opportunity cost is the maximum possible contribution forgone by not producing alternative product i.e. if Product X is produced then opportunity cost will be maximum of (₹ 6,000 from Y, ₹ 4,500 from Z).

Incremental Revenue / Differential Cost

Problem-10

Maruthi Agencies has received an order from a valuable client for supplying 3,00,000 pieces of a component at ₹ 550 per unit at a uniform rate of 25,000 units a month.

Variable manufacturing costs amount to ₹ 404.70 per unit, of which direct materials is ₹ 355 per unit. Fixed production overheads amount to ₹ 30 lacs per annum, including depreciation. There is a penalty/reward clause of ₹ 30 per unit for supplying less/more than 25,000 units per month. To adhere to the schedule of supply, the company procured a machine worth ₹ 14.20 lacs which will wear out by the end of the year and will fetch ₹ 3.55 lacs at the year end. After this supply of machine, the supplier offers another advanced machine which will cost ₹ 10.65 lacs, will wear out by the year end and not have any resale value. If the advanced machine is purchased immediately, the purchaser will exchange the earlier machine supplied at the price of the new machine. Fixed costs of maintaining the advanced machine will increase by ₹ 14,200/- per month for the whole year. While the old machine had the capacity to complete the production in 1 year, the new machine can complete the entire job in 10 months. The new machine will have material wastage of 0.5% . Assume uniform production throughout the year for both the machines.

Required

Using incremental cost/revenue approach, decide whether the company should opt for the advanced version.

Solution

| | Old (₹) | New (₹) | Incremental |
|--|------------|------------|---------------|
| Depreciation (₹14.20 lakhs – ₹3.55 lakhs) | 10,65,000 | 10,65,000 | --- |
| Fixed Cost Increase (12 months × ₹14,200) | --- | 1,70,400 | (-) 1,70,400 |
| Resale Value | 3,55,000 | --- | (-) 3,55,000 |
| Material (₹ 355 × 0.5% × 3,00,000 pieces) | --- | 5,32,500 | (-) 5,32,500 |
| Increase in Costs in New Machine Purchased | | | (-) 10,57,900 |
| Penalty ₹30 per unit | --- | --- | --- |
| Reward ₹30 per unit (5,000 units per month × 10 months × ₹30) | --- | 15,00,000 | 15,00,000 |
| Gain | | | 4,42,100 |

Decision

Buy the advanced version.

Working Note

Old Machine's Production is 25,000 units *per month*. Hence, no penalty and no reward.

New Machine's Production is 30,000 units $\left(\frac{3,00,000\text{units}}{10\text{months}}\right)$ *per month*.

Hence, there is reward for 5,000 units (30,000 units – 25,000 units) *per month*.

Cost Indifference Point**Problem-11**

The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System:

| | A Manual (₹) | B Semi-Automatic (₹) | C Fully-Automatic (₹) |
|--|------------------------|--------------------------------|---------------------------------|
| <i>Monthly fixed costs:</i> | | | |
| <i>Occupancy</i> | 15,000 | 15,000 | 15,000 |
| <i>Maintenance contract</i> | --- | 5,000 | 10,000 |
| <i>Equipment lease</i> | --- | 25,000 | 1,00,000 |
| <i>Unit variable costs (per report):</i> | | | |
| <i>Supplies</i> | 40 | 80 | 20 |
| <i>Labour</i> | ₹200 (5 hrs × ₹40) | ₹60 (1 hr × ₹60) | ₹20 (0.25 hr × ₹80) |

Required

- (i) Calculate cost indifference points. Interpret your results.
- (ii) If the present case load is 600 cases and it is expected to go up to 850 cases in near future, which method is most appropriate on cost considerations?



Solution

(i) Cost Indifference Point

| | A and B (₹) | A and C (₹) | B and C (₹) |
|--|--------------------------------|------------------------------------|----------------------------------|
| Differential Fixed Cost ... (I) | ₹30,000 (₹45,000 – ₹15,000) | ₹1,10,000 (₹1,25,000 – ₹15,000) | ₹80,000 (₹1,25,000 – ₹45,000) |
| Differential Variable Costs ... (II) | ₹100 (₹240 – ₹140) | ₹200 (₹240 – ₹40) | ₹100 (₹140 – ₹40) |
| Cost Indifference Point ... (I/II) (Differential Fixed Cost / Differential Variable Costs <i>per case</i>) | 300 Cases | 550 Cases | 800 Cases |

Interpretation of Results

At activity level below the indifference points, the alternative with lower fixed costs and higher variable costs should be used. At activity level above the indifference point alternative with higher fixed costs and lower variable costs should be used.

| No. of Cases | Alternative to be Chosen |
|-------------------|--------------------------|
| Cases ≤ 300 | Alternative 'A' |
| 300 ≥ Cases ≤ 800 | Alternative 'B' |
| Cases ≥ 800 | Alternative 'C' |

- (ii) Present case load is 600. Therefore, alternative B is suitable. As the number of cases is expected to go upto 850 cases, alternative C is most appropriate.

Problem-12

X Ltd. wants to replace one of its old machines. Three alternative machines namely M_1 , M_2 and M_3 are under its consideration. The costs associated with these machines are as under:

| | M_1 | M_2 | M_3 |
|-------------------------------|----------|----------|--------|
| | ₹ | ₹ | ₹ |
| Direct material cost p.u..... | 50 | 100 | 150 |
| Direct labour cost p.u..... | 40 | 70 | 200 |
| Variable overhead p.u..... | 10 | 30 | 50 |
| Fixed cost p.a..... | 2,50,000 | 1,50,000 | 70,000 |

Required

- (i) Compute the cost indifference points for these alternatives.
- (ii) Based on these points suggest a most economical alternative machine to replace the old one when the expected level of annual production is 1,200 units.

 **Solution**

Computation of Cost Indifference Points for three alternatives

$$\begin{aligned} \text{Cost Indifference Point of two machines} &= \frac{\text{Difference in Fixed Cost}}{\text{Difference in Variable Cost per unit}} \\ \\ \text{Machine M}_1 \text{ \& M}_2 &= \frac{\text{₹ 2,50,000} - \text{₹ 1,50,000}}{(\text{₹ 100} + \text{₹ 70} + \text{₹ 30}) - (\text{₹ 50} + \text{₹ 40} + \text{₹ 10})} \\ &= \frac{\text{₹ 1,00,000}}{\text{₹ 100}} \\ &= 1,000 \text{ units} \\ \\ \text{Machine M}_2 \text{ \& M}_3 &= \frac{\text{₹ 1,50,000} - \text{₹ 70,000}}{(\text{₹ 150} + \text{₹ 200} + \text{₹ 50}) - (\text{₹ 100} + \text{₹ 70} + \text{₹ 30})} \\ &= \frac{\text{₹ 80,000}}{\text{₹ 200}} \\ &= 400 \text{ units} \\ \\ \text{Machine M}_1 \text{ \& M}_3 &= \frac{\text{₹ 2,50,000} - \text{₹ 70,000}}{(\text{₹ 150} + \text{₹ 200} + \text{₹ 50}) - (\text{₹ 50} + \text{₹ 40} + \text{₹ 10})} \\ &= \frac{\text{₹ 1,80,000}}{\text{₹ 300}} \\ &= 600 \text{ units} \end{aligned}$$

From the above computations, it is clear that at activity level below the indifference point the alternative (machine) with lower fixed cost and higher variable costs should be used. In case the activity level exceeds the indifference point, a machine with lower variable cost per unit (or higher contribution per unit) and higher fixed cost, is more profitable to operate.

At the activity level equal to the indifference point both machines are on equal footing. Hence from the above we conclude as follows:

| Activity Level | Machine Preference |
|---------------------|---|
| Less than 400 units | M ₃ |
| Exactly 400 units | Either M ₂ or M ₃ |

2.39 Advanced Management Accounting

| | |
|---|---|
| Above 400 units but less than 1,000 units | M ₂ |
| Exactly 1,000 units | Either M ₁ or M ₂ |
| Above 1,000 units | M ₁ |

When expected level of activity is 1,200 units i.e. more than 1,000 units, Machine M₁ should be used.

Problem-13

XY Ltd. makes two products X and Y, whose respective fixed costs are F₁ and F₂. You are given that the unit contribution of Y is one-fifth less than the unit contribution of X, that the total of F₁ and F₂ is ₹ 1,50,000, that the BEP of X is 1,800 units (for BEP of X F₂ is not considered) and that 3,000 units is the indifference point between X and Y. (i.e. X and Y make equal profits at 3,000 unit volume, considering their respective fixed costs). There is no inventory buildup as whatever is produced is sold.

Required

Find out the values F₁ and F₂ and units contributions of X and Y.

Solution

Let C_x be the Contribution per unit of Product X.

Therefore Contribution per unit of Product Y = C_y = 4/5 C_x = 0.8 C_x

Given F₁ + F₂ = 1,50,000,

F₁ = 1,800 C_x (Break even Volume × Contribution per unit)

Therefore F₂ = 1,50,000 – 1,800 C_x.

3,000 C_x – F₁ = 3,000 × 0.8 C_x – F₂ or 3,000 C_x – F₁ = 2,400 C_x – F₂ (Indifference Point)

i.e., 3,000 C_x – 1,800 C_x = 2,400 C_x – 1,50,000 + 1,800 C_x

i.e., 3,000 C_x = 1,50,000, Therefore C_x = ₹ 50/- (1,50,000 / 3,000)

Therefore Contribution per unit of X = ₹ 50

Fixed Cost of X = F₁ = ₹ 90,000 (1,800 × 50)

Therefore Contribution per unit of Y is ₹ 50 × 0.8 = ₹ 40 and

Fixed Cost of Y = F₂ = ₹ 60,000 (1,50,000 – 90,000)

The Value of F₁ = ₹ 90,000, F₂ = ₹ 60,000 and X = ₹ 50 and Y = ₹ 40

Relevant Costing

Problem-14

XL Polymers, located in Sahibabad Industrial Area, manufactures high quality industrial products. AT Industries has asked XL Polymers for a special job that must be completed within one week.

Raw material R_1 (highly toxic) will be needed to complete the AT Industries' special job. XL Polymers purchased the R_1 two weeks ago for ₹7,500 for a job 'A' that recently was completed. The R_1 currently in stock is the excess from that job and XL Polymers had been planning to dispose of it. XL Polymers estimates that it would cost them ₹1,250 to dispose of the R_1 . Current replacement cost of R_1 is ₹6,000.

Special job will require 250 hours of labour G_1 and 100 hours of labour G_2 . XL Polymers pays their G_1 and G_2 employees ₹630 and ₹336 respectively for 42 hours of work per week. XL Polymers anticipates having excess capacity of 150 [G_1] and 200 [G_2] labour hours in the coming week. XL Polymers can also hire additional G_1 and G_2 labour on an hourly basis; these part-time employees are paid an hourly wage based on the wages paid to current employees.

Suppose that material and labour comprise XL Polymers's only costs for completing the special job.

Required

Calculate the 'Minimum Price' that XL Polymers should bid on this job?



Solution

Opportunity Cost of Labour - The G_2 labour has zero opportunity cost as there is no other use for the time already paid for and is available. However, XL Polymers needs to pay an additional amount for G_1 labour. This amount can be save if the special job were not there.

G_1 labour:

| | |
|----------------------------|------------|
| Hours Required | 250 |
| Hours Available | <u>150</u> |
| Extra Hours Needed | 100 |
| Cost per hour (₹630/42hrs) | <u>₹15</u> |
| Opportunity Cost | ₹1,500 |

Thus, the 'Opportunity Cost of Labour' for completing the special job is ₹1,500.

Opportunity Cost of Material – XL Polymers has no alternative use for the R_1 , they must dispose of it at a cost of ₹1,250. Thus, XL Polymers actually *saves* ₹1,250 by using the

2.41 Advanced Management Accounting

materials for the AT Industries' special job. Consequently, the 'Opportunity Cost of Material' is - ₹1,250 (i.e., the opportunity cost of this resource is negative).

The *minimum price* is the price at which XL Polymers just recovers its 'Opportunity Cost'. XL Polymers's 'Total Opportunity Cost' is ₹250 (₹1,500 - ₹1,250). Accordingly, minimum Price for the Special Job is ₹250.

Problem-15

A company has to decide whether to accept a special order or not for a certain product M in respect of which the following information is given:

| | | |
|---------------------------|---|--|
| Material A required | 5,000 kg | Available in stock. It was purchased 5 years ago at ₹ 35 per kg. If not used for M, it can be sold as scrap @ ₹ 15 per kg. |
| Material B required | 8,000 kg | This has to be purchased at ₹ 25 per kg from the market. |
| Other hardware items | ₹ 10,000 | To be incurred |
| Dept X - Labour oriented | 5 men for 1 month @ ₹ 7,000 per month per man | Labour to be freshly hired. No spare capacity available. |
| Dept Y - Machine oriented | 3,000 machine hours @ ₹ 5 per machine hour | Existing spare capacity may be used. |
| Pattern and Specification | ₹ 15,000 | To be incurred for M, but after the order, it can be sold for ₹ 2,000 |

Required

Considering relevant costs, find out the minimum value above which the company may accept the order.



Solution

Determination of Minimum Value of Special Order

| Cost Element | Relevant / Irrelevant | Calculation | Amt. (₹) |
|----------------------|-------------------------------------|-----------------|----------|
| Material – A | Realisable value is relevant. | 5,000 Kg. × ₹15 | 75,000 |
| Material – B | Relevant as it has to be purchased. | 8,000 Kg. × ₹25 | 2,00,000 |
| Other hardware items | Relevant as it is to be incurred. | ---- | 10,000 |

| | | | |
|--------------------------------|--|-----------------------------|----------|
| Dept X – Labour oriented | Relevant as fresh labours are to be hired. | 5 men × 1 month × ₹7,000 | 35,000 |
| Dept Y – Machine oriented | Irrelevant, as spare capacity is available. | ---- | ---- |
| Pattern and Specification | Relevant, Net cost after considering its resale value. | ₹ 15,000 – ₹ 2,000 | 13,000 |
| Minimum Value of Special Order | | | 3,33,000 |

Problem-16

S Limited is engaged in manufacturing activities. It has received a request from one of its important customers to supply a product which will require conversion of material 'M', which is a non-moving item.

The following details are available:

- Book value of material M..... ₹ 60*
- Realisable value of material M..... ₹ 80*
- Replacement cost of material M..... ₹ 100*

It is estimated that conversion of one unit of 'M' into one unit of the finished product will require one labour hour. At present, labour is paid at the rate of ₹ 20 per hour. Other costs are as follows:

- Out-of-pocket expenses..... ₹ 30 per unit*
- Allocated overheads..... ₹ 10 per unit*

The labour will be re-deployed from other activities. It is estimated that the temporary redeployment will not result in loss of contribution. The employees to be re-deployed are permanent employees of the company.

Required

Estimate the minimum price to be charged from the customer so that the company is not worse off by executing the order.

 **Solution**

Relevant Cost of Producing One Unit of the Finished Product

| (₹) | |
|---|----|
| Cost of Material 'M' (Realisable Value) | 80 |
| Cost of Labour (Being Sunk Cost) | 0 |

2.43 Advanced Management Accounting

| | |
|------------------------|-----|
| Out-of-Pocket Expenses | 30 |
| | 110 |

Allocated Overhead is not relevant for the decision. The customer should be charged ₹110 per unit.

Problem-17

Golden Bird Airlines Ltd. operates its services under the brand 'Golden Bird'. The 'Golden Bird' route network spans prominent business metropolis as well as key leisure destinations across the Indian subcontinent. 'Golden Bird', a low-fare carrier launched with the objective of commoditizing air travel, offers airline seats at marginal premium to train fares across India.

Profits of the 'Golden Bird' have been decreasing for several years. In an effort to improve the company's performance, consideration is being given to dropping several flights that appear to be unprofitable.

Income statement for one such flight from 'New Delhi' to 'Leh' (GB - 022) is given below (per flight):

| | ₹ | ₹ |
|--|----------|------------|
| Ticket Revenue (175 seats x 60% Occupancy x ₹ 7,000 ticket price) | | 7,35,000 |
| Less: Variable Expenses (₹ 1,400 per person) | | 1,47,000 |
| Contribution Margin | | 5,88,000 |
| Less: Flight Expenses: | | |
| Salaries, Flight Crew | 1,70,000 | |
| Salaries, Flight Assistants | 31,500 | |
| Baggage Loading and Flight Preparation | 63,000 | |
| Overnight Costs for Flight Crew and Assistants at destination | 12,600 | |
| Fuel for Aircraft | 2,38,000 | |
| Depreciation on Aircraft | 49,000* | |
| Liability Insurance | 1,47,000 | |
| Flight Promotion | 28,000 | |
| Hanger Parking Fee for Aircraft at destination | 7,000 | 7,46,100 |
| Net Gain / (Loss) | | (1,58,100) |

* Based on obsolescence

The following additional information is available about flight GB-022.

1. Members of the flight crew are paid fixed annual salaries, whereas the flight assistants are paid by the flight.
2. The baggage loading and flight preparation expense is an allocation of ground crew's salaries and depreciation of ground equipment.
3. One third of the liability insurance is a special charge assessed against flight GB-022 because in the opinion of insurance company, the destination of the flight is in a "high-risk" area.
4. The hanger parking fee is a standard fee charged for aircraft at all airports.
5. If flight GB-022 is dropped, 'Golden Bird' Airlines has no authorization at present to replace it with another flight.

Required

Using the data available, prepare an analysis showing what impact dropping flight GB-022 would have on the airline's profit.



Solution

Statement Showing Impact on Airline's Profit if Flight GB-022 is Discontinued

| | |
|--|-----------------|
| | ₹ |
| Contribution Margin lost if the flight is discontinued | (5,88,000) |
| Less: Flight Costs which can be avoided if the flight is discontinued: | |
| | ₹ |
| Flight Promotion | 28,000 |
| Fuel for Aircraft | 2,38,000 |
| Liability Insurance (1/3 x ₹ 1,47,000) | 49,000 |
| Salaries, Flight Assistants | 31,500 |
| Overnight Costs for Flight Crew and Assistants | <u>12,600</u> |
| | <u>3,59,100</u> |
| | (2,28,900) |

If Golden Bird Airlines Ltd. goes for discontinuation of flight GB-022, its profit will go down by ₹ 2, 28,900.

Following costs are not relevant to the decision:

- Salaries, flight crew - Fixed annual salaries which will not change
- Baggage loading and flight preparation- This is an allocated cost, which will continue even if the flight is discontinued.

2.45 Advanced Management Accounting

- Depreciation of aircraft -Sunk Cost
- Liability insurance (two third) - Sunk Cost
- Hanger parking fee- This cost will be incurred regardless of whether the flight is made.

Problem-18

A company had nearly completed a job relating to construction of a specialised equipment, when it discovered that the customer had gone out of business. At this stage, the position of the job was as under:

| | (₹) |
|--|----------|
| Original cost estimate | 1,75,200 |
| Costs incurred so far | 1,48,500 |
| Costs to be incurred | 29,700 |
| Progress payment received from original customer | 1,00,000 |

After searches, a new customer for the equipment has been found. He is interested to take the equipment, if certain modifications are carried out. The new customer wanted the equipment in its original condition, but without its control device and with certain other modifications. The costs of these additions and modifications are estimated as under:

| | |
|----------------------------|-----------------------------------|
| Direct Materials (at cost) | ₹ 1,050 |
| Direct Wages Dept.: A | 15 men days |
| Dept.: B | 25 men days |
| Variable Overheads | 25% of Direct Wages in each Dept. |
| Delivery Costs | ₹ 1,350 |

Fixed overheads will be absorbed at 50% of direct wages in each department.

The following additional information is available:

- (1) The direct materials required for the modification are in stock and if not used for modification of this order, they will be used in another job in place of materials that will now cost ₹ 2,250.
- (2) Department A is working normally and hence any engagement of labour will have to be paid at the direct wage rate of ₹ 120 per man day.
- (3) Department B is extremely busy. Its direct wages rate is ₹ 100 per man day and it is currently yielding a contribution of ₹ 3.20 per rupee of direct wages.
- (4) Supervisory overtime payable for the modification is ₹ 1,050.

- (5) *The cost of the control device that the new customer does not require is ₹ 13,500. If it is taken out, it can be used in another job in place of a different mechanism. The latter mechanism has otherwise to be bought for ₹ 10,500. The dismantling and removal of the control mechanism will take one man day in department A.*
- (6) *If the conversion is not carried out, some of the materials in the original equipment can be used in another contract in place of materials that would have cost ₹ 12,000. It would have taken 2 men days of work in department A to make them suitable for this purpose. The remaining materials will realize ₹ 11,400 as scrap. The drawings, which are included as part for the job can be sold for ₹ 1,500.*

Required

Calculate the minimum price, which the company can afford to quote for the new customer as stated above.

 **Solution**

Statement of Minimum Price Which the Company Can Afford to Quote for the New Customer (Based on Relevant Cost)

| | (₹) | (₹) |
|---|--------|----------|
| Cost to be incurred <i>to bring the equipment in its original condition</i> | | 29,700 |
| Direct Material (Replacement Value) | | 2,250 |
| Direct Wages | | |
| Dept. A: (15 men days × ₹120) | 1,800 | |
| Dept. B: (25 men days × ₹100) | 2,500 | |
| Opportunity Cost of Contribution Lost by Dept. B (₹2,500 × ₹3.20) | 8,000 | 12,300 |
| Variable Overheads [25% × (₹1,800 + ₹2,500)] | | 1,075 |
| Delivery Costs | | 1,350 |
| Supervisory Overtime <i>payable for modification</i> | | 1,050 |
| Saving Due to Alternative Use of Control Device | | |
| Bought Out Price | 10,500 | |
| <i>Less: Dismantling & Removal Cost (1 man day × ₹120)</i> | 120 | |
| <i>Less: Variable Cost (25% × ₹120)</i> | 30 | (10,350) |
| Net Loss on Material Cost Savings (W.N.) | | 11,700 |
| Opportunity Cost of Remaining Materials <i>which can be sold as scrap</i> | | 11,400 |

2.47 Advanced Management Accounting

| | | |
|---|--|--------|
| Opportunity Cost of Sale of Drawings | | 1,500 |
| Total Minimum Price which may be quoted | | 61,975 |

Working Note

| | (₹) |
|---|--------|
| Loss on Material Cost Saving of Equipment | 12,000 |
| Less: Conversion Cost (2 man days × ₹120) | 240 |
| Less: Variable Overheads (25% × ₹240) | 60 |
| Net Loss on Material Cost Saving of Equipment | 11,700 |

Problem-19

B Ltd. is a company that has, in stock, materials of type XY that cost ₹ 75,000, but that are now obsolete and have a scrap value of only ₹ 21,000. Other than selling the material for scrap, there are only two alternative uses for them.

Alternative-1

Converting the obsolete materials into a specialized product, which would require the following additional work and materials:

| | |
|-------------------------------------|-------------|
| Material A | 600 units |
| Material B | 1,000 units |
| Direct Labour | |
| 5,000 hours unskilled | |
| 5,000 hours semi skilled | |
| 5,000 hours highly skilled | |
| Extra selling and delivery expenses | ₹ 27,000 |
| Extra advertising | ₹ 18,000 |

The conversion would produce 900 units of saleable product and these could be sold for ₹ 300 per unit.

Material A is already in stock and is widely used within the firm. Although present stocks together with orders already planned, will be sufficient to facilitate normal activity and extra material used by adopting this alternative will necessitate such materials being replaced immediately. Material B is also in stock, stock, but is unlikely that any additional supplies can be obtained for some considerable time, because of an industrial dispute. At the present time material B is normally used in the production of product Z, which sells at ₹ 390 per unit and incurs total variable cost (excluding Material B) of ₹ 210 per unit. Each unit of product Z uses four units of Material B. The details of Materials A and B are as follows:

| | <i>Material A</i> | <i>Material B</i> |
|---|---------------------|----------------------|
| | (₹) | (₹) |
| <i>Acquisition cost at the time of purchase</i> | <i>100 per unit</i> | <i>₹ 10 per unit</i> |
| <i>Net realizable value</i> | <i>85 per unit</i> | <i>₹ 18 per unit</i> |
| <i>Replacement cost</i> | <i>90 per unit</i> | - |

Alternative-2

Adopting the obsolete materials for use as a substitute for a sub-assembly that is regularly used within the firm. Details of the extra work and materials required are as follows:

Material C *1,000 units*

Direct Labour:

- 4,000 hours unskilled*
- 1,000 hours semi-skilled*
- 4,000 hours highly skilled*

1,200 units of the sub-assembly are regularly used per quarter at a cost of ₹ 900 per unit. The adaptation of material XY would reduce the quantity of the sub-assembly purchased from outside the firm to 900 units for the next quarter only. However, since the volume purchased would be reduced, some discount would be lost and the price of those purchased from outside would increase to ₹ 1,050 per unit for that quarter.

Material C is not available externally though 1,000 units required would be available from stocks, it would be produced as extra production. The standard cost per unit of Material C would be as follows:

| | |
|---|------------------|
| | (₹) |
| <i>Direct labour, 6 hour unskilled labour</i> | <i>18</i> |
| <i>Raw materials</i> | <i>13</i> |
| <i>Variable overhead: 6 hours at ₹ 1</i> | <i>06</i> |
| <i>Fixed overhead: 6 hours at ₹ 3</i> | <u><i>18</i></u> |
| | <i>55</i> |

The wage rate and overhead recover rates for B Ltd. are:

| | |
|------------------------------|-----------------------------------|
| <i>Variable overhead</i> | <i>₹ 1 per direct labour hour</i> |
| <i>Fixed overhead</i> | <i>₹ 2 per direct labour hour</i> |
| <i>Unskilled labour</i> | <i>₹ 3 per direct labour hour</i> |
| <i>Semi-skilled labour</i> | <i>₹ 4 per direct labour hour</i> |
| <i>Highly skilled labour</i> | <i>₹ 5 per direct labour hour</i> |

2.49 Advanced Management Accounting

The unskilled labour is employed on a casual basis and sufficient labour can be acquired to exactly meet the production requirements. Semi-skilled labour is part of the permanent labour force, but the company has temporary excess supply of this type of labour at the present time. Highly skilled labour is in short supply and cannot be increased significantly in the short-term, this labour is presently engaged in meeting the demand for product L, which requires 4 hours of highly skilled labour. The contribution from the sale of one unit of product L is ₹ 24.

Required

Present cost information advising whether the stocks of Material XY should be sold, converted into a specialized product (Alternative 1) or adopted for use as a substitute for a sub-assembly (Alternative 2).

Solution

Alternative 1 – Conversion Vs Immediate Sale

| | (₹) |
|---|----------|
| Sales Revenue (900 units at ₹ 300 per unit) [Refer to W.N.-1] | 2,70,000 |
| <i>Less:</i> Relevant Costs | |
| Material XY Opportunity Cost [Refer to W.N.-2] | 21,000 |
| Material A (₹90 per unit) [Refer to W.N.-3] | 54,000 |
| Material B (1,000 units @ ₹ 45 per unit) [Refer to W.N.-4] | 45,000 |
| Direct Labour, Un-skilled (5,000 hours @ ₹3 per hour) | 15,000 |
| Direct Labour, Semi-skilled | Nil |
| Direct Labour, Highly-skilled (5,000 hours @ ₹11) [Refer to W.N.-5] | 55,000 |
| Variable Overheads (15,000 hours @ ₹1) [Refer to W.N.-6] | 15,000 |
| Extra Selling and Delivery Expenses | 27,000 |
| Extra Advertising | 18,000 |
| Fixed Advertising (Remain Same, Not Relevant) | --- |
| Net Relevant Savings | 20,000 |

Alternative 2 – (Adaptation Vs Immediate Sale)

| | (₹) |
|--|-----------|
| Normal Spending (1,200 units @ ₹ 900 per unit) | 10,80,000 |
| <i>Less:</i> Revised Spending (900 units @ ₹ 1,050 per unit) [Refer to W.N.-7] | 9,45,000 |
| Saving on Purchase of Sub-Assembly | 1,35,000 |

| | |
|---|--------|
| <i>Less:</i> Relevant Costs | |
| Material XY Opportunity Cost [Refer to W.N.-2] | 21,000 |
| Material C (1,000 units @ ₹37) [Refer to W.N.-8] | 37,000 |
| Direct Labour, Unskilled (4,000 hours @ ₹ 3 per hour) | 12,000 |
| Direct Labour, Semi-skilled | Nil |
| Direct Labour, Highly-skilled (4,000 hours @ ₹11 per hour) [Refer to W.N.- 5, 6] | 44,000 |
| Variable Overheads (9,000 hours @ ₹1 per hour) [Refer to W.N.-6] | 9,000 |
| Fixed Overheads | --- |
| Net Relevant Savings | 12,000 |

Evaluation

The evaluation of two alternatives clearly shows that Alternative 1, yields higher net revenue of ₹8,000 (₹20,000 – ₹12,000). Hence because of higher net revenue of Alternative 1, it is advisable to convert material XY into a specialized product.

Working Notes

1. There will be a additional sales revenue of ₹2,70,000 if Alternative 1 is chosen.
2. Acceptance of either Alternative 1 or 2 will mean a loss of revenue of ₹21,000 from the sale of the obsolete material XY and hence it is an opportunity cost for both of the alternatives. The original purchase cost of ₹75,000 is a sunk cost and thus not relevant.
3. Acceptance of Alternative 1 will mean that material A must be replaced at an additional cost of ₹54,000.
4. Acceptance of Alternative 1 will mean diversion of material B from the production of product Z. The excess of relevant revenues over relevant cost for product Z is ₹180 (₹390 – ₹210) and each unit of product Z uses four units of material B. The lost contribution (excluding the cost of material B which is incurred for both alternatives) will therefore be ₹45 for each unit of material B that is used for converting the obsolete materials into a specialised product.
5. Unskilled labour can be matched exactly to the company's production requirements. Hence acceptance of either alternative 1 or 2 will cause the company to incur additional unskilled labour cost at ₹3 for each hours. It is assumed that the semi-skilled labour will be able to meet the extra requirements of either alternatives at no extra cost to the company. Hence, cost of semi-skilled labour will not be relevant. Skilled labour is in short supply and can only be obtained by reducing the production of product L, resulting in a loss of contribution of ₹24 (given) or ₹6 per hour of skilled labour. Hence the relevant labour cost will be ₹6 (contribution lost per hour) + ₹5 (hourly rate of skilled labour) i.e. ₹11 per hour.

6. It is assumed that for each direct labour of input, variable overhead will increase by ₹1 hence for each alternative using additional direct labour hours, variable overheads will increase.
7. The cost of purchasing the sub-assembly will be reduced by ₹1,35,000 if the second alternative is chosen and so these savings are relevant to the decision.
8. The company will incur additional variable costs of ₹37 for each unit of material C that is manufactured, so the fixed overheads for material C viz. ₹18/- per unit is not a relevant cost.

Sale or Further Processing Decision

Problem-20

A process industry unit manufactures three joint products: A, B and C. C has no realisable value unless it undergoes further processing after the point of separation. The cost details of C are as follows:

| | p.u. |
|----------------------------------|----------|
| | ₹ |
| <i>Upto point of separation</i> | |
| Marginal cost..... | 30 |
| Fixed Cost..... | 20 |
| <i>After point of separation</i> | |
| Marginal cost..... | 15 |
| Fixed cost..... | <u>5</u> |
| | 70 |

C can be sold at ₹ 37 per unit and no more.

- (i) Would you recommend production of C?
- (ii) Would your recommendation be different if A, B and C are not joint products?



Solution

- (i) Cost incurred on Product 'C' *upto point of separation* is irrelevant for decision making as Product 'C' is a Joint Product. Joint Products are the result of same raw material & same process Operations.

Cost incurred *after point of separation* will be considered for decision making as *specifically* incurred for Product 'C'.

After further processing Product 'C' will contribute ₹17 per unit toward 'Joint Production Cost'.

Calculation is as follows

| Particulars | Amount (₹) |
|---|------------|
| Selling Price <i>per unit</i> | 37.00 |
| Less: Cost after separation: | |
| Marginal Cost <i>per unit</i> | 15.00 |
| Fixed Cost <i>per unit</i> | 5.00 |
| Contribution toward 'Joint Production Cost' | |

Hence, *further processing* of Product 'C' is recommended.

- (ii) If Product 'C' is not a joint product with same cost structure. In this case there will be *negative contribution* on production of Product 'C'. The calculation is as follows→

| Particulars | Amount (₹) |
|---------------------------------|------------|
| Selling Price <i>per unit</i> | 37.00 |
| Less: Marginal Cost (₹30 + ₹15) | 45.00 |
| Contribution | (8.00) |

Hence, production of Product 'C' will not be recommended.

Problem-21

A company processes different products from a certain raw material. The raw material is processed in process I (where normal loss is 10% of input) to give products A and B in the ratio 3 : 2. B is sold directly. A is processed further in process II (where normal loss is 12.5% of output) to give products C and D in the ratio 5:3. At this point C and D have sale values ₹ 55 and ₹ 40 per kg respectively. C can be processed further in process III with processing cost ₹ 3,95,600 and normal wastage 5% of input and then be sold at ₹ 66 per kg. D can be processed further in process IV with processing cost ₹ 3,82,500 and normal wastage 12.5% of output and then be sold at ₹ 55 per kg. The normal wastage of each process has no realizable value. During the production period, 2,00,000 kgs of raw material is to be introduced into Process I.

Required

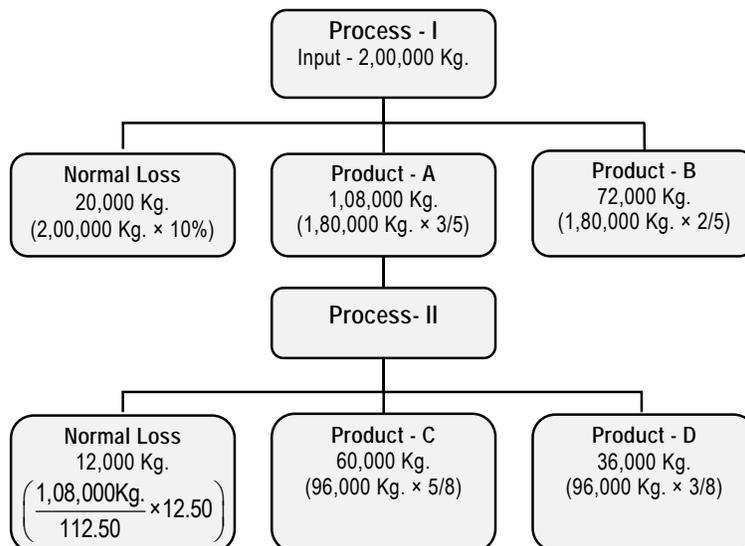
Using incremental cost-revenue approach, advise whether sale at split off or further processing is better for each of the products C and D.

 Solution

Statement Showing "Decision on Sale at - Split-off Point or After Further Processing"

| Product | Product - C | Product - D |
|--|---------------------------------|---|
| Quantity at Split off Point (Kg.) | 60,000 | 36,000 |
| Selling Price at Split off Point (₹) | 55 | 40 |
| Sales Revenue (₹) ... [A] | 33,00,000 (60,000 Kg. × ₹55) | 14,40,000 (36,000 Kg × ₹40) |
| Quantity if Processed Further (Kg.) | 57,000 (60,000 Kg. × 95%) | 32,000 $\left(\frac{36,000\text{Kg.}\times 100}{112.5}\right)$ |
| Selling Price (₹) <i>per unit</i> | 66 | 55 |
| Sales Revenue (₹) ...[B] | 37,62,000 (57,000 Kg. × ₹66) | 17,60,000 (32,000 Kg. × ₹55) |
| Incremental Revenue ...[C] = [B] - [A] | 4,62,000 | 3,20,000 |
| Incremental Cost (₹) ...[D] | 3,95,600 | 3,82,500 |
| Profit / (Loss) ...[C] - [D] | 66,400 | (62,500) |
| Decision | Process Further | Sale at Split-off Point |

Workings





It is not necessary to show above presentation.

Decision on Accepting / Quoting an Order

Problem-22

PQR Ltd., a manufacturer of tool kits has just completed XY's domestic order of 100 kits at a price of ₹ 1,650 per kit. The details of cost for XY's order are:

| | Cost (₹) |
|-----------------------------|----------|
| Direct Material | 90,000 |
| Direct Labour | 32,000 |
| Tools and Consumables | 16,400 |
| Variable overheads | 9,600 |
| Fixed overheads (allocated) | 15,000 |
| Total | 1,63,000 |

The company wishes to evaluate a special export order from Expo Ltd. of similar 300 kits at ₹ 1,600 per kit. For the export order, special packing has to be done at ₹ 20 per kit. An additional fixed inspection cost specific to this export order has to be incurred. The allocation of fixed overheads will be revised to increase by ₹ 25,000. Tools and Consumables above include special purpose tools costing ₹ 10,000 incurred for XY's order and these can be reused for the export order and the remaining portion is variable. PQR Ltd. wishes to accept the export order at 10% profit on the selling price.

Required

- What should be the maximum amount that can be incurred as inspection cost for making such an acceptance possible?
- If Expo Ltd. offers to take the products without inspection, what is the maximum discount (as a percentage of the existing export price) that PQR Ltd. can offer to retain its 10% profit on the revised selling price? (Round off calculations to two decimal places).



Solution

Statement Showing "Permissible Cost per kit"

| Items of Cost | (₹) |
|--|-----|
| Direct Material $\left(\frac{₹ 90,000}{100 \text{ kits}} \right)$ | 900 |

2.55 Advanced Management Accounting

| | |
|--|-------|
| Direct Labour $\left(\frac{₹32,000}{100kits}\right)$ | 320 |
| Consumables $\left(\frac{₹16,400-₹10,000}{100kits}\right)$ | 64 |
| Variable Overheads $\left(\frac{₹9,600}{100kits}\right)$ | 96 |
| Existing Variable Cost <i>per kit</i> | 1,380 |
| Add: Special Packing Cost <i>per kit</i> | 20 |
| Total Variable Cost <i>per kit</i> | 1,400 |
| Export Offer Price <i>per kit</i> | 1,600 |
| Less: Expected Profit (10% on Selling Price) | 160 |
| Total Permissible Cost <i>per kit</i> | 1,440 |

Maximum Inspection Cost *per kit* for making export offer acceptable is ₹40

$$\dots(₹1,440 - ₹1,400)$$

As Total Cost excluding Inspection Cost is ₹1,400 so the Selling Price will be ₹1,555.56

$$\dots\left(₹1,400 \times \frac{100}{90}\right)$$

Maximum Possible Discount on the Revised Selling Price is ₹ 44.44

$$\dots(₹1,600 - ₹1,555.56)$$

Percentage of Discount is 2.77%

$$\dots\left(\frac{₹44.44}{₹1,600} \times 100\right)$$

Hence Maximum Discount of 2.78 percent can be offered to retain 10% Profit on the Revised Selling Price.

Allocated Fixed Overheads amounting to ₹ 25,000 and Reusable Special Tools amounting to ₹10,000 are *irrelevant* and hence ignored in the *decision making process*.



This Problem can be solve by 'Total Cost & Revenue' approach.

Problem-23

HTM Ltd., by using 12,00,000 units of a material M produces jointly 2,00,000 units of H and 4,00,000 units of T. The costs and sales details are as under:

| | |
|---------------------------------------|-----------|
| | ₹ |
| Direct Material M @ ₹ 5 per unit..... | 60,00,000 |
| Other variable costs..... | 42,00,000 |
| Total fixed costs..... | 18,00,000 |
| Selling price of H per unit..... | 25 |
| Selling price of T per unit..... | 20 |

The company receives an additional order for 40,000 units of T at the rate of ₹ 15 per unit. If this order has been accepted, the existing price of T will not be affected. However, the present price of H should be reduced evenly on the entire sale of H to market the additional units to be produced.

Required

Find the minimum average unit price to be charged on H to sustain the increased sales.

Solution

Product H & T are joint products and produced in the ratio of 1:2 from the same direct material- M.

Production of 40,000 additional units of T results in production of 20,000 units of H.

Statement Showing "Contribution under Existing Situation"

| Particulars | Amount (₹) | Amount (₹) |
|---|------------|-------------|
| Sales Value: | | |
| H – 2,00,000 units @ ₹ 25 per unit | 50,00,000 | |
| T – 4,00,000 units @ ₹ 20 per unit | 80,00,000 | 1,30,00,000 |
| <i>Less:</i> Material- M (12,00,000 units @ ₹ 5 per unit) | | 60,00,000 |
| <i>Less:</i> Other Variable Costs | | 42,00,000 |
| Contribution | | 28,00,000 |

Let Minimum Average Selling Price *per unit* of H is ₹ X

Statement Showing "Contribution after Acceptance of Additional Order of 'T'"

| Particulars | Amount (₹) | Amount (₹) |
|-----------------------------------|------------|------------------------|
| Sales Value: | | |
| H – 2,20,000 units @ ₹ X per unit | 2,20,000 X | |
| T – 4,00,000 units @ ₹20 per unit | 80,00,000 | |
| 40,000 units @ ₹15 per unit | 6,00,000 | 2,20,000 X + 86,00,000 |

2.57 Advanced Management Accounting

| | |
|--|------------------------|
| Less: Material- M (12,00,000 units × 110%) @ ₹5 per unit | 66,00,000 |
| Less: Other Variable Costs (₹42,00,000 × 110%) | 46,20,000 |
| Contribution | 2,20,000 X – 26,20,000 |

Minimum Average Selling Price *per unit* of H

$$\begin{aligned}
 \text{Contribution after additional order of T} &= \text{Contribution under existing production} \\
 2,20,000 X - 26,20,000 &= 28,00,000 \\
 2,20,000 X &= 54,20,000 \\
 X &= ₹24.64
 \end{aligned}$$

Minimum Average Selling Price *per unit* of H is ₹ 24.64

Problem-24

A company has prepared the following budget for the forthcoming year:

| | (₹ in lakhs) |
|--------------------------|--------------|
| Sales | 20.00 |
| Direct materials | 3.60 |
| Direct labour | 6.40 |
| Factory overheads | |
| Variable | 2.20 |
| Fixed | 2.60 |
| Administration overheads | 1.80 |
| Sales commission | 1.00 |
| Fixed selling overheads | 0.40 |
| Profit | 2.00 |

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

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

to accept the order below total cost as, according to the company management, it will lead to a loss.

Required

State your arguments and advise the management on the acceptance of the special order.

 **Solution**

Statement Showing "Analysis of Cost and Profit"

| | (₹ in lakhs) | (₹ in lakhs) |
|-------------------------------------|--------------|--------------|
| Prime Cost | | |
| Direct Material | 3.60 | |
| Direct Labour | 6.40 | 10.00 |
| Overhead | | |
| Variable Factory Overhead | 2.20 | |
| Fixed Factory Overhead | 2.60 | |
| Administration Overheads | 1.80 | |
| Selling Commission | 1.00 | |
| Fixed Selling Overheads | 0.40 | 8.00 |
| Total Cost | | 18.00 |
| Profit | | 2.00 |
| Rate of Profit on Costs [₹2 / ₹18] | | 1 / 9 |

Overhead Absorption Rate based on direct wages 125% of Direct Wages (₹8.00 / ₹6.40 × 100)

Statement Showing "Break up of New Order"

| | (₹) |
|--------------------------------|----------|
| Direct Materials | 36,000 |
| Direct Labour | 64,000 |
| Overheads 125% of Direct Wages | 80,000 |
| Total Costs | 1,80,000 |
| Profit (1/9 on Total Cost) | 20,000 |
| Selling Price | 2,00,000 |

The following points emerge:

- (i) Factory overheads only are to be recovered on the basis of direct wages.

2.59 Advanced Management Accounting

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

Based on the above, the Factory Variable Overheads recovery rate may be calculated as under-

| | |
|--|-------------|
| Total Variable Factory Overheads | ₹2.20 lakhs |
| Direct Wages | ₹6.40 lakhs |
| Factory Overhead Rate ($\frac{₹2.20}{₹6.40} \times 100$) | 34.375% |

Applying this rate the Cost of the Special Order will be as under-

| | (₹) |
|-------------------------------------|----------|
| Direct Materials | 36,000 |
| Direct Labour | 64,000 |
| Overheads (34.375% of Direct Wages) | 22,000 |
| Total Costs | 1,22,000 |
| Price Offered | 1,50,000 |
| Margin (More than 1/9) | 28,000 |

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

Problem-25

Satish Enterprises is a leading exporter of Kid's Toys. J Ltd. of USA has approached Satish Enterprises for exporting a special toy named "Jumping Monkey". The order will be valid for next three years at 3,000 toys per month. The export price of the toy will be \$ 4.

Cost data per toy is as follows:

| | |
|--|------------|
| <i>Materials.....</i> | <i>₹60</i> |
| <i>Labour.....</i> | <i>₹25</i> |
| <i>Variable overheads.....</i> | <i>₹20</i> |
| <i>Primary packing of the toy.....</i> | <i>₹15</i> |

The toys will be packed in lots of 50 each. For this purpose a special box, which will contain the 50 toys will have to be purchased, cost being ₹ 400 per box.

Satish Enterprises will also have to import a special machine for making the toys. The cost of the machine is ₹ 24,00,000 and duty thereon will be at 12%. The machine will have an effective life of 3 years and depreciation is to be charged on straight-line method. Apart from depreciation, annual fixed overheads is estimated at ₹ 4,00,000 for the first year with 6% increase in the second year. Fixed overheads are incurred uniformly over the year.

Assuming the average conversion rate to be ₹ 50 per \$.

Required

- (i) Prepare a monthly and yearly profitability statements for the first year and second year assuming the production at 3,000 toys per month.
- (ii) Compute a monthly and yearly break-even units in respect of the first year.
- (iii) In what contingency can there be a second break-even point for the month and for the year as a whole?
- (iv) Have you any comments to offer on the above?

 **Solution**

(i) Profit for First / Second Year on Monthly and Yearly Basis

(Amount in '000)

| | First Year | | Second Year | |
|-----------------------------------|--|---------------|---|---------------|
| | Monthly (₹) | Yearly (₹) | Monthly (₹) | Yearly (₹) |
| Sales Revenue | 600 <small>{3,000 units × (\$4 × ₹ 50)}</small> | 7,200 | 600 | 7,200 |
| Material | 180 <small>(3,000 units × ₹ 60)</small> | 2,160 | 180 | 2,160 |
| Labour | 75 <small>(3,000 units × ₹ 25)</small> | 900 | 75 | 900 |
| Variable Overheads | 60 <small>(3,000 units × ₹ 20)</small> | 720 | 60 | 720 |
| Primary Packing | 45 <small>(3,000 units × ₹ 15)</small> | 540 | 45 | 540 |
| Boxes Cost | 24 <small>$\left(\frac{3,000 \text{ units}}{50 \text{ units}} \times ₹ 400\right)$</small> | 288 | 24 | 288 |
| Total Fixed Overheads (W.N.-1) | 108 <small>$\left(\frac{₹ 1,296}{12 \text{ months}}\right)$</small> | 1,296 | 110 <small>$\left(\frac{₹ 1,320}{12 \text{ Months}}\right)$</small> | 1,320 |
| Profit | 108 | 1,296 | 106 | 1,272 |

(ii) Monthly Break-Even Units for the First Year

| | Levels No. of Units (See W.N.-2) | | | |
|--|----------------------------------|--------------------------------|--------------------------------|--------------------------------|
| | 1,351-1,400 (₹) | 1,401-1,450 (₹) | 1,451-1,500 (₹) | 1,501-1,505 (₹) |
| Fixed Costs: | | | | |
| Total Fixed Overheads <i>per month</i> | 1,08,000 | 1,08,000 | 1,08,000 | 1,08,000 |
| Semi-Variable Costs : (Special Boxes Cost) (W.N.-2) | 11,200 (28 Boxes × ₹400) | 11,600 (29 Boxes × ₹400) | 12,000 (30 Boxes × ₹400) | 12,400 (31 Boxes × ₹400) |
| Total Fixed and Semi Variable Costs | 1,19,200 | 1,19,600 | 1,20,000 | 1,20,400 |
| Break-even Level (in units)* | 1,490 (₹1,19,200 / ₹ 80) | 1,495 (₹1,19,600 / ₹ 80) | 1,500 (₹1,20,000/ ₹ 80) | 1,505 (₹1,20,400/ ₹ 80) |

*

$$\left(\frac{\text{Total Fixed and Semi - Variable Cost}}{\text{Contribution per unit}} \right)$$

The above statement shows that the first and second break-even level of units, viz., 1,490 and 1,495 units falls outside the range of 1,351 -1,400 and 1,401 -1,450 units respectively. In the present case a monthly break-even level of units is 1,500 units which lies in the range of 1,451-1,500 units.

Yearly Break-Even Units for the First Year

| | Levels No. of Units (See W.N.-3) | | | |
|---|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | 17,851- 17,900 (₹) | 17,901- 17,950 (₹) | 17,951- 18,000 (₹) | 18,001- 18,050 (₹) |
| Fixed Costs | 12,96,000 | 12,96,000 | 12,96,000 | 12,96,000 |
| Semi-Variable Costs (Special Boxes Cost) | 1,43,200 (358 Boxes × ₹400) | 1,43,600 (359 Boxes × ₹ 400) | 1,44,000 (360 Boxes × ₹ 400) | 1,44,400 (361 Boxes × ₹ 400) |
| Total Fixed and Semi Variable Costs | 14,39,200 | 14,39,600 | 14,40,000 | 14,40,400 |

| | | | | |
|-----------------------------|--------------------|--------------------|--------------------|--------------------|
| Break-even Level (in units) | 17,990 | 17,995 | 18,000 | 18,005 |
| | (₹14,39,200 / ₹80) | (₹14,39,600 / ₹80) | (₹14,40,000 / ₹80) | (₹14,40,400 / ₹80) |

The above table shows that yearly break-even of units is 18,000 units which lies in the range of 17,951-18,000 units. The other first two figures do not lie in the respect ranges. Hence, they are not acceptable.

- (iii) In case the number of toys goes beyond *the* level of 1,500, one more box will be required to accommodate each 50 additional units of toys. In such a case the additional cost of a box will be ₹ 400. This amount can be recovered by the additional contribution of 5 toys. Thus, the second break-even point in such a contingency is 1,505 toys.

In case the number of toys goes beyond the level of 18,000 number, one more box will be required. The additional cost of this box will be ₹ 400; which can be recovered by the additional contribution of 5 toys. Thus, the second break-even point is 18,005 toys.

- (iv) Yearly break-even point of 18,000 units of toys in the first year is equal to 12 times the monthly break-even point of 1,500 units. Thus, both the monthly and yearly figures of break-even point fall on the upper limit of their respective range.

In the second case, it is not so because the monthly and yearly break-even point fall within the range of 50 toys.

Working Notes

(1)

| Fixed Overheads | 1st Year | 2nd Year |
|---|------------|------------|
| Depreciation $\left\{ \frac{\text{₹}24,00,000 + \text{₹}2,88,000 \text{ (Duty)}}{3 \text{ Years}} \right\}$ | ₹ 8,96,000 | ₹ 8,96,000 |
| Other Fixed Overheads | ₹4,00,000 | ₹4,24,000 |
| Total Fixed Overheads | ₹12,96,000 | ₹13,20,000 |

(2)

| | |
|---|------------|
| Fixed Overhead <i>in the first year</i> | ₹12,96,000 |
| Fixed Overhead <i>per month</i> | ₹1,08,000 |
| Contribution <i>per unit</i> (₹ 200 - ₹ 120) | ₹80 |
| Hence the Break-even Number of Units will be above 1,350 units $\left(\frac{\text{₹ } 1,08,000}{\text{₹}80} \right)$ | |

(3)

| | |
|---|------------|
| Fixed Overhead <i>in the first year</i> | ₹12,96,000 |
|---|------------|

2.63 Advanced Management Accounting

| | |
|--|--------------|
| Contribution <i>per unit</i> (₹200 – ₹120) | ₹80 |
| Hence the Break-even Number of Units <i>to recover fixed cost</i> will be above 16,200 units $\left(\frac{₹ 12,96,000}{₹80} \right)$ | |
| But, at this Break -even Point another Fixed Cost will be incurred on Boxes. | |
| Number of Boxes Required $\left(\frac{16,200 \text{ units}}{50 \text{ units}} \right)$ | 324 units |
| Cost of Boxes (324units × ₹400) | ₹1,29,600 |
| Now the Total Fixed Cost (₹12,96,000 + ₹1,29,600) | ₹14,25,600 |
| Therefore, the new Break-even Point $\left(\frac{₹14,25,600}{₹80} \right)$ | 17,820 units |

Problem-26

Souvenir Ltd. manufactures medals for winners of athletic events and other contests. Its manufacturing plant has the capacity to produce 10,000 medals each month. The company has current production and sales level of 7,500 medals per month. The current domestic market price of the medal is ₹150.

The cost data for the month of March, 2013 is as under:

| (₹) | |
|---|----------|
| <i>Variable Costs (that vary with units produced):</i> | |
| <i>Direct Materials</i> | 2,62,500 |
| <i>Direct Manufacturing Labour</i> | 3,00,000 |
| <i>Variable Costs (that vary with number of batches):</i> | |
| <i>Set-ups; Materials Handling; Quality Control (150 batches × ₹ 500 per batch)</i> | 75,000 |
| <i>Fixed Costs:</i> | |
| <i>Manufacturing Costs</i> | 2,75,000 |
| <i>Marketing Costs</i> | 1,75,000 |

Souvenir Ltd. has received a special one-time-only order for 2,500 medals at ₹100 per medal. Souvenir Ltd. makes medals for its existing customers in batch size of 50 medals (150 batches × 50 medals per batch = 7,500 medals).

The special order for 2,500 medals requires Souvenir Ltd. to manufacture the medals in 25 batches of 100 each.

Required

- (i) Should Souvenir Ltd. accept the special order? Why? Explain briefly.
- (ii) Suppose the plant capacity was 9,000 medals instead of 10,000 medals each month. The special order must be taken either in full or rejected totally. Should Souvenir Ltd. accept the special order? Why? Explain briefly.

**Solution****Stat. Showing "Contribution Margin – Accepting the Special Order of 2,500 Medals"**

| | (₹) |
|---|----------|
| Sales Revenue (2,500 Medals × ₹100 per medal) | 2,50,000 |
| Less: Variable Costs | |
| Direct Material (2,500 Medals × ₹35 per medal) | 87,500 |
| Direct Manufacturing Labour (2,500 Medals × ₹40 per medal) | 1,00,000 |
| Set-ups; Materials Handling ; Quality Control (25 Batches × ₹500 per batch) | 12,500 |
| Contribution Margin | 50,000 |

Decision

The above computations show that Souvenir Ltd. should accept the special order since its acceptance would increase the operating profit of the concern by ₹50,000.

**Statement Showing "Acceptance of Special Order by Souvenir Ltd."
(When the Plant Capacity was 9,000 Medals)**

| | (₹) |
|--|----------|
| Gain in Contribution Margin because of Special Order | 50,000 |
| Less: Loss of Contribution Margin on Reduction of 1,000 Medals Sales in the Internal Market (W.N.-1 & 2) | (65,000) |
| Loss of Contribution Margin | (15,000) |

Decision

The above computations show that the special order of 2,500 medals (when the plant capacity was reduced to 9,000 medals) should not be accepted since this decision will result in a loss of contribution margin by ₹ 15,000.

Working Notes

W.N.-1

Statement Showing "Present Contribution on 7,500 Medals"

| | (₹) |
|--|-----------|
| Sales Revenue (7,500 Medals × ₹150 per medal) | 11,25,000 |
| Less: Variable Costs | |
| Direct Material (7,500 Medals × ₹35 per medal) | 2,62,500 |
| Direct Manufacturing Labour (7,500 Medals × ₹40 per medal) | 3,00,000 |
| Set-up; Materials Handling; Quality Control (150 Batches × ₹500 per batch) | 75,000 |
| Contribution Margin | 4,87,500 |

W.N.-2

Statement Showing "Contribution Margin on 6,500 Medals"

| | (₹) |
|--|----------|
| Sales Revenue (6,500 Medals × ₹150 per medal) | 9,75,000 |
| Less: Variable Costs | |
| Direct Material (6,500 Medals × ₹35 per medal) | 2,27,500 |
| Direct Manufacturing Labour (6,500 Medals × ₹40 per medal) | 2,60,000 |
| Set-up; Materials Handling; Quality Control (130 Batches × ₹500 per batch) | 65,000 |
| Contribution Margin | 4,22,500 |

Make or Buy

Problem-27

X is a multiple product manufacturer. One product line consists of motors and the company produces three different models. X is currently considering a proposal from a supplier who wants to sell the company blades for the motors line.

The company currently produces all the blades it requires. In order to meet customer's needs, X currently produces three different blades for each motor model (nine different blades).

The supplier would charge ₹ 25 per blade, regardless of blade type. For the next year X has projected the costs of its own blade production as follows (based on projected volume of 10,000 units):

Direct materials..... ₹ 75,000
Direct labour..... ₹ 65,000

| | |
|-----------------------------|-----------------|
| Variable overhead..... | ₹ 55,000 |
| Fixed overhead | |
| Factory supervision..... | ₹ 35,000 |
| Other fixed cost..... | <u>₹ 65,000</u> |
| Total production costs..... | ₹ 2,95,000 |

Assume (1) the equipment utilized to produce the blades has no alternative use and no market value, (2) the space occupied by blade production will remain idle if the company purchases rather than makes the blades, and (3) factory supervision costs reflect the salary of a production supervisor who would be dismissed from the firm if blade production ceased.

Required

- (i) Determine the net profit or loss of purchasing (rather than manufacturing), the blades required for motor production in the next year.
- (ii) Determine the level of motor production where X would be indifferent between buying and producing the blades. If the future volume level were predicted to decrease, would that influence the decision?
- (iii) For this part only, assume that the space presently occupied by blade production could be leased to another firm for ₹ 45,000 per year. How would this affect the make or buy decision?



Solution

- (i) This is a make or buy decision so compare the incremental cost to make with the incremental cost buy.

| | Incremental Costs Per Unit (₹) |
|--|-----------------------------------|
| Direct Materials (₹75,000 ÷ 10,000 units) | 7.50 |
| Direct Labour (₹65,000 ÷ 10,000 units) | 6.50 |
| Variable Overhead (₹55,000 ÷ 10,000 units) | 5.50 |
| Supervision (₹35,000 ÷ 10,000 units) | 3.50 |
| Total Cost | 23.00 |

Compare the cost to make the blades for 10,000 motors. ₹23.00, with the cost to buy, ₹ 25.00 There is a net loss of ₹2.00 if 'X' chooses to buy the blades.

- (ii) 'X' will be indifferent between buying and making the blades when the total costs for making and buying will be equal at the volume level where:

$$\text{Variable Cost per unit} \times \text{No. of units} + \text{Avoidable Fixed Cost} = \text{Cost of Buy}$$

2.67 Advanced Management Accounting

$$\begin{aligned}
 \text{Variable Cost per unit (DM + DL + VO) } \times \text{ No. of units + Factory Supervision Cost} &= \text{Buying Cost per unit } \times \text{ No. of units} \\
 \text{Let No. of in units} &= U \\
 (\text{₹}7.50 + \text{₹}6.50 + \text{₹}5.50) \times U + \text{₹}35,000 &= \text{₹}25.00 U \\
 \text{₹}19.50 U + \text{₹}35,000 &= \text{₹}25.00 U \\
 \text{₹}25.00 U - \text{₹}19.50 U &= \text{₹}35,000 \\
 \text{₹}5.50 U &= \text{₹}35,000 \\
 U &= 6,364 \text{ units of blades}
 \end{aligned}$$

As volume of production decreases, the average per unit cost of in house production increases. If the volume falls below 6,364 motors, then 'X' would prefer to buy the blades from the supplier.

- (iii) If the space presently occupied by blade production could be leased to another firm for ₹45,000 per year, 'X' would face an opportunity cost associated with in house blade production for the 10,000 units of ₹4.50 per unit.

$$\begin{aligned}
 \text{New Cost to Make} &= \text{₹}23.00 + \text{₹}4.50 \\
 &= \text{₹}27.50
 \end{aligned}$$

Now 'X' should buy because the cost to make, ₹27.50, is higher than the cost to buy, ₹25.00.

Problem-28

Agro caps Ltd., engaged in manufacturing agricultural machinery, is preparing its annual budget for the coming year. The company has a metal pressing capacity of 20,000 hours, which will be insufficient for manufacture of all requirements of components A, B, C and D.

The company has the following choices-

- (i) *Buy the components entirely from outside suppliers.*
- (ii) *Buy from outside suppliers and / or use a partial second shift.*

The data for the current year are given below-

Standard Production Cost per unit-

| | A (₹) | B (₹) | C (₹) | D (₹) |
|------------------------|----------|----------|----------|----------|
| Requirement (in units) | 2,000 | 3,500 | 1,500 | 2,800 |
| Variable Cost | | | | |
| Direct Materials | 37 | 27 | 25 | 44 |

| | | | | |
|-----------------------|----|----|----|-----|
| Direct Wages | 10 | 8 | 22 | 40 |
| Direct Expenses | 10 | 20 | 10 | 60 |
| Fixed Overhead | 5 | 4 | 11 | 20 |
| Total Production Cost | 62 | 59 | 68 | 164 |

Direct expenses relate to the use of the metal presses which cost ₹ 10 per hour, to operate. Fixed overheads are absorbed as a percentage of direct wages.

Supply of all or any part of the total requirement can be obtained following prices, each delivered to the factory-

| Component | (₹) |
|-----------|-----|
| A..... | 60 |
| B..... | 59 |
| C..... | 52 |
| D..... | 168 |

Second shift operations would increase direct wages by 25 percent over the normal shift and fixed overhead by ₹ 500 for each 1,000 (or part thereof) second shift hours worked.

Required

- (i) Which component, and in what quantities should be manufactured in the 20,000 hours of press time available?
- (ii) Whether it would be profitable to make any of the balance of components required on a second shift basis instead of buying them from outside suppliers.



Solution

- (i) Components and Quantities to be Manufactured in 20,000 Hours of Press Time Available (Single Shift Operation)

| | Hrs. |
|--|---------------|
| Available Capacity for Metal Pressing..... | 20,000 |
| First, Produce D, Hours Required (2,800 × 6)..... | <u>16,800</u> |
| Balance Hours Available..... | 3,200 |
| Second, Produce A, Hours Required (2,000 × 1)..... | <u>2,000</u> |
| Balance Hours Available..... | 1,200 |
| Third, Produce B, for the Balance Hours Available (600 × 2)..... | <u>1,200</u> |
| Balance Hours Available..... | Nil |

2.69 Advanced Management Accounting

So, in 20,000 hours of press time available, all the requirements of components D and A and only 600 units of B can be manufactured. The balance requirement of component B i.e. 2,900 (3,500 – 600) units will have to be bought out or manufactured in the second shift.

- (ii) Since the purchase price of Component C (i.e. ₹ 52) is lower than the marginal cost of manufacturing (i.e. ₹ 57) in even single shift, it will not be profitable to make it, hence it should be purchased from outside.

Now it is to be seen whether 2,900 units of B should be produced in the second shift or bought from outside. The comparative position is given below:

Cost of Producing 2,900 units of Component B in Second Shift

| | (₹) |
|---|----------|
| Variable Cost <i>per unit</i> on Single Shift Basis | 55.00 |
| Add: Increase in Direct Wages <i>per unit</i> | 2.00 |
| Variable Cost <i>per unit</i> | 57.00 |
| Total Variable Cost for 2,900 units (2,900 units × ₹57) | 1,65,300 |
| Additional Fixed Cost* | 3,000 |
| Total Cost for Producing 2,900 units of B in Second Shift ... (A) | 1,68,300 |
| Bought Out Price for 2,900 units of B (2,900 units × ₹59) ... (B) | 1,71,100 |
| Disadvantage in Buying ... (A) – (B) | (2,800) |

(*) Additional Fixed Cost

5,800 hrs (2,900 units x 2 hrs.) are required for 2,900 units of B. Extra Fixed Cost for 5,800 hrs at ₹ 500 for every 1,000 hours (or part thereof) is ₹3,000.

Since the cost of manufacturing balance quantity of component B i.e. 2,900 units in second shift is less by ₹2,800, it is profitable to make it on a second shift basis instead of buying from outside suppliers.

Working Notes

- (a) Process Hours Required

| | A | B | C | D |
|---|-----|-----|-----|-----|
| | (₹) | (₹) | (₹) | (₹) |
| Direct Expenses <i>per unit</i> | 10 | 20 | 10 | 60 |
| No. of Press Hours <i>per unit</i> (Direct Expenses <i>per press hour</i> being ₹10) | 1 | 2 | 1 | 6 |

(b) Marginal Cost of Production *per unit* Vs Bought Out Price *per unit*

| | A (₹) | B (₹) | C (₹) | D (₹) |
|--|----------|----------|----------|----------|
| Marginal Cost | | | | |
| Direct Material | 37 | 27 | 25 | 44 |
| Direct Wages | 10 | 8 | 22 | 40 |
| Direct Expenses | 10 | 20 | 10 | 60 |
| Marginal Cost <i>per unit</i> | 57 | 55 | 57 | 144 |
| Bought Out Price | 60 | 59 | 52 | 168 |
| Excess of Bought Out Price over Marginal Cost | 3 | 4 | (5) | 24 |
| Press Hours <i>per unit</i> | 1 | 2 | 1 | 6 |
| Excess of Bought Out Price <i>per unit</i> of Limiting Factor (i.e. Press Hour) | 3 | 2 | (5) | 4 |

The bought-out price for component C is lower by ₹5 than the marginal cost of production and so it should be purchased from outside.

In case the remaining components A, B, and D are bought, their ranking in terms of loss per unit of limiting factors (press hour) would be (highest loss per unit), A and B. The capacity available should, therefore, be deployed for making D first and then A and thereafter B.

Problem-29

A firm needs a component in an assembly operation. If it wants to do the manufacturing itself, it would need to buy a machine for ₹ 4 lakhs which would last for 4 years with no salvage value. Manufacturing costs in each of the four years would be ₹ 6 lakhs, ₹ 7 lakhs, ₹ 8 lakhs and ₹ 10 lakhs respectively. If the firm had to buy the component from a supplier the component would cost ₹ 9 lakhs, ₹ 10 lakhs, ₹ 11 lakhs and ₹ 14 lakhs respectively in each of the four years.

However, the machine would occupy floor space which could have been used for another machine. This latter machine could be hired at no cost to manufacture an item, the sale of which would produce net cash flows in each of the four years of ₹ 2 lakhs; it is impossible to find room for both the machines and there are no other external effects. The cost of capital is 10% and P/V factor for each of the 4 years is 0.909, 0.826, 0.751 and 0.683 respectively. Should the firm make the component or buy from outside?

2.71 Advanced Management Accounting

 Solution

(₹ in lakhs)

| Year | Present Value Factor at 10% | When the Component is Manufactured | | When the Component is Bought | |
|------|-----------------------------|------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| | | Cash Outflows* | Present Value of Cash Outflows | Cash Outflows (Cost of Buying) | Present Value of Cash Outflows |
| 0 | 1.000 | 4 | 4.000 | - | - |
| 1 | 0.909 | 6+2 | 7.272 | 9 | 8.181 |
| 2 | 0.826 | 7+2 | 7.434 | 10 | 8.260 |
| 3 | 0.751 | 8+2 | 7.510 | 11 | 8.261 |
| 4 | 0.683 | 10+2 | 8.196 | 14 | 9.562 |
| | | | 34.412 | | 34.264 |

Cash Outflows* means Capital Cost *plus* Manufacturing Cost *plus* Opportunity Cost.

The above statement shows that there is a saving in buying the component amounting to ₹0.148 lakh (i.e. ₹34.412 lakhs – 34.264 lakhs).

Hence, it is beneficial to buy the component from outside.

Note

It may be noted that the loss of ₹ 2 lakhs of cash inflow for each of the 4 years due to inability of the firm to operate another machine when it manufactures the component has to be treated as an opportunity cost.

Problem-30

A company manufacture four products. The annual demand for products, selling prices and variable production costs are as follows:

| Products | P | Q | R | S |
|-------------------------|----------|----------|----------|--------|
| Demand (Units) | 1,20,000 | 1,86,000 | 1,71,000 | 99,000 |
| | ₹ | ₹ | ₹ | ₹ |
| Selling Price/unit | 23.88 | 28.68 | 55.08 | 47.88 |
| Direct Material/unit | 10.08 | 13.20 | 30.48 | 24.96 |
| Direct Labour/unit | 4.08 | 4.08 | 6.72 | 6.36 |
| Variable Overheads/unit | 1.44 | 1.44 | 2.40 | 2.16 |

Other Data:

- (i) The variable overheads are absorbed on a machine hour basis at a rate of ₹ 1.20 per machine hour.
- (ii) Fixed overheads total ₹46,84,000 per annum.
- (iii) Production capacity available 8,15,000 machine hours per annum.
- (iv) Products P, Q and R can be bought-in at ₹21.36 per unit, ₹24 per unit and ₹48 per unit respectively.

Required

Calculate the best product mix for the year and the resulting optimal profit.

 **Solution**

(i) **Statement Showing "Calculation of Contribution/ unit "**

| | P | Q | R | S |
|--|-------|-------|-------|-------|
| | (₹) | (₹) | (₹) | (₹) |
| Selling Price ... (A) | 23.88 | 28.68 | 55.08 | 47.88 |
| Variable Cost | | | | |
| Direct Material | 10.08 | 13.20 | 30.48 | 24.96 |
| Direct Labour | 4.08 | 4.08 | 6.72 | 6.36 |
| Variable Overheads | 1.44 | 1.44 | 2.40 | 2.16 |
| Total Variable Cost ... (B) | 15.60 | 18.72 | 39.60 | 33.48 |
| Contribution <i>per unit</i> ... (A) - (B) | 8.28 | 9.96 | 15.48 | 14.40 |

(ii) **Calculation of Machine Hours/ unit**

| | | | | |
|-------------------------------|------|------|------|------|
| Machine Hours <i>per unit</i> | 1.20 | 1.20 | 2.00 | 1.80 |
|-------------------------------|------|------|------|------|

(iii) **Machine Hours Required**

| | | | | |
|-------------------------------|-----------|-----------|-----------|-----------|
| Machine Hours <i>per unit</i> | 1,44,000* | 2,23,200% | 3,42,000@ | 1,78,200# |
| | Total | | | 8,87,400 |

* - (1,20,000 × 1.2); % - (1,86,000 × 1.2); @ - (1,71,000 × 2); # - (99,000 × 1.8)

- (iv) Total Machine Hours Available 8,15,000. Hence, it is a key factor. Product 'S' is to be manufactured, since it is not available with sub-contractor/ market.

(v) Statement Showing "Make or Buy for Products P, Q, R"

| | P (₹) | Q (₹) | R (₹) |
|--|----------|----------|----------|
| Sub-Contractor/ Buy Price | 21.36 | 24.00 | 48.00 |
| <i>Less:</i> Variable Manufacturing Cost | 15.60 | 18.72 | 39.60 |
| Saving in Cost | 5.76 | 5.28 | 8.40 |
| Saving in Cost <i>per machine hour</i> | 4.8 | 4.4 | 4.20 |
| Ranking | I | II | III |

(vi) Statement Showing "Best Product Mix"

| Product | units | Machine Hour/ Unit | Total Machine Hours |
|-------------|----------|--------------------|---------------------|
| S | 99,000 | 1.8 | 1,78,200 |
| P | 1,20,000 | 1.2 | 1,44,000 |
| Q | 1,86,000 | 1.2 | 2,23,200 |
| R (Balance) | 1,34,800 | 2.0 | 2,69,600 |
| Total | | | 8,15,000 |

Balance quantity of R to be purchased 36,200 units (1,71,000 – 1,34,800).

(vii) Profitability Statement

| Product | No of Units | Contribution/unit (₹) | Total Cont. (₹) |
|------------------------------|-------------|---------------------------|--------------------|
| P (Mfg) | 1,20,000 | 8.28 | 9,93,600 |
| Q (Mfg) | 1,86,000 | 9.96 | 18,52,560 |
| R (Mfg) | 1,34,800 | 15.48 | 20,86,704 |
| R (Buy) | 36,200 | 7.08 (₹55.08 - ₹48.00) | 2,56,296 |
| S (Mfg) | 99,000 | 14.40 | 14,25,600 |
| Total Contribution | | | 66,14,760 |
| <i>Less:</i> Fixed Overheads | | | 46,84,000 |
| Net Profit | | | 19,30,760 |

Problem-31

Aditya Ltd. manufactures four products A-1, B-2, C-3 and D-4 in Gurgaon and one product F-1 in Faridabad. Aditya Ltd. operates under Just-in-time (JIT) principle and does not hold any inventory of either finished goods or raw materials.

Company has entered into an agreement with M Ltd. to supply 10,000 units per month of each product produced from Gurgaon unit at a contracted price. Aditya Ltd. is bound to supply these contracted units to M Ltd. without any fail. Following are the details related with non contracted units of Gurgaon unit.

(Amount in ₹)

| | A-1 | B-2 | C-3 | D-4 |
|---|---------|---------|---------|---------|
| Selling Price per unit | 360.00 | 285.00 | 290.00 | 210.00 |
| Direct Labour @ ₹ 45 per hour | 112.50 | 67.50 | 135.00 | 67.50 |
| Direct Material M-1 @ ₹ 50 per kg. | 50.00 | 100.00 | --- | 75.00 |
| Direct Material M-2 @ ₹ 30 per litre. | 90.00 | 45.00 | 60.00 | --- |
| Variable Overhead (varies with labour hrs) | 12.50 | 7.50 | 15.00 | 7.50 |
| Variable Overhead (varies with machine hrs) | 9.00 | 12.00 | 9.00 | 15.00 |
| Total Variable Cost | 274.00 | 232.00 | 219.00 | 165.00 |
| Machine Hours per unit | 3 hours | 4 hours | 3 hours | 5 hours |
| Maximum Demand per month (units) | 90,000 | 95,000 | 80,000 | 75,000 |

The products manufactured in Gurgaon unit use direct material M-1 and M-2 but product F-1 produced in Faridabad unit is made by a distinct raw material Z. Material Z is purchased from the outside market at ₹ 200.00 per unit. One unit of F-1 requires one unit of material Z.

Material Z can also be manufactured at Gurgaon unit but for this 2 hours of direct labour, 3 hours of machine time and 2.5 litres of material M-2 will be required.

The Purchase manager has reported to the production manager that material M-1 and M-2 are in short supply in the market and only 6,50,000 Kg. of M-1 and 6,00,000 litre of M-2 can be purchased in a month.

Required

- (i) Calculate whether Aditya Ltd. should manufacture material Z in Gurgaon unit or continue to purchase it from the market and manufacture it in Faridabad unit.
- (ii) Calculate the optimum monthly usage of Gurgaon unit's available resources and make decision accordingly.
- (iii) Calculate the purchase price of material Z at which your decision in (i) can be sustained.

 Solution

(i) Manufacturing Cost of Material Z, if Manufactured in Gurgaon unit

| | Amount (₹) |
|--|---------------|
| Direct Labour (2 hours × ₹45) | 90.00 |
| Direct Material M-2 (2.5 litre × ₹30) | 75.00 |
| Variable Overhead, Varies with Labour Hours (2hours × ₹5) | 10.00 |
| Variable Overhead, Varies with Machine Hours (3hours × ₹3) | 9.00 |
| Total Variable Cost | 184.00 |

The purchasing cost of material Z from the outside market is ₹200, which is more than the cost to manufacture it in Gurgaon unit. Hence, it will be beneficial for the Aditya Ltd. to manufacture material Z in Gurgaon unit itself.

(ii) Monthly Requirement of Direct Material M-1 & M-2

For Contracted units

| | A-1 | B-2 | C-3 | D-4 | Total |
|---|--------|--------|--------|--------|--------|
| Units to be Supplied to M Ltd. (units) | 10,000 | 10,000 | 10,000 | 10,000 | 40,000 |
| Direct Material M-1 (in Kg) [W.N.-1] | 10,000 | 20,000 | --- | 15,000 | 45,000 |
| Direct Material M-2 (in Litre) [W.N.-2] | 30,000 | 15,000 | 20,000 | --- | 65,000 |

For Non-Contracted units

| | A-1 | B-2 | C-3 | D-4 | Total |
|---|----------|----------|----------|----------|----------|
| Demand in Outside Market (units) | 90,000 | 95,000 | 80,000 | 75,000 | 3,40,000 |
| Direct Material M-1 (in Kg) [W.N.-1] | 90,000 | 1,90,000 | --- | 1,12,500 | 3,92,500 |
| Direct Material M-2 (in Litre) [W.N.-2] | 2,70,000 | 1,42,500 | 1,60,000 | --- | 5,72,500 |

Availability and Demand Comparison

| | Direct Material M-1 (in Kg) | Direct Material M-2 (in Litre) |
|------------------------|--------------------------------|-----------------------------------|
| Availability in Market | 6,50,000 | 6,00,000 |
| Requirement | 4,37,500 (45,000+3,92,500) | 6,37,500 (65,000+5,72,500) |

Material M-2 is a limiting factor as its availability is less than its requirement to produce contracted as well as for non-contracted units.

To optimum usage of resources available in Gurgaon unit, prioritisation of production of products is necessary. The following is the comparison table of product A-1, B-2, C-3 and Z. Product D-4 is not taken into comparison as material M-2 is not required to produce product D-4.

Calculation of Contribution per litre of M-2

| | A-1 | B-2 | C-3 | Z |
|--|---------|-----------|---------|-----------|
| Contribution <i>per unit</i> (W.N-3 & 4) | ₹ 86.00 | ₹ 53.00 | ₹ 71.00 | ₹ 16.00 |
| Quantity of Material M-2 <i>per unit</i> | 3 litre | 1.5 litre | 2 litre | 2.5 litre |
| Contribution <i>per litre</i> of M-2 | ₹ 28.67 | ₹ 35.33 | ₹ 35.50 | ₹ 6.40 |
| Rank | III | II | I | IV |

Since, contribution per unit of material Z is lowest as compared to other products consuming material M-2. *Material –Z cannot be manufactured under the given resource constraint. Hence only existing products of Gurgaon units should be manufactured.*

Optimum Production Plan

| Product | No. of Units | Quantity of M-2 Required (in Litre) | Balance Availability of M-2 (in Litre) |
|---------|--------------|--|---|
| C-3 | 90,000 | 1,80,000 (90,000 units × 2 litre) | 4,20,000 (6,00,000 – 1,80,000) |
| B-2 | 1,05,000 | 1,57,500 (1,05,000 units × 1.5 litre) | 2,62,500 (4,20,000 – 1,57,500) |
| A-1 | 87,500* | 2,62,500 (87,500 units × 3 litre) | 0 (2,62,500 – 2,62,500) |

(*) Units that can be produced with the help of available quantity of M-2 i.e. 2,62,500 litre.

- (iii) Decision in requirement (i) will be changed as material Z cannot be manufactured in Gurgaon unit as noted in requirement (ii). *The minimum purchase price of material Z at which decision taken in (i) above can be sustained* is calculated as below:

| | Amount (₹) |
|--|------------|
| Existing Purchase Price | 200.00 |
| Add: Market Price <i>to be increased by</i> [W.N.-5] | 55.68 |
| Total | 255.68 |

Working Notes

(1) Quantity of M-1 required per unit of production

| | A-1 | B-2 | D-4 |
|---------------------------------|------|------|--------|
| Cost per unit | ₹50 | ₹100 | ₹75 |
| Rate per Kg. | ₹50 | ₹50 | ₹50 |
| Quantity per unit of Production | 1Kg. | 2Kg. | 1.5Kg. |

(2) Quantity of M-2 required per unit of production

| | A-1 | B-2 | C-3 |
|---------------------------------|---------|-----------|---------|
| Cost of per unit | ₹90 | ₹45 | ₹60 |
| Rate per Kg. | ₹30 | ₹30 | ₹30 |
| Quantity per unit of Production | 3 litre | 1.5 litre | 2 litre |

(3) Contribution per unit (₹)

| | A-1 | B-2 | C-3 | D-4 |
|------------------------------|-----|-----|-----|-----|
| Selling Price per unit | 360 | 285 | 290 | 210 |
| Less: Variable Cost per unit | 274 | 232 | 219 | 165 |
| Contribution per unit | 86 | 53 | 71 | 45 |

(4) Contribution (Benefit) per unit of Material Z

| | (₹) |
|---------------------------|-----|
| Purchasing Cost per unit | 200 |
| Less: Cost of Manufacture | 184 |
| Contribution per unit | 16 |

- (5) The next best product to material Z is A-1 {as calculated in (ii) above} which has a contribution of ₹28.67 per litre of M-2 which is ₹22.27 (₹28.67 – ₹6.40) higher than the contribution per litre of M-2 for material Z. Material Z required 2.5 litre of M-2, therefore, purchase price of material Z would have to ₹55.68 (2.5 litre × ₹22.27) higher than the existing market price.

Problem-32

Jupiter Ltd, a 'Fast-Moving Consumer Goods (FMCG)' company intends to diversify the product line to achieve full utilisation of its plant capacity. As a result of considerable research made, the company has been able to develop a new product called 'EXE'.

'EXE' is packed in cans of 100 ml capacity and is sold to the wholesalers in cartons of 24 cans at ₹120 per carton. Since the company uses its spare capacity for the manufacture of 'EXE',

no additional fixed expenses will be incurred. However accountant has allocated a share of ₹1,12,500 per month as fixed expenses to be absorbed by 'EXE' as a fair share of the company's present fixed costs to the new product for costing purposes.

The company estimates the production and sale of 'EXE' at 1,50,000 cans per month and on this basis the following cost estimates (per carton) have been developed:

| | ₹ |
|-----------------------|-----------|
| Direct Materials..... | 54 |
| Direct Wages..... | 36 |
| All Overheads..... | <u>27</u> |
| Total Costs..... | 117 |

After a detailed market survey the economy is confident that the production and sales of 'EXE' can be increased to 1,75,000 cans per month and ultimately to 2,25,000 cans per month.

The company at present has a capacity for the manufacture of 1,50,000 empty cans and the cost of the empty cans if purchased from outside will result in a saving of 20% in material and 10% in other costs of 'EXE'. The price at which the outside firm is willing to supply the empty cans is ₹ 0.675 per empty can. If the company desires to manufacture empty cans in excess of 1,50,000 cans, a machine involving an additional fixed overhead of ₹ 7,500 per month will have to be installed.

Required

- (i) *State by showing your workings whether the company should make or buy the empty cans at each of the three volumes of production of 'EXE' namely, 1,50,000, 1,75,000 and 2,25,000 cans.*
- (ii) *At what volume of sales will it be economical for the company to install the additional equipment for the manufacture of empty cans?*
- (iii) *Evaluate the profitability on the sale of 'EXE' at each of the aforesaid three levels of output based on your decision and showing the cost of empty cans as a separate element of cost.*



Solution

- (i) If the company increases production to 1,75,000 cans of 'EXE', 1,50,000 empty cans should be manufactured and additional 25,000 cans should be purchased at ₹16,875 [Refer W.N. 5 & 6]

If the company increases production to 2,25,000 cans of 'EXE', 1,50,000 empty cans should be manufactured and additional 75,000 cans should be purchased at a cost of ₹ 50,625. [Refer W.N. 5 & 6]

2.79 Advanced Management Accounting

- (ii) Additional fixed overheads to be incurred on a new machine: ₹7,500 Savings per unit if empty *cans* are made instead of buying:

$$₹ 0.675 - ₹ 0.6375 = ₹ 0.0375$$

Minimum additional quantity of empty *cans* to be made to recover the additional fixed costs:

$$₹7,500 / ₹0.0375 = 2,00,000 \text{ empty } cans$$

Installation of the new machine for the manufacture of empty *cans* will be economical at production level of 3,50,000 *cans* per month.

- (iii) Evaluation of the Profitability on Sale of "EXE" at the 3 Levels.

| | Per <i>can</i> (₹) | 1,50,000 <i>can</i> (₹) | 1,75,000 <i>can</i> (₹) | 2,25,000 <i>can</i> (₹) |
|----------------------------|-----------------------|----------------------------|----------------------------|----------------------------|
| Sales | 5.0000 | 7,50,000.00 | 8,75,000.00 | 11,25,000.00 |
| Less: Direct Material | 1.8000 | 2,70,000.00 | 3,15,000.00 | 4,05,000.00 |
| Direct Wages | 1.3500 | 2,02,500.00 | 2,36,250.00 | 3,03,750.00 |
| Variable Overheads | 0.3375 | 50,625.00 | 59,062.50 | 75,937.50 |
| Empty <i>can</i> made | 0.6375 | 95,625.00 | 95,625.00 | 95,625.00 |
| Empty <i>can</i> purchases | 0.6750 | | 16,875.00 | 50,625.00 |
| Net Gain | | 1,31,250.00 | 1,52,187.50 | 1,94,062.50 |

Workings

- | | |
|--|----------|
| (1) All Overheads for one carton or 24 <i>cans</i> | ₹27 |
| Therefore, per <i>can</i> Overheads (₹27/24) | 1.125 |
| Fixed Overheads Allocated for 1,50,000 <i>cans</i> | ₹112,500 |
| Per <i>can</i> Fixed Overheads (₹1,12,500 / 1,50,000 <i>cans</i>) | ₹0.75 |
| Variable Overheads per <i>can</i> (₹1.125 – ₹0.75) | ₹0.375 |
| (2) Direct Wage per carton | ₹36 |
| Per <i>can</i> (₹36 / 24) | ₹1.50 |
| (3) Direct Materials per carton | ₹ 54 |
| Per <i>can</i> (₹54 / 24) | ₹2.25 |

(4) Cost of making one empty *can*:

| | Cost per <i>can</i> of 'EXE' (₹) | Cost % empty <i>can</i> | Cost empty <i>can</i> (₹) | Cost of per <i>can</i> of 'EXE' without empty <i>can</i> (₹) |
|--------------------|----------------------------------|-------------------------|---------------------------|--|
| Direct Material | 2.250 | 20 | 0.4500 | 1.8000 |
| Direct Wages | 1.500 | 10 | 0.1500 | 1.3500 |
| Variable Overheads | 0.375 | 10 | 0.0375 | 0.3375 |
| Total | 4.125 | | 0.6375 | 3.4875 |

(5) Cost of manufacturing/buying of 1,50,000 empty *cans* of 'EXE':

| | Empty <i>can</i> Cost (₹) | If empty <i>can</i> made (₹) | If empty <i>can</i> purchased (₹) |
|--------------------|---------------------------|------------------------------|-----------------------------------|
| Direct Material | 0.4500 | 67,500.00 | ----- |
| Direct Wages | 0.1500 | 22,500.00 | ----- |
| Variable Overheads | 0.0375 | 5,625.00 | ----- |
| Purchase Price | 0.6750 | ----- | 1,01,250.00 |
| Total | | 95,625.00 | 1,01,250.00 |

Company should manufacture the empty *cans* for a production volume of 1,50,000 'EXE' *cans* as capacity is available and cost of manufacture is lower.

(6) After the level of 1,50,000 empty *cans*, the company has to install a new machine involving a total additional Fixed Overheads of ₹ 7,500. The cost of making and buying the additional *cans* of 25,000 and 75,000 will be as follows:

| | Cost per <i>can</i> (₹) | Make (₹) | Buy (₹) | Make (₹) | Buy (₹) |
|----------------------|-------------------------|--------------------|-----------|--------------------|-----------|
| | | 25,000 <i>cans</i> | | 75,000 <i>cans</i> | |
| Direct Material | 0.4500 | 11,250.00 | ----- | 33,750.00 | ----- |
| Direct Wages | 0.1500 | 3,750.00 | ----- | 11,250.00 | ----- |
| Variable Overheads | 0.0375 | 937.50 | ----- | 2,812.50 | ----- |
| Additional Overheads | | 7,500.00 | ----- | 7,500.00 | ----- |
| Purchase Price | 0.6750 | ----- | 16,875.00 | ----- | 50,625.00 |
| Total | | 23,437.50 | 16,875.00 | 55,312.50 | 50,625.00 |

The cost of buying additional empty *cans* at both the levels is lower than the cost of their manufacture.

Determination of Production Mix / Production Planning

Problem-33

A company is producing three products X, Y & Z. Relevant information is given below:

| Product | X | Y | Z |
|----------------------------------|-------|-------|-----|
| Raw material per unit (kg) | 20 | 12 | 30 |
| Machine hours per unit (hours) | 3 | 5 | 4 |
| Selling price per unit (₹) | 500 | 400 | 800 |
| Maximum limit of production Unit | 1,500 | 1,500 | 750 |

Only 9,200 hours are available for production at a cost of ₹20 per hour and maximum 50,000 kgs. of material @ ₹ 20 per kg., can be obtained.

(Only product mix quantities are to be shown, calculation of total profit at that product mix not required to be shown)

Required

On the basis of the above information determine the product-mix to give the highest profit if at least two products are produced.

Solution

Computation of Contribution per Key Factor(s) for Various Products

| Particulars | Products | | |
|-------------------------------|-----------------------|-----------------------|-----------------------|
| | X | Y | Z |
| Selling Price p. u. (₹) | 500 | 400 | 800 |
| Variable Cost p. u. (₹): | | | |
| Material | 400 (₹20 × 20 Kg.) | 240 (₹20 × 12 Kg.) | 600 (₹20 × 30 Kg.) |
| Machine Charge | 60 (₹20 × 3 hrs) | 100 (₹ 20 × 5 hrs) | 80 (₹20 × 4 hrs) |
| Total Variable Cost p. u. (₹) | 460 | 340 | 680 |
| Contribution p. u. (₹) | 40 | 60 | 120 |
| Ranking | III | II | I |
| Requirement of Material (Kg.) | 20 | 12 | 30 |

| | | | |
|-------------------------------------|-------|-------|-------|
| Contribution per Kg.(₹) | 2.00 | 5.00 | 4.00 |
| Ranking | III | I | II |
| Requirement of Machine Hours (Hrs.) | 3 | 5 | 4 |
| Contribution <i>per hour</i> (₹) | 13.33 | 12.00 | 30.00 |
| Ranking | II | III | I |

It is clear from the above ranking(s):-

- I. Contribution per Unit is maximum in case of product Y & Z.
- II. Contribution per Kg. of Raw Material also maximum in case of product Y & Z.
- III. Contribution per Machine Hour is maximum in case of product X & Z.

So product Z is common in all cases and priority shall be given for production of 'Z'. Balance resources should be divided between other two products X & Y.

Statement Showing Balance Resources for Product X & Y

| Resources | Maximum Availability (a) | Maximum Production Z (b) | Consumption of Resources p.u. (c) | Total Cons. (d) = (b) x (c) | Balance (a) - (d) |
|--------------|--------------------------|--------------------------|-----------------------------------|-----------------------------|-------------------|
| Material | 50,000 Kg. | 750 | 30 Kg. | 22,500 Kg. | 27,500 Kg. |
| Machine Hrs. | 9,200 Hrs. | 750 | 4 Hrs. | 3,000 Hrs. | 6,200 Hrs. |

The production of X & Y may be calculated with the help of following equations by utilizing balance resources: -

$$20X + 12Y = 27,500 \dots(i)$$

$$3X + 5Y = 6,200 \dots(ii)$$

Then,

$$\begin{array}{r} 30X + 18Y = 41,250 \\ \dots \text{equation (i) multiplied by 1.5} \end{array}$$

$$\begin{array}{r} 30X + 50Y = 62,000 \\ \dots \text{equation (ii) multiplied by 10} \end{array}$$

$$\begin{array}{r} - \quad - \quad - \\ -32Y = -20,750 \\ Y = 648.43 \text{ i.e. } 648 \text{ units} \end{array}$$

Putting the value of Y in equation (ii)

$$3X + (5 \times 648) = 6,200$$

Or $3X = 2,960$

Or $X = 986 \text{ units}$

2.83 Advanced Management Accounting

So the of Product Mix is

$$\begin{aligned} X &= 986 \text{ units} \\ Y &= 648 \text{ units} \\ Z &= 750 \text{ units} \end{aligned}$$

Problem-34

An agro-products producer company is planning its production for next year. The following information is relating to the current year:

| Products/Corps | A ₁ | A ₂ | B ₁ | B ₂ |
|----------------------------|----------------|----------------|----------------|----------------|
| Area occupied (acres) | 250 | 200 | 300 | 250 |
| Yield per acre (ton) | 50 | 40 | 45 | 60 |
| Selling price per ton (₹) | 200 | 250 | 300 | 270 |
| Variable cost per acre (₹) | | | | |
| Seeds | 300 | 250 | 450 | 400 |
| Pesticides | 150 | 200 | 300 | 250 |
| Fertilizers | 125 | 75 | 100 | 125 |
| Cultivations | 125 | 75 | 100 | 125 |
| Direct wages | 4,000 | 4,500 | 5,000 | 5,700 |

Fixed overhead per annum ₹ 53,76,000.

The land that is being used for the production of B₁ and B₂ can be used for either crop, but not for A₁ and A₂. The land that is being used for A₁ and A₂ can be used for either crop, but not for B₁ and B₂. In order to provide adequate market service, the company must produce each year at least 2,000 tons each of A₁ and A₂ and 1,800 tons each of B₁ and B₂.

Required

- (i) Prepare a statement of the profit for the current year.
- (ii) Profit for the production mix by fulfilling market commitment.
- (iii) Assuming that the land could be cultivated to produce any of the four products and there was no market commitment, calculate: Profit amount of most profitable crop and break-even point of most profitable crop in terms of acres and sales value.

 Solution
(i) Calculation of Selling Price and Contribution *per acre*

| Products | A ₁ | A ₂ | B ₁ | B ₂ | Total |
|------------------------------------|----------------|----------------|----------------|----------------|-----------|
| Yield <i>per acre</i> (tones) | 50 | 40 | 45 | 60 | |
| Selling Price <i>per tones</i> (₹) | 200 | 250 | 300 | 270 | |
| Sales Revenue <i>per acre</i> | ₹10,000 | ₹10,000 | ₹13,500 | ₹16,200 | |
| Variable Cost <i>per acre</i> (₹) | 4,700 | 5,100 | 5,950 | 6,600 | |
| Contribution <i>per acre</i> (₹) | 5,300 | 4,900 | 7,550 | 9,600 | |
| Area (Acres) | 250 | 200 | 300 | 250 | |
| Total Contribution (₹) | 13,25,000 | 9,80,000 | 22,65,000 | 24,00,000 | 69,70,000 |
| Less: Fixed Cost | | | | | 53,76,000 |
| Profit (₹) | | | | | 15,94,000 |

(ii) Profit Statement for Recommended Mix

| Products | A ₁ | A ₂ | B ₁ | B ₂ | Total |
|---|----------------|------------------|------------------|----------------|-----------|
| Contribution <i>per acre</i> | 5,300 | 4,900 | 7,550 | 9,600 | |
| Rank | 1 | 2 | 2 | 1 | |
| Minimum Sales Requirement <i>in acres</i> | | 50 [2,000/40] | 40 [1,800/45] | | |
| Recommended Mix <i>in acres</i> | 400 | 50 | 40 | 510 | |
| Total Contribution (₹) | 21,20,000 | 2,45,000 | 3,02,000 | 48,96,000 | 75,63,000 |
| Less: Fixed Cost | | | | | 53,76,000 |
| Profit | | | | | 21,87,000 |

(iii) Most Profitable Crop: Production should be concentrated on B₂ which gives highest contribution *per acres* – ₹9,600.

| | |
|---|------------|
| Overall Contribution if - Complete land is used for B ₂ (1,000 × ₹9,600) | ₹96,00,000 |
| Less: Fixed Cost | ₹53,76,000 |
| Profit | ₹42,24,000 |

$$\begin{aligned} \text{Break-even Point in acres for B}_2 &= ₹53,76,000 \div ₹9,600 \\ &= 560 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Break-even Point in sales value} &= 560 \text{ acres} \times (\text{₹}270 \times 60 \text{ tones}) \\ &= ₹90,72,000 \end{aligned}$$

Problem-35

A company manufactures and sells a product, the price of which is controlled by the Government. Raw material required for this product is also made available at a fixed controlled price. The following figures have been called for the previous two accounting years of the company:

| | Year- I | Year- II |
|--|----------|----------|
| Quantity Sold (tones) | 1,26,000 | 1,44,000 |
| Price per tone | ₹ 185 | ₹ 185 |
| (₹ In thousands) | | |
| Sales Value | 23,310 | 26,640 |
| Raw Materials | 11,340 | 12,960 |
| Direct Labour | 1,512 | 1,872 |
| Factory, Administration and Selling Expenses | 9,702 | 11,232 |
| Profit | 756 | 576 |

During the year II direct labour rates increased by $8\frac{1}{3}\%$. Increases in factory, administration and selling expenses during the year were ₹ 8,10,000 on account of factors other than the increased quantities produced and sold.

Required

The managing director desires to know, what quantity if they had produced and sold would have given the company the same net profit per tonne in Year II as it earned during the Year I. Advise him.

**Solution**

| | (₹) |
|---|--------|
| Sales Price | 185.00 |
| Variable Cost: | |
| Material (W.N.-1) | 90.00 |
| Labour (W.N.-2) | 13.00 |
| Variable Overhead (W.N.-3) | 40.00 |
| Contribution per tonne | 42.00 |
| Profit Required (₹7,56,000 / 1,26,000 tonnes) | 6.00 |

| | |
|---|-----------|
| Balance Contribution <i>per tonne</i> for meeting Fixed Costs | 36.00 |
| Fixed Costs (W.N.-4) | 54,72,000 |
| Quantity Required in tonnes ($\text{₹}54,72,000 \div \text{₹}36$) | 1,52,000 |

Working Notes

| | |
|--|-------------------|
| 1. Materials Cost <i>per tonne</i> in Year II $\left(\frac{\text{₹}1,29,60,000}{1,44,000\text{tonnes}} \right)$ | ₹90 |
| 2. Labour Cost <i>per tonne</i> in Year II $\left(\frac{\text{₹}18,72,000}{1,44,000\text{tonnes}} \right)$ | ₹13 |
| 3. Variable portion of Factory, Administration and Sell. Expenditure, etc | ₹ |
| Total in Year II | 1,12,32,000 |
| Increase <i>otherwise than on account of increased turnover</i> | <u>8,10,000</u> |
| | 1,04,22,000 |
| Amount Spent in Year I | <u>97,02,000</u> |
| Increase | 7,20,000 |
| Increase in Quantity Sold | 18,000 tonnes |
| Variable Expenses <i>per tonne</i> $\left(\frac{\text{₹}7,20,000}{18,000\text{tonnes}} \right)$ | ₹40 |
| 4. Fixed portion of Factory, Administration and Selling Expenses (Yr. 2) | ₹1,12,32,000 |
| Variable Expenses @ ₹ 40 <i>per tonne</i> | <u>₹57,60,000</u> |
| Fixed Portion | ₹54,72,000 |

Problem-36

Fairbilt Furniture Ltd. manufactures three products: Tables, Chairs and Cabinets. The company is in the process of finalizing the plans for the coming year; hence the executives thought it would be prudent to have a look at the product-wise performance during the current year. The following information is furnished:

| | Tables | Chairs | Cabinets |
|--------------------|--------|--------|----------|
| Unit Selling Price | 80 | 60 | 36 |
| Direct Material | 28 | 24 | 16 |
| Direct Labour | 20 | 12 | 12 |

2.87 Advanced Management Accounting

| | | | |
|---|--------|--------|----------|
| <i>Factory Overheads:</i> | | | |
| <i>Variable</i> | 8 | 6 | 4 |
| <i>Fixed</i> | 8 | 6 | 1.28 |
| <i>Selling, Distribution and General Administration Expenses:</i> | | | |
| <i>Variable</i> | 4 | 2 | 2 |
| <i>Fixed</i> | 4 | 6 | 1.52 |
| <i>Unit Cost</i> | 72 | 56 | 36.80 |
| <i>Unit Profit / (Loss)</i> | 8 | 4 | (0.80) |
| <i>Sales Volume (units)</i> | 10,000 | 15,000 | 15,000 |
| <i>Profit / (Loss)</i> | 80,000 | 60,000 | (12,000) |

For the coming period, the selling prices and the cost of three products are expected to remain unchanged. There will be an increase in the sales of tables by 1,000 units and the increase in sales of cabinets is expected to be 8,000 units. The sales of chairs will remain to be unchanged. Sufficient additional capacity exists to enable the increased demands to be met without incurring additional fixed costs. Some among the executives contend that it will be unwise to go for additional production and sale of cabinets, since it is already making losses at ₹ 0.80 per unit. The suggestion is that cabinets should be eliminated altogether.

Required

Do you agree? Substantiate with necessary analysis and determine the product wise and overall profits for the coming year.

 **Solution**

Note

Reconciliation of the figures given for 'Cabinets' reveals the fact that the Selling Price is ₹36 (₹36.80 – ₹0.80)

Fairbilt Furniture Ltd.
Statement Showing "Product-wise Contribution and Total Profit"

| Particulars | Tables | | Chairs | | Cabinets | | Total |
|----------------------|----------|---------|----------|---------|----------|---------|-----------|
| | Per Unit | Total | Per Unit | Total | Per Unit | Total | |
| Sales Volume (units) | | 10,000 | | 15,000 | | 15,000 | |
| Selling Price (₹) | 80 | 800,000 | 60 | 900,000 | 36 | 540,000 | 22,40,000 |

| | | | | | | | |
|--|----|---------|----|---------|----|---------|---------|
| Direct Material | 28 | 280,000 | 24 | 360,000 | 16 | 240,000 | 880,000 |
| Direct Labour | 20 | 200,000 | 12 | 180,000 | 12 | 180,000 | 560,000 |
| Variable Factory Overheads | 8 | 80,000 | 6 | 90,000 | 4 | 60,000 | 230,000 |
| Variable Selling, Distribution and Administration Overhead | 4 | 40,000 | 2 | 30,000 | 2 | 30,000 | 100,000 |
| Contribution | 20 | 200,000 | 16 | 240,000 | 2 | 30,000 | 470,000 |
| Fixed Factory Overheads | | 80,000 | | 90,000 | | 19,200 | 189,200 |
| Fixed Selling, Distribution and Administration Overheads | | 40,000 | | 90,000 | | 22,800 | 152,800 |
| Total Profit | | | | | | | 128,000 |

The above analysis shows the cabinets make a contribution of ₹2 per unit. The loss sustained in the previous year is because of the falling sales volume below breakeven level.

Fairbilt Furniture Ltd.
Budgeted Performance for the Coming Year

| | Tables | Chairs | Cabinets |
|------------------------|---------|---------|----------|
| Unit Contribution (₹) | 20 | 16 | 2 |
| Sales Volume (units) | 11,000 | 15,000 | 23,000 |
| Total Contribution (₹) | 220,000 | 240,000 | 46,000 |
| Less: Fixed Cost (₹) | 120,000 | 180,000 | 42,000 |
| Profit (₹) | 100,000 | 60,000 | 4,000 |

The company makes a total profit of ₹164,000 if all the products are continued. However, if the production of cabinets is discontinued, there will be an adverse effect on the overall profit of the company. This is because cabinets also contribute toward meeting the fixed costs of the company.

Problem-37

Jaya-Surya Ltd. (JSL) manufactures and sells two products 'Jaya' and 'Surya'. Both Jaya and Surya use a regular machine while Surya uses another high-precision machine as well. The following information is available for the next quarter.

| | Jaya | Surya |
|--|-------|-------|
| Selling Price per unit (₹) | 1,500 | 2,000 |
| Variable Manufacturing Cost per unit (₹) | 900 | 1,600 |
| Variable Marketing Cost per unit (₹) | 250 | 150 |

2.89 Advanced Management Accounting

| | | |
|---|-----------|-----------|
| Budgeted Allocation of Fixed Overhead Costs (₹) | 18,00,000 | 85,00,000 |
| Regular Machine Hours per unit | 2.0 | 1.0 |

Further information is available as follows:

- JSL faces a capacity constraint of 60,000 hours on the regular machine for the next quarter and there is no constraint on the high precision machine for the next quarter.
- Out of ₹ 85,00,000 budgeted allocation of fixed overhead costs to product Surya, ₹ 60,00,000 is payable for hiring the high precision machine. This cost is charged entirely to product Surya. The hiring agreement can be cancelled at any time without penalties.
- All other overhead costs are fixed and cannot be changed.
- A minimum quantity of 12,500 units per quarter of Jaya must be produced to fulfill a commitment to a customer.
- Any quantity of any product can be sold at the given prices.

Required

- (i) Calculate the product mix of Jaya and Surya which would maximise the relevant operating profit of JSL in the next quarter.
- (ii) JSL can double the quarterly capacity of regular machine at a cost of ₹ 28,00,000. Calculate the new product mix and the amount by which the relevant operating profit will increase.



Solution

- (i) Calculation of Contribution Margin *per machine hour*

| | Jaya (₹) | Surya (₹) |
|---|----------|-----------|
| Selling Price <i>per unit</i> | 1,500 | 2,000 |
| Less: Variable Manufacturing Cost <i>per unit</i> | (900) | (1,600) |
| Less: Variable Marketing Cost <i>per unit</i> | (250) | (150) |
| Contribution Margin <i>per unit</i> | 350 | 250 |
| Number of Regular Machine Hours | 2.0 | 1.0 |
| Contribution Margin <i>per machine hour</i> | 175 | 250 |
| Ranking | II | I |

Based on the ranking above, manufacturing preference will be given to Surya but after the committed production of 12,500 units of Jaya.

Since to manufacture Surya, a hiring cost of ₹ 60,00,000 is also paid for high precision

machine, so the result obtained through the above ranking may not be beneficial. For this purpose we solve this problem taking two options.

Option 1: 12,500 units of Jaya and 35,000* units of Surya:

*[60,000 hours – (12,500 units of Jaya × 2 hours) ÷ 1 hour to produce one unit of Surya]

| | Amount (₹) |
|---|-------------|
| Contribution Margin on Jaya (12,500 units × ₹ 350) | 43,75,000 |
| Contribution Margin on Surya (35,000 units × ₹ 250) | 87,50,000 |
| Total Contribution Margin | 1,31,25,000 |
| Less: Hire Charges on High Precision Machine | (60,00,000) |
| Net Relevant Contribution | 71,25,000 |

Option 2: Produce only Jaya i.e. 30,000 units :

Contribution Margin / Net Relevant Contribution (30,000 units × ₹ 350) = ₹ 1,05,00,000

Even though Surya has the higher contribution margin per machine hour but net relevant contribution option 1 is lower than the option 2. Hence, JSL should produce 30,000 units of Jaya only to earn more profit.

- (ii) Based on the above ranking, if preference is given to production of Surya after the production of committed units of Jaya i.e. 12,500 units of Jaya and 95,000 units of Surya.

Option 1: 12,500 units of Jaya and 95,000* units of Surya:

*[1,20,000 hours – (12,500 units of Jaya × 2 hours) ÷ 1 hour to produce one unit of Surya]

| | Amount (₹) |
|---|-------------|
| Contribution Margin on Jaya (12,500 units × ₹ 350) | 43,75,000 |
| Contribution Margin on Surya (95,000 units × ₹ 250) | 2,37,50,000 |
| Total Contribution Margin | 2,81,25,000 |
| Less: Hire Charges on High Precision Machine | (60,00,000) |
| Less: Capacity Enhancement Cost | (28,00,000) |
| Net Relevant Contribution | 1,93,25,000 |

Option 2: Produce only Jaya i.e. 60,000 units:

| | Amount (₹) |
|--|-------------|
| Contribution Margin (60,000 units × ₹ 350) | 2,10,00,000 |
| Less: Capacity Enhancement Cost | (28,00,000) |
| Net Relevant Contribution | 1,82,00,000 |

2.91 Advanced Management Accounting

When capacity of the regular machine is doubled, the optimum product mix will be 12,500 units of Jaya and 95,000 units of Surya.

Increase in operating profit will be ₹ 88,25,000 (₹ 1,93,25,000 – ₹ 1,05,00,000).



While calculating relevant contribution from the option 1 and option 2 in requirements (i) and (ii) above, the contribution from the 12,500 units of Jaya may also be ignored as this is same under the two options.

Problem-38

The following is the trading summary of a manufacturing concern which makes two products, X and Y.

Trading Summary For the 4 Months Period 30th April, 2013

| | X (₹) | | Y (₹) | | Total (₹) |
|------------------------|-------|--------|-------|-------|-----------|
| Sales | | 10,000 | | 4,000 | 14,000 |
| Less: Cost of Sales | | | | | |
| Direct Cost* | | | | | |
| Labour | 3,000 | | 1,000 | | |
| Materials | 1,500 | 4,500 | 1,000 | 2,000 | 6,500 |
| Indirect Costs | | | | | |
| Variable Expenses* | | 2,000 | | 1,000 | 3,000 |
| Fixed Expenses** | | | | | |
| Common to both X and Y | | 1,250 | | 1,250 | 2,500 |
| | | 2,250 | | (250) | 2,000 |

* These costs tend to vary in direct proportion to physical output.

** These costs tend to remain constant irrespective of the physical outputs of X and Y.

It has been the practice of the concern to allocate these costs equally between X and Y. The following proposals have been made by the Board of Directors for your consideration as financial adviser:

- (i) Discontinue Product -Y.
- (ii) As an alternative to (i), reduce the price of Y, by 20 per cent. It is estimated that the demand will then increase by 40 per cent.
- (iii) Double the price of X. (It is estimated that this will reduce the demand by the three fifths.)

Required

Recommend the proposals to be taken after evaluating each of these three proposals.

 **Solution**
Evaluation of the Proposals**(i) Profit Statement When Product Y is Discontinued**

In case Product Y is discontinued, Product X will also have to bear the Fixed Expenses previously borne by Product Y. The final position will be as follows:

| | |
|--------------------------------|---------|
| Existing Net Profit of X..... | ₹ 2,250 |
| Less: Fixed Expenses of Y..... | ₹ 1,250 |
| Final Net Profit..... | ₹ 1,000 |

(ii) Profit Statement When the Price of Y is Reduced by 20 per cent (It will result in 40% increase in Demand)

| | (₹) |
|--|-------|
| Sales ($₹4,000 \times \frac{80}{100} \times \frac{140}{100}$) | 4,480 |
| Less: Direct Costs ($₹2,000 + 40\%$ of ₹2,000) | 2,800 |
| Less: Indirect Costs- Variable Expenses ($₹1,000 + 40\%$ of ₹1,000) | 1,400 |
| Less: Fixed Expenses (Old) | 1,250 |
| Net Loss | (970) |
| Less: Profit of X (Old) | 2,250 |
| Final Net Profit | 1,280 |

(iii) Profit Statement When the Price of 'X' is Doubled (this will reduce the Demand by three-fifths or 60%)

| | (₹) |
|---|-------|
| Sales ($₹10,000 \times \frac{200}{100} \times \frac{2}{5}$) | 8,000 |
| Less: Direct Costs ($₹4,500 - 60\%$ of ₹4,500) | 1,800 |
| Less: Indirect Costs - Variable Expenses ($₹2,000 - 60\%$ of ₹2,000) | 800 |
| Contribution | 5,400 |
| Less: Fixes Expenses (Old) | 1,250 |
| Less: Net Loss of Y (Old) | 250 |
| Final Net Profit | 3,900 |

2.93 Advanced Management Accounting

The above analysis shows that the Net Profit is maximum under alternative (3) i.e. when the Price of X is doubled and the Demand reduces by three-fifths. This alternative will increase the present level of Net Profit from ₹2,000 to ₹3,900 for a four month period. It is, therefore, suggested that the concern should adopt alternative (3).

Problem-39

E Ltd. is engaged in the manufacturing of three products in its factory. The following budget estimates are prepared for 2014-15:

| | Products | | |
|--------------------------------------|----------|--------|--------|
| | A | B | C |
| Sales (units) | 10,000 | 25,000 | 20,000 |
| Selling Price per unit (₹) | 40 | 75 | 85 |
| Less: Direct Materials per unit (₹) | 10 | 14 | 18 |
| Direct Wages per unit @ ₹ 2 per hour | 8 | 12 | 10 |
| Variable Overhead per unit (₹) | 8 | 9 | 10 |
| Fixed Overhead per unit (₹) | 16 | 18 | 20 |
| Profit / Loss | (2) | 22 | 27 |

After the finalisation of the above manufacturing schedule, it is observed that presently only 80% capacity being utilised by these three products. The production activities are made at the same platform and it may be interchangeable among products according to requirement. In order to improve the profitability of the company the following three proposals are put for consideration:

- (a) Discontinue product A and capacity released may be used for either product B or C or equally shared. The fixed cost of product A is avoidable. Expected changes in material cost and selling price subject to the utilisation of product A's capacity are as under:

Product B: Material cost increased by 10% and selling price reduced by 2%.

Product C: Material cost increased by 5% and selling price reduced by 5%.

- (b) Discontinue product A and divert the capacity so released and the idle capacity to produce a new product D for meeting export demand whose per unit cost data are as follows:

| | (₹) |
|-----------------|-----|
| Selling Price | 60 |
| Direct Material | 28 |

| | |
|-----------------------------|----------|
| Direct Wages @ ₹ 3 per hour | 12 |
| Variable Overheads | 6 |
| Fixed Cost (Total) | 1,05,500 |

- (c) Product A, B and C are continuously run and hire out the idle capacity fixing a price in such a way that the same rate of profit per direct labour hour is obtained in the original budget estimates.

Required

- (i) Prepare a statement of profitability of products A, B and C in existing situation.
 (ii) Evaluate the above proposals independently and calculate the overall profitability of the company under each proposal.
 (iii) What proposal should be accepted, if the company wants to maximise its Profit?

 **Solution**

- (i) **Budgeted Profitability Statement under Existing Situation**

| | A (₹) | B (₹) | C (₹) | Total (₹) |
|---|----------|-----------|----------|-----------|
| Selling Price | 40 | 75 | 85 | |
| Less: Total Variable Costs (Direct Material + Direct Labour + Variable Overhead) | 26 | 35 | 38 | |
| Contribution | 14 | 40 | 47 | |
| Sales (units) | 10,000 | 25,000 | 20,000 | |
| Contribution (₹) | 1,40,000 | 10,00,000 | 9,40,000 | 20,80,000 |
| Less: Fixed Cost (₹) | 1,60,000 | 4,50,000 | 4,00,000 | 10,10,000 |
| Profit / Loss (₹) | (20,000) | 5,50,000 | 5,40,000 | 10,70,000 |

- (ii) **Proposal (a)**

Alternative use of A's Capacity for Product B or C or B & C Equally

Hours Released from Discontinuance of A 40,000 hours (10,000 units × 4hrs.)

| | Product B | Product C | B & C |
|----------------------|--|--|------------------------|
| No of Units Possible | 6,666 $\left(\frac{40,000\text{hrs.}}{6\text{hrs.}}\right)$ | 8,000 $\left(\frac{40,000\text{hrs.}}{5\text{hrs.}}\right)$ | B - 3,333 C - 4,000 |

Revised Contribution of Product B and Product C

| Particulars | B (₹) | C (₹) |
|------------------------------|-------|-------|
| Selling Price | 73.50 | 80.75 |
| <i>Less:</i> Direct Material | 15.40 | 18.90 |
| Direct Wages | 12.00 | 10.00 |
| Variable Overheads | 9.00 | 10.00 |
| Contribution | 37.10 | 41.85 |
| Number of Hours | 6 | 5 |
| Contribution <i>per hour</i> | 6.18 | 8.37 |

Decision

It is better to produce C.

Taking both changes in the selling price and material cost are for the entire production or the incremental production. Profitability is calculated below:

Proposal (a)

Profitability Statement if A's Capacity Utilized by C

| Particulars | Option-1 Changes for Entire Production (₹) | Option-2 Changes for Incremental Production (₹) |
|------------------------------|--|---|
| Sales Volume | 28,000 | 8,000 |
| Contribution <i>per unit</i> | 41.85 | 41.85 |
| Total Contribution | 11,71,800 | 3,34,800 |
| <i>Less:</i> Fixed Cost | 4,00,000 | --- |
| Profit | 7,71,800 | 3,34,800 |
| Existing Profit of B | 5,50,000 | 5,50,000 |
| Existing Profit of C | --- | 5,40,000 |
| Total Profit | 13,21,800 | 14,24,800 |

Proposal (b)

$$\begin{aligned} \text{Existing Capacity} &= 2,90,000 \text{ hrs.} \\ &= (4 \text{ hrs.} \times 10,000 \text{ units} + 6 \text{ hrs.} \times \\ &\quad 25,000 \text{ units} + 5 \text{ hrs.} \times 20,000 \text{ units}) \end{aligned}$$

$$\begin{aligned} \text{Idle Capacity} &= \left(2,90,000 \text{hrs.} \times \frac{20\%}{80\%} \right) \\ &= 72,500 \text{ hours} \\ \text{Capacity for Product 'D'} &= \text{Idle Capacity} + \text{A's Spare Capacity} \\ &= 72,500 \text{ hrs.} + 40,000 \text{ hrs.} \\ &= 1,12,500 \text{ hrs.} \\ \text{No. of units 'D' (Produced)} &= 28,125 \text{ units.} \left(\frac{1,12,500 \text{hrs.}}{4 \text{hrs.}} \right) \end{aligned}$$

Profitability Statement – Proposal (b)

| | D (₹) |
|---|-----------|
| Selling Price | 60 |
| <i>Less:</i> Variable Cost: Direct Material | 28 |
| Direct Wages | 12 |
| Variable Overheads | 6 |
| Contribution | 14 |
| Contribution Amount (28,125 units × ₹14) | 3,93,750 |
| <i>Less:</i> Fixed Cost | 1,05,500 |
| Profit | 2,88,250 |
| <i>Add:</i> Existing Profit of B & C | 10,90,000 |
| Total Profit | 13,78,250 |

Proposal (c) Hiring Out Idle Capacity

| Particulars | (₹) |
|--|-----------|
| Idle Hours | 72,500 |
| Existing Profit <i>per hour</i> (₹10,70,000 / 2,90,000 hrs.) | 3.69 |
| Revenue from Hire Out | 2,67,500 |
| Existing Profit | 10,70,000 |
| Total Profit | 13,37,500 |

Profit Summary of Alternatives (₹)

| Existing | Proposal (a) Option- 1 | Proposal (a) Option- 2 | Proposal (b) | Proposal (c) |
|-----------|---------------------------|---------------------------|--------------|--------------|
| 10,70,000 | 13,21,800 | 14,24,800 | 1,378,250 | 13,37,500 |

(iii) Decision on Option *on the basis of* Profitability

- (i) If price and cost under proposal (a) is for entire production of C: Proposal (b) of Export, should be accepted.
- (ii) If price and cost under proposal (a) is for incremental production C only: Proposal (a) – Option 2, should be accepted.

Problem-40

E Ltd. manufactures and sells four types of products under the brand names A, B, C and D. On a turnover of ₹ 30 crores in 2009, company earned a profit of 10% before interest and depreciation which are fixed. The details of product mix and other information are as follows:

| <i>Products</i> | <i>Mix% to Total Sales</i> | <i>PV Ratio (%)</i> | <i>Raw Material as % on Sales Value</i> |
|-----------------|--------------------------------|-------------------------|---|
| <i>A</i> | <i>30</i> | <i>20</i> | <i>35</i> |
| <i>B</i> | <i>10</i> | <i>30</i> | <i>40</i> |
| <i>C</i> | <i>20</i> | <i>40</i> | <i>50</i> |
| <i>D</i> | <i>40</i> | <i>10</i> | <i>60</i> |

Interest and depreciation amounted to ₹ 225 lakhs and ₹ 115.50 lakhs respectively. Due to increase in prices in the international market, the company anticipates that the cost of raw materials which are imported will increase by 10% during 2010. The company has been able to secure a license for the import of raw materials of a value of ₹ 1,535 lakhs at 2010 prices. In order to counteract the increase in costs of raw materials, the company is contemplating to revise its product mix. The market survey report indicates that the sales potential of each of the products: 'A', 'B' and 'C' can be increased upto 30% of total sales value of 2009. There was no inventory of finished goods or work in progress in both the year.

Required

Set an optimal product mix for 2010 and find the profitability.

 Solution

Revised P/V Ratio and Ranking of Products

| Product | Existing P/V Ratio (%) | Increase in Raw Material Cost as % of Sales Value | Revised P/V Ratio (%) | Revised Raw Material as % of Sale Value | Contribution per ₹ 100 of Raw Material (%) | Rank |
|---------|------------------------|---|-----------------------|---|--|------|
| A | 20 | 3.5 | 16.5 | 38.50 | 42.86% | III |
| B | 30 | 4 | 26 | 44.00 | 59.09% | II |
| C | 40 | 5 | 35 | 55.00 | 63.64% | I |
| D | 10 | 6 | 4 | 66.00 | 6.06% | IV |

Maximum Sales Potential (₹ in lakhs)

| | | |
|---|-------|------------------|
| A | 900 | (30 % of ₹3,000) |
| B | 900 | (30 % of ₹3,000) |
| C | 900 | (30 % of ₹3,000) |
| D | 1,200 | (40 % of ₹3,000) |

Allocation of Raw Material

(Supply is Restricted to ₹ 1,535 lacs in Order of Raw Material Profitability)

| Product | Rank | Sales (₹ in lakhs) | Raw Material per (₹ 100 lakhs Sales) | Raw Material Required | Balance Raw Material |
|---------|------|--------------------|--------------------------------------|-----------------------|----------------------|
| C | I | 900 | 55 | 495 | 1,040 |
| B | II | 900 | 44 | 396 | 644 |
| A | III | 900 | 38.5 | 346.5 | 297.5 |
| D | IV | 451** | 66 | 297.5* | 0 |

* Balancing figure, hence sales will be restricted to 451** lakhs [297.5 / 66%]

Profitability Statement

| Product | Existing (2009) (₹ in Lakhs) | | | Proposed (2010) (₹ in Lakhs) | | |
|---------|------------------------------|-----------|--------------|------------------------------|-----------|--------------|
| | Sales | P/V Ratio | Contribution | Sales | P/V Ratio | Contribution |
| A | 900 | 20 | 180 | 900 | 16.5 | 148.5 |
| B | 300 | 30 | 90 | 900 | 26 | 234 |
| C | 600 | 40 | 240 | 900 | 35 | 315 |

2.99 Advanced Management Accounting

| | | | | | | |
|---|-------|----|--------|---|---|--------|
| D | 1,200 | 10 | 120 | 451 | 4 | 18.04 |
| Less: Fixed Costs* | | | 330 | Less: Fixed Costs* | | 330 |
| Profit before Depreciation and Interest | | | 300 | Profit before Depreciation and Interest | | 385.54 |
| Less: Depreciation | | | 225 | Less: Depreciation | | 225.00 |
| Less: Interest | | | 115.5 | Less: Depreciation | | 115.50 |
| Profit before Tax | | | (40.5) | Profit before Tax | | 45.04 |

* Balancing Figure (Contribution – Profit before Depreciation & Interest)

The increase of contribution of ₹85.54 in 2010 will set off loss of ₹40.50 lakhs and result in profit of ₹ 45.04 lakhs.

Problem-41

V.C. Ltd. makes and sells two products, P and Q. The budgeted selling price of P is ₹ 1,800 and that of Q is ₹ 2,160. Variable costs associated with producing and selling the P are ₹ 900 and with Q ₹ 1,800. Annual fixed production and selling costs of V.C. Ltd. are ₹ 88,000.

The company has two production/ sales options. The P and Q can be sold either in the ratio of two P to three Q or in the ratio of one P to two Q.

Required

What will be the optimal mix and why?



Solution

Statement Showing "Contribution per unit"

| | Products | |
|-------------------------------------|----------|-------|
| | P | Q |
| Budgeted Selling Price per unit (₹) | 1,800 | 2,160 |
| Less: Variable Cost per unit (₹) | 900 | 1,800 |
| Contribution per unit (₹) | 900 | 360 |

Alternative-I

Production / Sales Option: 2 units of P and 3 units of Q

Total Contribution under 1st Option

$$\begin{aligned}
 &= 2 \text{ units} \times ₹ 900 + 3 \text{ units} \times ₹ 360 \\
 &= ₹1,800 + ₹1,080 \\
 &= ₹2,880
 \end{aligned}$$

Decision Making using Cost Concepts and CVP Analysis 2.100

$$\begin{aligned}
 \text{Break- even Point} &= \frac{\text{Annual Fixed Production \& Selling Costs}}{\text{Total Contribution under 1st Option}} \\
 &= \frac{\text{₹ 88,000}}{\text{₹ 2,880}} \\
 &= 30.56 \text{ (Set of 5 units each)}
 \end{aligned}$$

| | Products | | Total |
|---------------------------|--|--|---------------|
| | P | Q | |
| Break- even Point (units) | 61.12 units (30.56 × 2 units) <i>Or 61 units (approx.)</i> | 91.68 units (30.56 × 3 units) <i>Or 92 units (approx.)</i> | ₹ 3,08,520 |
| Break-even Sales (₹) | ₹1,09,800 (61 units × ₹1,800) | ₹ 1,98,720 (92 units × ₹ 2,160) | |

Alternative-II

Production / Sales Option: 1 unit of P and 2 units of Q

Total Contribution under 2nd Option

$$\begin{aligned}
 &= 1 \text{ unit} \times \text{₹ 900} + 2 \text{ units} \times \text{₹ 360} \\
 &= \text{₹ 900} + \text{₹ 720} \\
 &= \text{₹ 1,620}
 \end{aligned}$$

$$\text{Break-even point} = \frac{\text{₹ 88,000}}{\text{₹ 1,620}}$$

$$= 54.32 \text{ (Set of 3 units each)}$$

| | Products | | Total |
|--------------------------|--|--|------------|
| | P | Q | |
| Break-even Point (units) | 54 units (approx.) (54.32 × 1 unit) | 109 units (approx.) (54.32 × 2 units) | ₹ 3,32,640 |
| Break-even Sales (₹) | ₹97,200 (54 units × ₹ 1,800) | ₹2,35,440 (109 units × ₹ 2,160) | |

Note

The annual fixed production and selling cost given in the problem are such that it is not possible to determine the exact figure of break -even point under two options. As a result of

2.101 Advanced Management Accounting

the approximations made as above under option I, at break-even sales level there is over recovery of fixed, cost ₹20; whereas under option II there is an under recovery of fixed cost to the extent of ₹160.

Decision & Reasoning

The above computations disclose that Option I is preferable over Option II, as it results in a lower level of sales to reach break-even (because of higher average contribution per unit). The average contribution per unit under option I is ₹ 576 (₹ 2,880 / 5 units) while under option II it is ₹ 540 (₹ 1,620 / 3 units).

Problem-42

N.P. Ltd. produces two products P and Q. The draft budget for the next month is as under:

| | P | Q |
|--|--------|----------|
| <i>Budgeted Production and Sales (units)</i> | 40,000 | 80,000 |
| <i>Selling Price ₹ / unit</i> | 25 | 50 |
| <i>Total Costs ₹ / unit</i> | 20 | 40 |
| <i>Machine Hours / unit</i> | 2 | 1 |
| <i>Maximum Sales Potential (units)</i> | 60,000 | 1,00,000 |

The fixed expenses are estimated at ₹ 9,60,000 per month. The company absorbs fixed overheads on the basis of machine hours which are fully utilised by the budgeted production and cannot be further increased.

When the budget was discussed, the Managing Director stated that the product mix should be altered to yield optimum profit.

The Marketing Director suggested that he would introduce a new Product-C, each unit of which will take 1.5 machine hours. However, a processing vat involving a capital outlay of ₹ 2,00,000 is to be installed for processing Product -C. The additional fixed overheads relating to the processing vat was estimated at ₹ 60,000 per month. The variable cost of Product- C was estimated at ₹ 21 per Unit.

Required

- (i) Calculate the profit as per draft budget for the next month.*
- (ii) Revise the product mix based on data given for P and Q to yield optimum profit.*
- (iii) The company decides to discontinue either Product- P or Q whichever is giving lower profit and proposes to substitute Product- C instead. Fix the selling price of product- C in such a way as to yield 15% return on additional capital employed besides maintaining the same overall profit as envisaged in (ii) above.*

 Solution

(i) Profit as per Draft Budget for the Next Month

| | Products | | | | Total |
|-------------------------------|--------------|-----------|--------------|-----------|----------------|
| | P | | Q | | |
| Budgeted Production and Sales | 40,000 units | | 80,000 units | | 1,20,000 units |
| | Per Unit (₹) | Total (₹) | Per unit (₹) | Total (₹) | (₹) |
| Sales | 25 | 10,00,000 | 50 | 40,00,000 | 50,00,000 |
| Less: Total Costs | 20 | 8,00,000 | 40 | 32,00,000 | 40,00,000 |
| Profit | 5 | 2,00,000 | 10 | 8,00,000 | 10,00,000 |

(ii) Basic Calculations

| | | | |
|-----|--|---|-----------------|
| (a) | Machine Hrs. | P: 40,000 units × 2 hrs. Q: 80,000 units × 1 hr. | 1,60,000 hrs. |
| (b) | Fixed Overhead Rate <i>per machine hr.</i> | ₹9,60,000 / 1,60,000 hrs. | ₹6 |
| (c) | Fixed Overhead <i>per unit</i> | P: 2 hrs. × ₹6 Q: 1 hr. × ₹6 | ₹12 ₹6 |
| (d) | Contribution <i>per unit</i> | P: ₹12 + ₹5 Q: ₹6 + ₹10 | ₹17 ₹16 |
| (e) | Product-wise Contribution <i>per machine hr.</i> | P: ₹ 17/2hrs. Q: ₹16/1 hr. | ₹8.50 ₹16.00 |

Revised Product Mix to Yield Optimum Profit

Product Q has higher contribution per machine hour. Since machine hour is a limiting factor hence maximum units of product Q should be produced. However, maximum sales potentiality of Product Q is 1,00,000 units. This will take 1,00,000 machine hour. The balance 60,000 hours should be used to produce 30,000 units of P.

The Revised Product Mix to Yield Optimum Profit will be as follows-

| | |
|-----------------------------------|--------------------|
| Product Q (1,00,000 units × ₹ 16) | ₹ 16,00,000 |
| Product P (30,000 units × ₹ 17) | ₹ 5,10,000 |
| Total Contribution | ₹ 21,10,000 |

2.103 Advanced Management Accounting

| | |
|----------------------|-------------|
| Less: Fixed Expenses | ₹ 9,60,000 |
| Profit | ₹ 11,50,000 |

- (iii) Product - P gives lower contribution per machine hour, hence, it will be discontinued and Product - C will be manufactured in its place. The discontinuance of Product - P will make available 60,000 machine hours to produce 40,000 units of Product - C.

The computation of Selling Price of Product - C can be done as follows-

Computation of Selling Price of Product- C

| | (₹) |
|--|-----------|
| Variable Cost (40,000 units × ₹21) | 8,40,000 |
| Additional Fixed Cost <i>per month</i> | 60,000 |
| Return on Capital (₹2,00,000 × ₹1.25%) | 2,500 |
| Present Contribution from Product P | 5,10,000 |
| Total Sales Value <i>to be recovered</i> | 14,12,500 |
| Selling Price <i>per unit</i> of C (₹14,12,500 / 40,000 units) | 35.31 |

Problem-43

Venus Ltd. is engaged in the manufacture of four products in its factory. The production and sales volume is much lower than the normal volume and so there is a substantial unfavourable variance in the recovery of overheads. The sales and cost data for a year are as under:-

(₹ in lakhs)

| | A | B | C | D | Total |
|---------------------------|-----|-----|------|-----|-------|
| Sales | 400 | 500 | 200 | 100 | 1200 |
| Direct Materials | 64 | 70 | 32 | 7 | 173 |
| Direct Wages | 88 | 105 | 60 | 18 | 271 |
| Factory Overheads | 128 | 172 | 120 | 24 | 444 |
| Selling & Admn. Overheads | 80 | 100 | 40 | 20 | 240 |
| Profit / Loss | 40 | 53 | (52) | 31 | 72 |
| Unabsorbed Overheads | | | | | 48 |
| Net Profit | | | | | 24 |

50 percent of the factory overheads is variable at normal operating volume and the variable selling and administration overheads account for 5% of sales.

Of the total sales of product 'C' half of the volume is used in the market for applications in which product 'D' can be substituted. Thus if product 'C' is not available the sales of product 'D' can be increased by ₹ 100 lakhs without any change in the fixed selling expenses.

Of the total sales of product 'C' about 25% is sold in conjunction with product 'A'. The customers will not be able to substitute product 'D' and so the sales of product 'A' will be reduced by 12.5% of the present level if product 'C' is withdrawn.

In the event of total discontinuance of product 'C', the fixed factory and selling and administration overheads will be reduced by ₹ 20 lakhs. Alternatively if the production and sales of product 'C' is maintained to the extent of 25% of the present level as service to product 'A', there will be a reduction in the fixed costs to the extent of ₹ 10 lakhs.

Required

- (i) Prepare statements to show the financial implications of:
 - (a) Continuance of Product 'C'
 - (b) Total discontinuance of product 'C'
 - (c) Continuance of product 'C' only as service to customers using product 'A' whose business will otherwise be lost.
- (ii) Make your recommendations on the course of action to be taken by the company with such comments as you may like to offer.



Solution

- (i) (a) Workings

| Computation of Total Fixed Overheads | | (₹ in lakhs) |
|--------------------------------------|---------------------|--------------|
| Factory Overheads | | 444 |
| Less: 50% Variable | | 222 |
| | Balance Fixed...(A) | 222 |
| Selling & Administrative Overheads | | 240 |
| Less: 5% of Sales-Variable | | 60 |
| | Balance Fixed...(B) | 180 |
| Unabsorbed Overheads – Fixed | ...(C) | 48 |
| Total Fixed Overheads | ...(A) + (B) + (C) | 450 |

Financial Implications of Continuance of Product 'C'

(₹ in lakhs)

| | A | B | C | D | Total |
|---|-----|-----|-----|-----|-------|
| Sales | 400 | 500 | 200 | 100 | 1,200 |
| Direct Materials | 64 | 70 | 32 | 7 | 173 |
| Direct Wages | 88 | 105 | 60 | 18 | 271 |
| Variable Factory Overheads (50%) | 64 | 86 | 60 | 12 | 222 |
| Variable Selling & Admn. Overheads (5% of Sales) | 20 | 25 | 10 | 5 | 60 |
| Contribution | 164 | 214 | 38 | 58 | 474 |
| Fixed Overheads | | | | | 450 |
| Profit | | | | | 24 |

(b) Workings

| | |
|---|--------------|
| Savings in Fixed Overheads | = ₹20 lakhs |
| Hence Fixed Overheads (₹450 – ₹20) | = ₹430 lakhs |
| Sales of Product 'D' | = ₹200 lakhs |
| Reduction in Sales of Product 'A' by 12½% | = ₹50 lakhs |
| Thus Sale of Product 'A' | = ₹350 lakhs |

Financial Implications of Total Discontinuance of Product 'C'

(₹ in lakhs)

| | Products | | | |
|------------------------------------|----------|-----|-----|-------|
| | A | B | D | Total |
| Sales | 350 | 500 | 200 | 1,050 |
| Direct Materials | 56 | 70 | 14 | 140 |
| Direct Wages | 77 | 105 | 36 | 218 |
| Factory Overheads Variable | 56 | 86 | 24 | 166 |
| Selling & Admn. Overheads Variable | 17.5 | 25 | 10 | 52.5 |
| Contribution | 143.5 | 214 | 116 | 473.5 |
| Fixed Overheads | | | | 430.0 |
| Profit | | | | 43.5 |

(c) Workings

Saving in Fixed Overheads = ₹10 lakhs

Hence Fixed Overheads (₹450 – ₹10) = ₹440 lakhs

Financial Implications of Continuance of Product 'C' as Service to Product 'A'

(₹ in lakhs)

| | Products | | | | |
|-----------------------------------|----------|-----|-----|-----|-------|
| | A | B | C | D | Total |
| Sales | 400 | 500 | 50 | 200 | 1,150 |
| Direct Materials | 64 | 70 | 8 | 14 | 156 |
| Direct Wages | 88 | 105 | 15 | 36 | 244 |
| Variable Factory Overheads | 64 | 86 | 15 | 24 | 189 |
| Variable Selling & Adm. Overheads | 20 | 25 | 2.5 | 10 | 57.5 |
| Contribution | 164 | 214 | 9.5 | 116 | 503.5 |
| Fixed Overheads | | | | | 440.0 |
| Profit | | | | | 63.5 |

- (ii) The above statements show that continuance of product 'C' as service to product 'A' increases the profitability to ₹63.5 lakhs because of the increase in sales of product 'D' which is the highest contribution yielding product. Therefore, the company should adopt this course i.e. producing product 'C' only as service to customers using product 'A' whose business will otherwise be lost. However, the company should ensure that the market will be able to absorb increased production of 'D' at the prevailing prices and the available machine capacity will be adequate for manufacture of increased volume of product 'D'.

Problem-44

Bloom Ltd. makes three products, A, B and C. The following information is available:

| | <i>(Figures in Rupees per unit)</i> | | |
|------------------------------------|-------------------------------------|------------|------------|
| | <i>A</i> | <i>B</i> | <i>C</i> |
| <i>Selling price (peak-season)</i> | <i>550</i> | <i>630</i> | <i>690</i> |
| <i>Selling price (off-season)</i> | <i>550</i> | <i>604</i> | <i>690</i> |
| <i>Material cost</i> | <i>230</i> | <i>260</i> | <i>290</i> |

2.107 Advanced Management Accounting

| | | | |
|---|-----|-----|-----------|
| <i>Labour (peak-season)</i> | 110 | 120 | 150 |
| <i>Labour (off-season)</i> | 100 | 99 | 149 |
| <i>Variable production overhead</i> | 100 | 120 | 130 |
| <i>Variable selling overhead (only for peak-season)</i> | 10 | 20 | 15 |
| <i>Labour hours required for one unit of production</i> | 8 | 11 | 7 (hours) |

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

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

Required

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

 **Solution**

**Bloom Ltd.
Peak Season
Statement of Contribution and BEP (in units)**

(Figures in ₹)

| Product | A | B | C | Gen. |
|--------------------------------|------------|------------|------------|------|
| <i>Selling Price per unit</i> | 550 | 630 | 690 | |
| <i>Variable Costs per unit</i> | | | | |
| Direct Material | 230 | 260 | 290 | |
| Direct Labour | 110 | 120 | 150 | |
| Variable Overhead - Production | 100 | 120 | 130 | |
| Variable Overhead - Selling | 10 | 20 | 15 | |
| Total Variable Cost | 450 | 520 | 585 | |

| | | | | |
|---|--|--|--|--------|
| Contribution / unit | 100 | 110 | 105 | |
| Direct Labour hours Required <i>per unit</i> | 8 | 11 | 7 | |
| Contribution per Labour Hour | 12.5 | 10 | 15 | |
| Ranking | II | III | I | |
| General Fixed Overhead | --- | --- | --- | 20,000 |
| Specific Fixed Overhead | --- | 2,000 | 4,780 | 6,780 |
| BEP (units) (for only 1 Product at a time) | $\left(\frac{₹20,000}{₹100}\right)$ 200 units | $\left(\frac{₹22,000}{₹110}\right)$ 200 units | $\left(\frac{₹24,780}{₹105}\right)$ 236 units | |

Maximum 231 units $\left(\frac{1,617\text{hrs.}}{7\text{hrs.}}\right)$ can be produced of product C with limited labour hours 1,617. Since, 231units are less than break even units. Hence, Bloom Ltd. cannot produce C. Next Rank is of Product A.

Maximum 202 units $\left(\frac{1,617\text{hrs.}}{8\text{hrs.}}\right)$ can be produced of product A with limited labour hours. Break Even of A is 200 units. Profit if only A is produced –

| | |
|---------------------------------|--------|
| | (₹) |
| Contribution (202 units × ₹100) | 20,200 |
| Less: Fixed Cost | 20,000 |
| Profit | 200 |

**Bloom Ltd.
Off Season
Statement of Contribution and Demand**

(Figures in ₹ per unit)

| Product | A | B | C |
|------------------------------|-----|-----|-----|
| Selling Price | 550 | 604 | 690 |
| Less: Direct Material | 230 | 260 | 290 |
| Direct Labour | 100 | 99 | 149 |
| Production-Variable Overhead | 100 | 120 | 130 |
| Contribution <i>per unit</i> | 120 | 125 | 121 |
| Ranking | III | I | II |
| Maximum Demand | 100 | 115 | 135 |

Statement of Profitability under Different Options
(Limit of Production, 215 units)

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

Best strategy is to produce 100 units of product A and 115 units of product B during off season. Maximum profit is ₹4,375.

Problem-45

Dyal Dairies Ltd. has two processing and bottling plants, Danida and Danima, in adjoining districts. The comparative cost and revenue data budgeted per month are as below:-

| | <i>Danida</i> | <i>Danima</i> |
|----------------------------|-----------------|---------------|
| <i>Production (Litres)</i> | <i>1,00,000</i> | <i>75,000</i> |
| <i>Variable Costs:</i> | <i>(₹)</i> | <i>(₹)</i> |
| <i>Bottles</i> | <i>1,00,000</i> | <i>79,000</i> |
| <i>Closures</i> | <i>90,000</i> | <i>71,500</i> |
| <i>Crates</i> | <i>14,000</i> | <i>12,500</i> |
| <i>Milk Loss</i> | <i>30,000</i> | <i>47,000</i> |
| <i>Electricity</i> | <i>14,000</i> | <i>14,000</i> |
| <i>Fuel</i> | <i>40,000</i> | <i>46,000</i> |
| <i>Water</i> | <i>10,000</i> | <i>11,250</i> |

| | | |
|------------------------------|----------|----------|
| <i>Fixed Costs:</i> | (₹) | (₹) |
| <i>Electricity</i> | 13,500 | 11,000 |
| <i>Salaries & Wages</i> | 90,000 | 60,000 |
| <i>Depreciation</i> | 50,000 | 20,000 |
| <i>Total Costs (₹)</i> | 4,51,500 | 3,72,250 |
| <i>Sales Realisation (₹)</i> | 7,00,000 | 5,25,000 |
| <i>Profit (₹)</i> | 2,48,500 | 1,52,750 |

Danima's high cost, low margin status drawn management's attention. It is also observed that Danida can increase its production by 50 per cent with the existing plant capacity and without additional manpower.

Two proposals are under consideration:

- (i) Cut down Danima's production by 25,000 litres and increase Danida's production by 25,000 litres.
- (ii) Cut down Danima's production by 50,000 litres and increase Danida's production by 50,000 litres.

For the additional quantity produced in excess of 1,00,000 litres, Danida will incur ₹ 0.40 per litre towards group incentive. Transporting the additional output from Danida to Danima's region for sale will cost ₹ 10,000 in both cases.

Required

- (i) Prepare a statement to show the contribution and the profit for Danida, Danima and for the company as a whole, for each proposal. Comment on the results.
- (ii) The management is keen that the cut in Danima's production should not result in its reporting loss, as that would demoralize its employees. If break-even production is to be retained in Danima and the balance alone is to be transferred to Danida. Show the contribution and the profit for Danida, Danima and the company as a whole.

 **Solution**

- (i) **Proposal 1**

Statement Showing "Contribution and the Profit"

| | Danida | Danima | Total |
|------------------------|----------|--------|-------|
| Production (Litres) | 1,25,000 | 50,000 | |
| Contribution per litre | ₹4.02 | ₹3.25 | |

2.111 Advanced Management Accounting

| | | | |
|-----------------------------------|----------|----------|----------|
| Total Contribution (₹) | 5,02,500 | 1,62,500 | 6,65,000 |
| Less: Group Incentive Payable (₹) | 10,000 | --- | 10,000 |
| Less: Fixed Cost (₹) | 1,53,500 | 91,000 | 2,44,500 |
| Less: Transport Cost (₹) | 10,000 | --- | 10,000 |
| Profit (₹) | 3,29,000 | 71,500 | 4,00,500 |
| Budgeted Profit (₹) | 2,48,500 | 1,52,750 | 4,01,250 |

Comments

The Proposal, if implemented, will result in a drop in overall profit by ₹750 {₹4,01,250 – ₹4,00,500}.

Proposal 2

Statement Showing “Contribution and the Profit”

| | Danida | Danima | Total |
|-----------------------------------|----------|----------|----------|
| Production (Litres) | 1,50,000 | 25,000 | 1,75,000 |
| Contribution <i>per litre</i> | ₹4.02 | ₹3.25 | |
| Total Contribution (₹) | 6,03,000 | 81,250 | 6,84,250 |
| Less: Group Incentive Payable (₹) | 20,000 | --- | 20,000 |
| Less: Fixed Cost (₹) | 1,53,500 | 91,000 | 2,44,500 |
| Less: Transport Cost (₹) | 10,000 | --- | 10,000 |
| Profit (₹) | 4,19,500 | (9,750) | 4,09,750 |
| Budgeted Profit (₹) | 2,48,500 | 1,52,750 | 4,01,250 |

Comments

The implementation of the proposal will increase profits for the company as a whole by ₹ 8,500 { ₹4,09,750 – ₹4,01,250} though Danima will be reporting loss.

| | |
|---|---------------|
| (ii) Contribution <i>per litre</i> for Danima | ₹3.25 |
| Total Fixed Costs of Danima | ₹91,000 |
| Break – even Production for Danima $\left(\frac{₹91,000}{₹3.25} \right)$ | 28,000 liters |

The production that could be transfer from Danima to Danida, retaining break – even production in Danima, is 47,000 litres {75,000 litres – 28,000 litres}.

Statement Showing "Contribution and the Profit"

| | Danida | Danima | Total |
|-----------------------------------|----------|----------|----------|
| Production (litres) | 1,47,000 | 28,000 | 1,75,000 |
| Contribution <i>per litre</i> | ₹4.02 | ₹3.25 | |
| Total Contribution (₹) | 5,90,940 | 91,000 | 6,81,940 |
| Less: Group Incentive Payable (₹) | 18,800 | --- | 18,800 |
| Less: Fixed Costs (₹) | 1,53,500 | 91,000 | 2,44,500 |
| Less: Transport Cost (₹) | 10,000 | --- | 10,000 |
| Profit | 4,08,640 | --- | 4,08,640 |
| Budgeted Profit | 2,48,500 | 1,52,750 | 4,01,250 |

The Overall Profit will increase by ₹7,390 { ₹4,08,640 – ₹4,01,250} by transferring 47,000 litres of production to Danida.

Working Note

Sales Price Computation *per liter*

| | Danida (₹) | Danima (₹) |
|---------------------|--|--|
| Sales Price | 7.00 $\left(\frac{₹7,00,000}{1,00,000\text{liters}} \right)$ | 7.00 $\left(\frac{₹5,25,000}{75,000\text{liters}} \right)$ |
| Less: Variable Cost | 2.98 $\left(\frac{₹2,98,000}{1,00,000\text{liters}} \right)$ | 3.75 $\left(\frac{₹2,81,250}{75,000\text{liters}} \right)$ |
| Contribution | 4.02 | 3.25 |

Problem-46

Future Ltd. manufactures product N using one unit each of three components named P, Q & R and sells it at ₹ 37.50 per unit. It has two divisions. In production division it produces all the types of components by using its full capacity of 42,000 machines hours. In assembly division the remaining job is performed by the workers manually before N is ready for sale:

Product N is manufactured in batches of 100 units and the data relating to the current production per batch are:

2.113 Advanced Management Accounting

| | Machine Hours | Variable Cost (₹) | Fixed Cost (₹) | Total Cost (₹) |
|-----------------------------|---------------|-------------------|----------------|----------------|
| <i>Production Division:</i> | | | | |
| <i>Component – P</i> | 15 | 375 | 150 | 525 |
| <i>Component – Q</i> | 25 | 450 | 175 | 625 |
| <i>Component – R</i> | 30 | 450 | 450 | 900 |
| <i>Assembly Division:</i> | | | | |
| <i>Assembly---</i> | | 800 | 325 | 1,125 |
| | | 2,075 | 1,100 | 3,175 |

For the next year the company has estimated that its sale would go up by 50% more than the present sales and probably even by 75% if the production capacity is made available.

The machine capacity cannot be increased during the next year even though the workers in the assembly division can be increased as per requirement without any increase in fixed costs. To meet the increased demand, production can be taken up and processed in assembly division by procuring the components from the open market. The company has received the following price quotations for the purchase of components:

| | P | Q | R |
|---------------------------------|------|------|------|
| Price offered per component (₹) | 5.55 | 7.00 | 8.40 |

Required

- (i) Determine the production and profits being earned at present.
- (ii) Indicate which of the component (s) should be purchased and in what quantities at the two estimated levels of output viz. increase by 50% and 75% of existing production.
- (iii) Prepare a statement showing the company's profitability at both the estimated levels of output.

 **Solution**

- (i) **Statement of Current Production of Product**

Machine Hours Utilised per batch of 100 units

| | |
|--------------|-----------|
| P | 15 |
| Q | 25 |
| R | <u>30</u> |
| Total (Hrs.) | 70 |

Available Machine Hours 42,000

Current Year Production of P, Q and R *in batches of 100 units*

$$\left(\frac{42,000 \text{ hours}}{70 \text{ hours}} \right) = 600 \text{ Batches}$$

60,000 units (600 batches × 100 units) of Product -N produced.

Statement of Profit Earned *during current year*

(Sale of 60,000 units of Product – N)

| | (₹) |
|--|-----------|
| Sales Revenue (60,000 units × ₹ 37.50) | 22,50,000 |
| <i>Less : Variable Costs:</i> | |
| Component P (600 batches × ₹375) | 2,25,000 |
| Component Q (600 batches × ₹450) | 2,70,000 |
| Component R (600 batches × ₹450) | 2,70,000 |
| Assembly (600 batches × ₹800) | 4,80,000 |
| Contribution | 10,05,000 |
| <i>Less: Fixed Cost (600 batches × ₹1,100)</i> | 6,60,000 |
| Profit | 3,45,000 |

(ii) **Contribution *per batch* and Ranking of Components**

| | Components | | |
|---|------------|-----|-----|
| | P | Q | R |
| Price Offered (₹) | 555 | 700 | 840 |
| Variable Costs (₹) | 375 | 450 | 450 |
| Contribution / Savings (₹) | 180 | 250 | 390 |
| Machine Hours Required | 15 | 25 | 30 |
| Contribution / Saving <i>per machine hour</i> (₹) | 12 | 10 | 13 |
| Rank to Manufacture | II | III | I |

Quantities of Components to be purchased from the market at the quoted price when the estimated level of output increases by 50% and 75% of the existing production of 600 batches, (that is when the output level of production increases to 900 batches and 1,050 batches)

2.115 Advanced Management Accounting

| 900 Batches | | | | | |
|--|---------------------------|------------|-------------------------------|----------------|-----------------------------|
| Comp | Required Prod. in Batches | Hrs/ Batch | Production Planned in Batches | Hours Utilized | Balance Hours |
| 1 | 2 | 3 | 4 | 5= 3×4 | 6 |
| R | 900 | 30 | 900 | 27,000 | 15,000 (42,000 – 27,000) |
| P | 900 | 15 | 900 | 13,500 | 1,500 (15,000 – 13,500) |
| Q | 900 | 25 | 60 | 1,500 | – (1,500 – 1,500) |
| In this case 840 batches (900 batches – 60 batches) or 84,000 units of component Q should be purchased from the market. | | | | | |
| 1,050 batches | | | | | |
| Comp | Required Prod. in Batches | Hrs/ Batch | Production Planned in Batches | Hours Utilized | Balance Hours |
| 1 | 2 | 3 | 4 | 5=3×4 | 6 |
| R | 1,050 | 30 | 1,050 | 31,500 | 10,500 (42,000 – 31,500) |
| P | 1,050 | 15 | 700 | 10,500 | – (10,500 – 10,500) |
| Q | 1,050 | 25 | – | – | – |
| In this case 350 batches (1,050 batches – 700 batches) or 35,000 units of component P and 1,050 batches or 1,05,000 units component Q should be purchased. | | | | | |

(iii) Statement of Profitability

| Particulars | 900 Batches or 90,000 units (₹) | 1,050 Batches or 1,05,000 units (₹) |
|---------------------------------------|---------------------------------|-------------------------------------|
| Sales Revenue (₹37.50 per unit) | 33,75,000 | 39,37,500 |
| Less: Variable Cost (Manufacturing*): | | |
| P | 3,37,500 (900 × ₹375) | 2,62,500 (700 × ₹375) |
| Q | 27,000 (60 × ₹450) | --- |

| | | |
|--|--------------------------|----------------------------|
| R | 4,05,000 (900 × ₹450) | 4,72,500 (1,050 × ₹450) |
| <i>Less: Variable Cost (Purchasing):</i> | | |
| P | --- | 1,94,250 (350 × ₹555) |
| Q | 5,88,000 (840 × ₹700) | 7,35,000 (1,050 × ₹700) |
| <i>Less: Assembly Cost</i> | | |
| | 7,20,000 | 8,40,000 |
| Contribution | 12,97,500 | 14,33,250 |
| <i>Less: Fixed Cost</i> | | |
| | 6,60,000 | 6,60,000 |
| Profit | 6,37,500 | 7,73,250 |

* Refer to part (ii) of the answer.

Problem-47

Gemini Publishers Ltd. is considering launching a new monthly magazine at a selling price of ₹ 10 per copy. Sales of the magazine are expected to be 5,00,000 copies per month, but it is possible that the actual sales could differ quite significantly from this estimate.

Two different methods of producing the magazine are being considered and neither would involve any additional capital expenditure. The estimated production cost for each of the two methods of manufacture, together with the additional marketing and distribution costs of selling the new magazine, are given below:

| | <i>Method A</i> | <i>Method B</i> |
|-----------------------------|-----------------|------------------|
| <i>Variable Costs</i> | ₹ 5.50 per copy | ₹ 5.00 per copy |
| <i>Specific Fixed Costs</i> | ₹ 8,00,000 p.m. | ₹ 12,00,000 p.m. |
| <i>Semi-Variable Costs:</i> | | |
| <i>3,50,000 Copies</i> | ₹ 5,50,000 p.m. | ₹ 4,75,000 p.m. |
| <i>4,50,000 Copies</i> | ₹ 6,50,000 p.m. | ₹ 5,25,000 p.m. |

The following estimates have been available:

It may be assumed that the fixed cost content of the semi-variable cost will remain constant throughout the range of activity shown.

The company currently sells a magazine covering related topics to those that will be included in the new publication, and consequently, it is anticipated that sales of this existing magazine will be adversely affected. It is estimated that for every ten copies sold of the new publication, sales of the existing magazines will be reduced by one copy.

2.117 Advanced Management Accounting

Sales and cost data of the existing magazines are as shown below:

| | |
|---------------------------|------------------------|
| Sales..... | ₹ 2,20,000 copies p.m. |
| Selling Price..... | ₹ 8.50 per copy |
| Variable Costs..... | ₹ 3.50 per copy |
| Specific Fixed Costs..... | ₹ 8,00,000 p.m. |

Required

- Calculate, for each production the net increase in company profits which will result from the introduction of the new magazine, at each of the following levels of activity:
 5,00,000 Copies p.m.
 4,00,000 Copies p.m.
 6,00,000 Copies p.m.
- Calculate, for each production method, the amount by which sales volume of the new magazine could decline from the anticipated 5,00,000 copies per month, before the company makes an additional profit from the introduction of the new publication.
- Briefly identify any conclusions which may be drawn from your calculation.



Solution

- Calculation of Net Increase in Company Profits

Method A

| | Levels Activity | | |
|----------------------------------|-----------------|-----------|-----------|
| Copies Sold | 5,00,000 | 4,00,000 | 6,00,000 |
| Contribution <i>per copy</i> (₹) | 3.00 | 3.00 | 3.00 |
| Total Contribution (₹) | 15,00,000 | 12,00,000 | 18,00,000 |
| Less: Total Fixed Costs (₹) | 10,00,000 | 10,00,000 | 10,00,000 |
| Net Increase in Profit (₹) | 5,00,000 | 2,00,000 | 8,00,000 |

Method B

| | Level of Activity | | |
|----------------------------------|-------------------|-----------|-----------|
| Copies Sold | 5,00,000 | 4,00,000 | 6,00,000 |
| Contribution <i>per copy</i> (₹) | 4.00 | 4.00 | 4.00 |
| Total Contribution (₹) | 20,00,000 | 16,00,000 | 24,00,000 |
| Less: Total Fixed Costs (₹) | 15,00,000 | 15,00,000 | 15,00,000 |
| Net Increase in Profit (₹) | 5,00,000 | 1,00,000 | 9,00,000 |

- (ii) Break -even Point = Fixed Cost ÷ Contribution *per unit*
 Method A = ₹10,00,000 ÷ ₹3
 = 3,33,333 Copies
 Method B = ₹15,00,000 ÷ ₹4
 = 3,75,000 Copies

The margin of safety or the amount by which sales volume of the new magazine could decline is the difference between the anticipated sales and the breakeven point sales. This is calculated below-

- Method A = 5,00,000 Copies – 3,33,333 Copies
 = 1,66,667 Copies
 Method B = 5,00,000 Copies – 3,75,000 Copies
 = 1,25,000 Copies

- (iii) The above calculations show that Method B has a higher breakeven point and a higher contribution per copy sold. Therefore, profits from method B are more vulnerable to a decline in sales volume. However, higher profits are obtained with method B.

The contribution per copy of the existing magazine is ₹5. Therefore, the breakeven point from the sales of the existing magazines is 1,60,000 copies (₹8,00,000 ÷ ₹ 5.00).

The current level of monthly sales is 2,20,000 copies. Therefore, sales can drop by 60,000 copies before breakeven point is reached. For every 10 copies sold of the new magazine, sales of the existing magazine will be reduced by one copy. Consequently, if more than 6,00,000 copies of the new magazine are sold, the existing magazine will make a loss. Therefore, if the sales of the new magazine are expected to consistently exceed 6,00,000 copies, then the viability of the existing magazine must be questioned.

Workings

1. Analysis of Semi-Variable Costs

Method A

- Variable Element = Increase in Cost ÷ Increase in Activity
 = ₹1,00,000 ÷ 1,00,000 Copies
 = ₹1 *per copy*
 Fixed Element = Total Semi-Variable Cost – Variable Cost (at an activity level of 3,50,000 copies)
 = ₹5,50,000 – ₹3,50,000
 = ₹2,00,000

Method B

| | |
|------------------|--|
| Variable Element | = Increase in Cost ÷ Increase in Activity |
| | = ₹50,000 ÷ 1,00,000 Copies |
| | = ₹0.50 <i>per copy</i> |
| Fixed Element | = Total Semi-Variable Cost – Variable Cost (at an activity level of 3,50,000 copies) |
| | = ₹4,75,000 – ₹1,75,000 |
| | = ₹3,00,000 |

Note

The analysis is based on a comparison of total costs and activity levels at 3,50,000 and 4,50,000 copies per month respectively.

2. Total Fixed Cost

| | |
|---|-----------------|
| Method A | (₹) |
| Specific Fixed Cost..... | 8,00,000 |
| Add: Fixed Element in Semi-Variable Cost..... | <u>2,00,000</u> |
| Total | 10,00,000 |
| Method B | (₹) |
| Specific Fixed Cost..... | 12,00,000 |
| Add: Fixed Element in Semi-Variable Cost..... | <u>3,00,000</u> |
| Total | 15,00,000 |

3. Contribution *per copy* of New Magazine

| | Method A | Method B |
|---|--------------|--------------|
| | (₹) | (₹) |
| Selling Price | <u>10.00</u> | <u>10.00</u> |
| Variables Cost (given) | 5.50 | 5.00 |
| Variable Element of Semi-Variable Cost | 1.00 | 0.50 |
| Lost Contribution from Existing Magazine (On 10 new copies, ₹5 will be lost) | <u>0.50</u> | <u>0.50</u> |
| Total Variable Costs | <u>7.00</u> | <u>6.00</u> |
| Contribution | 3.00 | 4.00 |

Problem-48

Apex Limited manufacturer two products, P and Q, using the same production facility. The following information is available for a production period:

| Particulars | Product P | Product Q |
|--------------------------------------|-----------|-----------|
| Demand (units) | 2,20,000 | 1,75,000 |
| Contribution (₹ / unit) | 10 | 12 |
| Machine hours required per 100 units | 15 | 25 |

P and Q can be produced only in batches of 100 units, and whatever is produced has to be sold or discarded. Inventory build-up is not possible from one production period to another. The total fixed costs for each level of production and directly attributable to P and Q are given below:

| Level of output | Total Fixed Costs (₹) | |
|---|-----------------------|-----------|
| | Product P | Product Q |
| Upto 1,00,000 units | 6,00,000 | 5,50,000 |
| 1,00,001 to 2,00,000 units | 13,50,000 | 12,20,000 |
| 2,00,001 to 3,00,000 units (maximum possible level) | 18,70,000 | 15,50,000 |

75,000 machine hours are available in the production period.

Required

- (i) Calculate the quantities of P and Q in the best product mix to achieve the maximum profit and compute the maximum profit.
- (ii) What will be the opportunity cost of meeting P's demand fully?

 **Solution**

(i) **Statement Showing "Contribution / Machine Hour"**

| | 'P' | 'Q' |
|----------------------------------|--|--|
| Demand (batches of 100 units) | 2,200 $\left(\frac{2,20,000 \text{ units}}{100 \text{ units}} \right)$ | 1,750 $\left(\frac{1,75,000 \text{ units}}{100 \text{ units}} \right)$ |
| Contribution (₹/ batch) | 1,000 (₹10 × 100 units) | 1,200 (₹12 × 100 units) |
| Machine Hours Required per batch | 15 | 25 |
| Contribution / Machine Hour | 66.66... | 48 |
| Rank | I | II |

2.121 Advanced Management Accounting

Allocation of Machine Hours *on the basis of ranking*

| | | |
|--|---|--|
| Produce 'P' <i>as much as possible</i> | = | 2,200 batches |
| Hours Required | = | 33,000 hrs (2,200 batches × 15 hrs.) |
| Balance Hours Available | = | 42,000 hrs (75,000 hrs. – 33,000 hrs.) |
| Produce 'Q' (the Next Best) | = | 1,680 batches $\left(\frac{42,000 \text{ hrs.}}{25 \text{ hrs.}}\right)$ |

Statement Showing "Maximum Possible Contribution"

| Product | Batches | Cont./Batch (₹) | Total (₹) |
|-------------------------------|---------|--------------------|--------------|
| 'P' | 2,200 | 1,000 | 22,00,000 |
| 'Q' | 1,680 | 1,200 | 20,16,000 |
| Maximum Possible Contribution | | | 42,16,000 |

Statement Showing "Incremental Fixed Cost"

| | 'P' (₹) | 'Q' (₹) |
|---------------------|------------|------------|
| Up to 1,000 batches | 6,00,000 | 5,50,000 |
| Next 1,000 batches | 7,50,000 | 6,70,000 |
| Next 1,000 batches | 5,20,000 | 3,30,000 |

For producing additional batches above 2,000 batches of Product 'P' Apex Limited have to incur additional fixed cost of ₹5,20,000 to earn additional contribution of ₹2,00,000 (200 batches × ₹1,000) which is not beneficial. However, hours saved on 200 batches i.e. 3,000 hrs (200 batches × 15 hrs.) can be utilized for production of 'Q' to the extent of 70 batches (1,750 batches i.e. maximum demand of 'Q' – 1,680 batches).

The contribution from producing additional 70 batches of Product 'Q' will be ₹84,000 (70 batches × ₹1,200). Accordingly best product mix will be 2,000 batches of 'P' and 1,750 batches of 'Q'.

Statement Showing "Maximum Profit"

| Product | Batches | Cont./Batch | Total |
|------------------------|---------|-------------|-----------|
| 'P' | 2,000 | 1,000 | 20,00,000 |
| 'Q' | 1,750 | 1,200 | 21,00,000 |
| Contribution | | | 41,00,000 |
| Less: Fixed Cost – 'P' | | | 13,50,000 |
| Less: Fixed Cost – 'Q' | | | 12,20,000 |
| Net Profit | | | 15,30,000 |

(ii) **Statement Showing "Opportunity Cost"**
[Benefit Denied in the Next Best Alternative i.e. (i)]

| Particulars | Total |
|---|-----------------|
| Additional Fixed Cost Not Covered by Producing 'P' in the Maximum Range (₹5,20,000 – ₹2,00,000) | 3,20,000 |
| Add: Loss of Contribution (Not Producing 70 batches of 'Q') | 84,000 |
| Total Opportunity Cost | 4,04,000 |

Decision on Subcontracting

Problem-49

Lee Electronic manufactures four types of electronic products, A, B, C and D. All these products have a good demand in the market. The following figures are given to you:

| | A | B | C | D |
|-------------------------------------|--------|--------|--------|--------|
| Material Cost (₹/u) | 64 | 72 | 45 | 56 |
| Machining Cost (₹/u @ ₹ 8 per hour) | 48 | 32 | 64 | 24 |
| Other Variable Costs (₹/u) | 32 | 36 | 44 | 20 |
| Selling Price (₹/u) | 162 | 156 | 173 | 118 |
| Market Demand (Units) | 52,000 | 48,500 | 26,500 | 30,000 |

Fixed overhead at different levels of operation are:

| Level of Operation (in production hours) | Total Fixed Cost (₹) |
|---|-------------------------|
| Upto 1,50,000..... | 10,00,000 |
| 1,50,000 – 3,00,000..... | 10,50,000 |
| 3,00,000 – 4,50,000..... | 11,00,000 |
| 4,50,000- 6,00,000..... | 11,50,000 |

At present, the available production capacity in the company is 4,98,000 machine hours. This capacity is not enough to meet the entire market demand and hence the production manager wants to increase the capacity. The company wants to retain the customers by meeting their demands through alternative ways. One alternative is to sub-contract a part of its production. The sub-contract offer received as under:

| | A | B | C | D |
|--------------------------|-----|-----|-----|-----|
| Sub-contract Price (₹/u) | 146 | 126 | 155 | 108 |

Required

The company seeks your advice in terms of products and quantities to be produced and/or sub-contracted, so as to achieve the maximum possible profit. Also compute the profit expected from your suggestion.

 **Solution**

| | Demand (Units) | | | |
|--|----------------|--------|--------|--------|
| | 52,000 | 48,500 | 26,500 | 30,000 |
| | A | B | C | D |
| Selling Price | 162 | 156 | 173 | 118 |
| Direct Material | 64 | 72 | 45 | 56 |
| Manufacturing Cost | 48 | 32 | 64 | 24 |
| Other Variable Cost | 32 | 36 | 44 | 20 |
| Contribution (₹/u) | 18 | 16 | 20 | 18 |
| Machine Hours <i>per unit</i> | 6 | 4 | 8 | 3 |
| Contribution (₹/ M/c hr.) | 3 | 4 | 2.5 | 6 |
| Ranking | III | II | IV | I |
| Sub-Contract Cost ₹/ u) | 146 | 126 | 155 | 108 |
| Contribution (₹ / u) on (Sub-Contract) | 16 | 30 | 18 | 10 |

Decision

It is more profitable to sub-contract B, since contribution is higher sub-contract.

1st Level of Operations

| | | |
|--------------------------------------|---|--|
| Produce D <i>as much as possible</i> | = | 30,000 units |
| Hours Required | = | 90,000 hrs (30,000 units × 3hrs.) |
| Balance Hours Available | = | 60,000 hrs |
| Produce the Next Best | = | 10,000 units of A* $\left(\frac{60,000 \text{ hrs}}{6 \text{ hrs / u}}\right)$ |

*Since B is better to be outsourced.

| Product | Particulars | Contribution/ unit | Contribution (₹) |
|---------|-----------------------|-----------------------|---------------------|
| | Produce: 10,000 units | 18 | 1,80,000 |

| | | | |
|--------------------|-------------------------------|----|-----------|
| A | Outsource: 42,000 units | 16 | 6,72,000 |
| B | Outsource Fully: 48,500 units | 30 | 14,55,000 |
| C | Outsource Fully: 26,500 units | 18 | 4,77,000 |
| D | Fully Produce: 30,000 units | 18 | 5,40,000 |
| Total Contribution | | | 33,24,000 |
| Less: Fixed Cost | | | 10,00,000 |
| Net Gain | | | 23,24,000 |

2nd Level of Operation

Both A and C increase contribution by own manufacture only by ₹2/- per unit. 1,50,000 hrs can produce 25,000 units of A.

Contribution increases by ₹50,000 (25,000 units × ₹2) [Difference in Contribution *sub-contract* and *own manufacturing* is ₹2]

But increase in Fixed Cost by ₹50,000.

At the 2nd level of operation, the *increase in contribution* by own manufacturing is *exactly set up* by *increase in fixed costs* by ₹ 50,000/-. It is a *point of financial indifference*, but other conditions like reliability or possibility of the sub-contractor increasing his price may be considered and decision may them but towards own manufacture.

3rd Level of Operation

| | | |
|--|---|--|
| Additional Hrs Available | = | 1,50,000 hrs. |
| Unit of A that are Needed | = | [52,000 – 25,000 (2 nd Level) – 10,000 (1 st Level)] |
| | = | 17,000 units |
| Hrs. Required for A | = | 17,000 units × 6 hrs/u |
| | = | 1,02,000 hrs. |
| Balance Hours Available for C | = | 1,50,000 hrs. – 1,02,000 hrs. |
| | = | 48,000 hrs. |
| Units of C can be Produced | = | 6,000 units |
| Increase in Contribution over Level 1 st or 2 nd | = | ₹46,000 |
| | | (A: 17,000 units × ₹2 + C: 6,000 units × ₹2) |
| Increase in Fixed Cost | = | ₹50,000 |
| Additional Loss | = | ₹50,000 – ₹46,000 |
| | = | ₹4,000 |

2.125 Advanced Management Accounting

4th Level of Operation

| | | |
|--|---|--|
| Additional Hrs Available | = | 1,50,000 hrs. |
| Additional 1,50,000 can give | = | 18,750 units of C $\left(\frac{1,50,000 \text{hrs.}}{8 \text{hrs.}} \right)$ |
| Increase in Contribution | = | ₹37,500 (C: 18,750 units × ₹2) |
| Increase in Fixed Cost | = | ₹50,000 |
| Additional Loss | = | ₹50,000 – ₹37,500 |
| | = | ₹12,500 |
| Level 1 st Profit will go down by | = | ₹12,500 + ₹4,000 |
| | = | ₹16,500 |

Advice

Do not Expand Capacities.

Summary

| Product | Produce (Units) | Sub-Contract (Units) | Contribution (Production) | Contribution (Sub-Contract) | Total Contribution |
|--------------------|-----------------|----------------------|---------------------------|-----------------------------|--------------------|
| A | 10,000 | 42,000 | 1,80,000 | 6,72,000 | 8,52,000 |
| B | --- | 48,500 | --- | 14,55,000 | 14,55,000 |
| C | --- | 26,500 | --- | 4,77,000 | 4,77,000 |
| D | 30,000 | --- | 5,40,000 | --- | 5,40,000 |
| Total Contribution | | | | | 33,24,000 |
| Less: Fixed Cost | | | | | 10,00,000 |
| Profit | | | | | 23,24,000 |

Problem-50

AXE Ltd. manufactures four products A, B, C and D. The following details are available for a production period:

| | A | B | C | D |
|---------------|-----|-----|-----|-----|
| Selling price | 100 | 109 | 121 | 124 |
| Material cost | 40 | 42 | 46 | 40 |

| | | | | |
|---|--------|--------|--------|--------|
| <i>Labour cost</i> | | | | |
| <i>Assembly Dept. @ ₹ 10 per hour</i> | 15 | 20 | 15 | 20 |
| <i>Machine Dept. @ ₹ 12 per hour</i> | 18 | 24 | 36 | 30 |
| <i>Variable overheads @ ₹ 4 per labour hour in assembly dept.</i> | 6 | 8 | 6 | 8 |
| <i>Maximum external demand (units)</i> | 40,000 | 55,000 | 36,000 | 30,000 |

Total fixed cost is dependent on the output level and is tabulated below at different levels of output:

| Production units (any combination of one or more of any A, B, C or D) | Total fixed cost (₹) |
|--|-----------------------------|
| Zero to 1,00,000 units | 8,43,000 |
| 1,00,001 to 1,50,000 units | 12,50,000 |
| 1,50,001 to 2,00,000 units | 16,00,000 |

Production facilities can be interchangeably used among the products.

Labour availability in the assembly department is limited to 2,20,000 hours for the production period. A local firm has offered to make any quantity of any of the products on a sub-contract basis at the following rates:

| | A | B | C | D |
|-------------------------------------|----------|----------|----------|----------|
| <i>Sub-contract Price (₹ /unit)</i> | 85 | 95 | 101 | 100 |

Required

- (i) Advise the management on how many units of each product are to be manufactured or subcontracted to fulfill maximum market demand. What would be the corresponding profits?
- (ii) What is the minimum number of units to be produced to achieve break-even point?
- (iii) What would you advise as the best strategy to maximize profits if assembly labour is not a limiting factor and if there is no compulsion to fulfill market demand?
(Only relevant figures need to be discussed. A detailed profitability statement is not required).

 Solution

(i) Assembly Labour is a Limiting Factor & to fulfill Maximum Market Demand

Contribution *per unit* as well as Contribution *per assembly hour*

| | Demand (Units) | | | |
|-----------------------------------|----------------|--------|--------|--------|
| | 40,000 | 55,000 | 36,000 | 30,000 |
| | A | B | C | D |
| Selling Price (₹/u) | 100 | 109 | 121 | 124 |
| Material Cost (₹/u) | 40 | 42 | 46 | 40 |
| Labour Cost (₹/u) | | | | |
| Assembly Dept. | 15 | 20 | 15 | 20 |
| Machine Dept. | 18 | 24 | 36 | 30 |
| Variable Overheads (₹/u) | 6 | 8 | 6 | 8 |
| Contribution (₹/u) | 21 | 15 | 18 | 26 |
| Assembly Hours <i>per unit</i> | 1.5 | 2 | 1.5 | 2 |
| Contribution (₹/hr.) | 14 | 7.5 | 12 | 13 |
| Rank [Contribution (₹/hr.)] | I | IV | III | II |
| Sub-Contract Price (₹/u) | 85 | 95 | 101 | 100 |
| Contribution (₹/u) [Sub-Contract] | 15 | 14 | 20 | 24 |

It is more profitable to *sub-contract C*, since contribution is higher in sub-contracting.Allocation of Assembly Hours *on the basis of ranking*

| | | |
|--------------------------------------|---|---|
| Produce A <i>as much as possible</i> | = | 40,000 units |
| Hours Required | = | 60,000 hrs (40,000 units × 1.5 hrs.) |
| Balance Hours Available | = | 1,60,000 hrs (2,20,000 hrs. – 60,000 hrs.) |
| Produce the Next Best | = | 30,000 units of D |
| Hours Required | = | 60,000 hrs (30,000 units × 2 hrs.) |
| Balance Hours Available | = | 1,00,000 hrs (1,60,000 hrs. – 60,000 hrs.) |
| Produce the Next Best | = | 50,000 units of B $\left(\frac{1,00,000 \text{ hrs}}{2 \text{ hrs/u}} \right)$ |

Profit on the basis of ranking

| Product | Particulars | Contribution/unit (₹) | Contribution (₹) |
|--------------------|---------------------------|--------------------------|---------------------|
| A | Produce: 40,000 units | 21 | 8,40,000 |
| | Subcontract: NIL units | 15 | --- |
| B | Produce: 50,000 units | 15 | 7,50,000 |
| | Subcontract: 5,000 units | 14 | 70,000 |
| C | Produce: NIL units | 18 | --- |
| | Subcontract: 36,000 units | 20 | 7,20,000 |
| D | Produce: 30,000 units | 26 | 7,80,000 |
| | Subcontract: NIL units | 24 | --- |
| Total Contribution | | | 31,60,000 |
| Less: Fixed Cost | | | 12,50,000 |
| Net Profit | | | 19,10,000 |

Decision

However AXE Ltd. can save fixed cost of ₹ 4,07,000 (₹ 12,50,000 – ₹ 8,43,000) if it keeps its production limited to 1,00,000 units. But in this case AXE Ltd. has to subcontract 20,000 units of B to fulfill maximum market demand. Contribution Lost from subcontracting of 20,000 units is amounting to ₹ 20,000 [20,000 units × (₹ 15 – ₹ 14)]. Hence optimum profit would be ₹ 22,97,000 [₹ 19,10,000 + ₹ 4,07,000 – ₹ 20,000].

Production Vs Sub Contract (units) and Profit – Best Strategy

| Prod | Produced [Units] | Sub-Contract [Units] | Contribution [Production] (₹) | Contribution [Sub-Contract] (₹) | Total Contribution (₹) |
|--------------------|---------------------|-------------------------|-------------------------------------|---------------------------------------|------------------------------|
| A | 40,000 | --- | 8,40,000 | --- | 8,40,000 |
| B | 30,000 | 25,000 | 4,50,000 | 3,50,000 | 8,00,000 |
| C | --- | 36,000 | --- | 7,20,000 | 7,20,000 |
| D | 30,000 | --- | 7,80,000 | --- | 7,80,000 |
| Total Contribution | | | | | 31,40,000 |
| Less: Fixed Cost | | | | | 8,43,000 |
| Net Profit | | | | | 22,97,000 |

(ii) Break Even Point

Recovery of Fixed Cost

| Particulars | Amount (₹) |
|---|------------|
| Fixed Cost (at Best Strategy) | 8,43,000 |
| Less: Recovered from Product 'D' (₹26 × 30,000 units) | 7,80,000 |
| Balance | 63,000 |
| Less: Recovered from Product 'A' $\left(\frac{₹63,000}{₹21} = 3,000 \text{ units} \right)$ | 63,000 |

Minimum number of units to be produced to achieve break-even point:

Product D = 30,000 units

Product A = 3,000 units

Accordingly, earliest BEP at 33,000 units

(iii) Assembly Labour is Not a Limiting Factor & No Requirement to Fulfil Maximum Market Demand

Comparison of Contribution *per unit* (Make Vs Sub-Contracting)

| | Demand (Units) | | | |
|-----------------------------------|----------------|--------|-----------------|--------|
| | 40,000 | 55,000 | 36,000 | 30,000 |
| | A | B | C | D |
| Contribution (₹/u) [Make] | 21 | 15 | 18 | 26 |
| Contribution (₹/u) [Sub-Contract] | 15 | 14 | 20 | 24 |
| Best Strategy | Make | Make | Sub Contracting | Make |
| Ranking for Production | II | III | --- | I |

Decision

From the above comparison table it can be seen manufacturing of product A, B and D gives higher contribution per unit as compared to sub-contracting. Therefore, AXE Ltd. should manufacture the entire quantity of product A, B and D and Subcontract the production of product C. However AXE Ltd. can save fixed cost of ₹4,07,000 (₹12,50,000 – ₹8,43,000) by limiting its production level to 1,00,000 units only. In this case AXE Ltd. will make 30,000 units, 40,000 units and 30,000 units of product D, A and B respectively. But in this case AXE Ltd. has to subcontract 25,000 units of B to earn maximum profit.

Production Vs Sub Contract (units) and Profit – Best Strategy

| Prod. | Produced [Units] | Sub-Contract [Units] | Contribution [Production] (₹) | Contribution [Sub-Contract] (₹) | Total Contribution (₹) |
|--------------------|------------------|----------------------|-------------------------------|---------------------------------|------------------------|
| A | 40,000 | --- | 8,40,000 | --- | 8,40,000 |
| B | 30,000 | 25,000 | 4,50,000 | 3,50,000 | 8,00,000 |
| C | --- | 36,000 | --- | 7,20,000 | 7,20,000 |
| D | 30,000 | --- | 7,80,000 | --- | 7,80,000 |
| Total Contribution | | | | | 31,40,000 |
| Less: Fixed Cost | | | | | 8,43,000 |
| Net Profit | | | | | 22,97,000 |



It may not be necessary to prepare 'Statement Showing Production Vs Sub Contract (units) and Profit – Best Strategy' for part (iii), but only relevant figures need to be shown.

Problem-51

Golden Pet Ltd. specialises in the manufacture of one litre plastic bottles. The firm's customers include dairy processors, fruit juice manufacturers and manufacturers of edible oils. The bottles are produced by a process called blow moulding. A machine heats plastic to the melting point. A bubble of molten plastic is formed inside a mould, and a jet of hot air is forced into the bubble. This blows the plastic into the shape of the mould. The machine releases the moulded bottle, an employee trims off any flashing (excess plastic around the edge) and the bottle is complete.

The firm has four moulding machines, each capable of producing 100 bottles per hour. The firm estimates that the variable cost of producing a plastic bottle is 20 paise. The bottles are sold for 50 paise each.

Management has been approached by a local toy company that would like the firm to produce a moulded plastic toy for them. The toy company is willing to pay ₹ 3.00 per unit for toy. The variable cost to manufacture the toy will be ₹ 2.40. In addition, Golden Pet Ltd. would have to incur a cost of ₹ 20,000 to construct the needed mould exclusively for this order. Because the toy uses more plastic and is of a more intricate shape than a bottle, a moulding machine can produce only 40 units per hour. The customer wants 1,00,000 units. Assume that Golden Pet Ltd. has the total capacity of 10,000 machine hours available during the period in which the toy company wants the delivery of toys. The firm's fixed costs, excluding the costs to construct the toy mould, during the same period will be ₹ 2,00,000.

Required

- (i) If the management predicts that the demand for its bottles will require the use of 7,500 machine hours or less during the period, should the special order accepted? Give reasons.
- (ii) If the management predicts that the demand for its bottles will be higher than its ability to produce bottles, should the order be accepted? Why?
- (iii) If the management has located a firm that has just entered the moulded plastic business. This firm has considerable excess capacity and more efficient moulding machine and is willing to subcontract the toy job, or any portion of it, for ₹ 2.80 per unit. It will construct its own toy mould. Determine Golden Pet Ltd 's minimum expected excess machine hour capacity needed to justify producing any portion of the order itself rather than subcontracting it entirely.
- (iv) The management predicted that it would have 1,600 hours of excess machine hour capacity available during the period. Consequently, it accepted the toy order and subcontracted 36,000 units to the other plastic company. In fact, demand for bottles turned out to be 9,00,000 units for the period. The firm was able to produce only 8,40,000 units because it had to produce the toys. What was the cost of the prediction error failure to predict demand correctly?

**Solution**

- (i) The Golden Pet Ltd. has a surplus of 2,500 machine hours. The special order for supply of 1,00,000 toys also requires 2,500 hours of machine time (1,00,000 toys / 40 units). In case the Golden Pet Ltd. accepts the order, it will make an extra profit of ₹ 40,000 as given below-

| | (₹) |
|--|----------|
| Sales Revenue (1,00,000 toys × ₹3) | 3,00,000 |
| Less: Variable Costs (1,00,000 toys × ₹2.40) | 2,40,000 |
| Contribution | 60,000 |
| Less: Fixed Costs | 20,000 |
| Profit | 40,000 |

The Golden Pet Ltd. will thus make an extra profit of ₹ 40,000 and therefore, it should accept the order.

- (ii) In case of Golden Pet Ltd., the machine time is a limiting factor and hence it will be appropriate to calculate the contribution per machine hour for both capacities as shown below-

| | Contribution <i>per hour</i> from Bottle | | Contribution <i>per hour</i> from Toys | |
|--|---|-----|---|-----|
| | | (₹) | | (₹) |
| Production <i>in one hour</i> | 100 bottles | | 40 toys | |
| Sales Value <i>for one hour production</i> | (100 × ₹ 0.50) | 50 | (40 × ₹ 3) | 120 |
| Less: Variable Cost | (100 × ₹ 0.20) | 20 | (40 × ₹ 2.40) | 96 |
| Contribution <i>per hour</i> | | 30 | | 24 |

The above computation shows that the contribution per hour is higher in case of bottles. Hence, if the management predicts that the demand for bottles will be higher than its capacity to produce them, it should not accept the special order for toys. Rather, it should use the total available machine hours for production of bottles.

- (iii) The point of indifference (cost break-even point) between the two alternatives, i.e., producing toys by the Golden Pet Ltd. itself or sub-contracting their production, can be determined as follows:

Let the number of toys to be produced be 'x'.

In case the firm uses the surplus time available for producing toys, the total cost would amount to $₹20,000 + 2.4x$

In case the Golden Pet Ltd. decides in favour of sub-contracting the production of toys, the total cost of toys would amount to $2.80x$. On the basis of the above equations, the point of difference can be ascertained as follows:

$$2.80x = 20,000 + 2.4x$$

$$\text{Or } x = 50,000 \text{ units}$$

This means that as long as the Golden Pet Ltd. has the surplus time available to produce more than 50,000 toys, it is better to produce them than to buy them from outside. However, if the firm has time to produce less than 50,000 toys, it would be better give the job to a sub-contractor and thus, avoid the fixed cost of ₹20,000. Thus, Golden Pet Ltd. must have more than 1,250 hours (50,000/40 units per hour) of machine time to justify the production of toys by itself as compared to sub-contracting the job.

- (iv) (a) The firm decided to manufacture 64,000 toys and sub-contract the manufacture of 36,000 toys. This has resulted in production of only 8,40,000 bottles. The economics of this decision would be as under:

| Particulars | Bottles Produced 8,40,000 units | Toys | | Total |
|----------------------|--|-----------------------------|------------------------------|----------|
| | | Produced 64,000 units | Sub-Cont. 36,000 units | |
| | (₹) | (₹) | (₹) | (₹) |
| Sales | 4,20,000 | 1,92,000 | 1,08,000 | 7,20,000 |
| Less: Variable Costs | | | | |
| (8,40,000 × ₹0.20) | 1,68,000 | --- | --- | |
| (64,000 × ₹2.40) | --- | 1,53,600 | --- | |
| (36,000 × ₹2.80) | --- | --- | 1,00,800 | 4,22,400 |
| Contribution | 2,52,000 | 38,400 | 7,200 | 2,97,600 |
| Less: Fixed Costs | 2,00,000 | 20,000 | --- | 2,20,000 |
| Profit | 52,000 | 18,400 | 7,200 | 77,600 |

- (b) In case the Management is of the opinion that the demand for bottles would be 9,00,000 it would have realised that only 1,000 machine hours would be available. In such a case, since the contribution per hour from bottles is higher as compared to that of toys, the management would have produced 9,00,000 bottles requiring 9,00,000 hours. The entire order for supply of 1,00,000 toys would have been given to the sub-contractor as per analysis in (iii) above. The economics of such alternative would be as under:

| Particulars | Bottles Made 9,00,000 units | Toys Sub-contracted 1,00,000 units | Total |
|----------------------|--------------------------------|---------------------------------------|----------|
| | (₹) | (₹) | (₹) |
| Sales | 4,50,000 | 3,00,000 | 7,50,000 |
| Less: Variable costs | | | |
| (9,00,000 × ₹0.20) | 1,80,000 | | |
| (1,00,000 × ₹2.80) | | 2,80,000 | 4,60,000 |
| Contribution | 2,70,000 | 20,000 | 2,90,000 |
| Less: Fixed Costs | 2,00,000 | --- | 2,00,000 |
| Profit | 70,000 | 20,000 | 90,000 |

Thus, the Cost of the Prediction Error of ₹ 12,400, Calculated as under-

| | |
|---|----------|
| Net Profit of Optimal Action [as per (iv) (b)] | ₹ 90,000 |
| Net Profit of Actual Production [as per (iv) (a)] | ₹ 77,600 |
| Cost of Prediction Error | ₹ 12,400 |

Decision on Capacity Utilization

Problem-52

AB Ltd. manufactures product 'X'. the company operates single shift of 8 hours for 300 days in a year. The capital employed in the business is ₹ 18 crores.

The manufacturing operations of the company comprise of four production departments. The company at present produces 9,000 units of product 'X' at maximum capacity. However, the capacity utilization of all the four departments are not equal and the present individual capacity utilizations are as under:

| Department | Capacity Utilisation (%) |
|------------|--------------------------|
| A..... | 75 |
| B..... | 100 |
| C..... | 70 |
| D..... | 50 |

The present return on capital of the company has gone down to 10% from the earlier cut-off rate of 15% due to increased cost of production.

As the company cannot operate more than one shift, the management is considering two alternative proposals to increase the return on capital employed.

Alternative I

To hire out the surplus capacity of departments A, C and D. The cost and revenue projections are as under:

| Department | Hire Charges per Hour | Incremental Cost per Hour |
|------------|-----------------------|---------------------------|
| A | 2,500 | 2,000 |
| C | 1,800 | 1,500 |
| D | 1,600 | 1,200 |

Alternative II

To increase the installed capacity of the factory to 12,000 units by adding plant and machinery in department B at a capital cost of ₹ 4 crore. Any Balance surplus capacity in other departments after meeting the increased volume to be hired out as per alternative I. The additional units would fetch incremental revenue of ₹ 1,600 per unit.

Required

Evaluate the two proposals and suggest to the management, which of the two proposals is to be accepted.

 Solution

Alternative-I

Statement Showing "Net Revenue"

| Production | Surplus Capacity Hours | Hire Charges per hour | Total Revenue (₹ Lacs) | Incremental Costs per hour (₹) | Total Cost (₹ Lacs) | Net Revenue (₹ Lacs) |
|---|------------------------|-----------------------|------------------------|--------------------------------|---------------------|----------------------|
| | (a) | (b) | (c)=(a)×(b) | (d) | (e)=(a)×(d) | (f)=(c)-(e) |
| A | 600 | 2,500 | 15.00 | 2,000 | 12.00 | 3.00 |
| B | 720 | 1,800 | 12.96 | 1,500 | 10.80 | 2.16 |
| D | 1,200 | 1,600 | 19.20 | 1,200 | 14.40 | 4.80 |
| <i>Add.</i> Present Income (10% of ₹1,800 lacs) | | | | | | 180.00 |
| Total return | | | | | | 189.96 |

$$\begin{aligned}
 \text{Return on Investment} &= \frac{\text{Total Return}}{\text{Total Investment}} \times 100 \\
 &= \left(\frac{189.96 \text{ lacs}}{1,800 \text{ lacs}} \right) \times 100 \\
 &= 10.553\%
 \end{aligned}$$

Alternative-II

Statement Showing "Net Revenue"

| Production | Surplus Capacity Hours | Hire Charges per hour | Total Revenue (₹ Lacs) | Incremental Costs per hour (₹) | Total Cost (₹ Lacs) | Net Revenue (₹ Lacs) |
|---|------------------------|-----------------------|------------------------|--------------------------------|---------------------|----------------------|
| | (a) | (b) | (c)=(a)×(b) | (d) | (e)=(a)×(d) | (f)=(c)-(e) |
| C | 160 | 1,800 | 2.88 | 1,500 | 2.40 | 0.48 |
| D | 800 | 1,600 | 12.80 | 1,200 | 9.60 | 3.20 |
| <i>Add.</i> Revenue Earned on Additional Units (3,000 units × ₹1,600) | | | | | | 48.00 |
| <i>Add.</i> Present Income on Investment (10% × ₹1,800 lacs) | | | | | | 180.00 |
| Total Return | | | | | | 231.68 |

$$\begin{aligned} \text{Return on Investment} &= \left(\frac{231.68 \text{ lacs}}{2,200 \text{ lacs}} \right) \times 100 \\ &= 10.53\% \end{aligned}$$

Evaluation of two alternative proposals-

Since the return on investment under Alternative-I is more than that under Alternative- II; therefore it should be accepted.

Working Notes

- Statement of total available, utilized and surplus capacity hours when 9,000 units of product 'X' are produced.

| Departments | Available Capacity Hours | Capacity Utilized | | Surplus Capacity Hours |
|-------------|-------------------------------|-------------------|-----------------|------------------------|
| | | (in %) | (in hours) | |
| (1) | (2) | (3) | (4) = (2) × (3) | (5)=(2) - (4) |
| A | 2,400 (300 days × 8 hours) | 75 | 1,800 | 600 |
| B | 2,400 | 100 | 2,400 | NIL |
| C | 2,400 | 70 | 1,680 | 720 |
| D | 2,400 | 50 | 1,200 | 1,200 |

- Statement of total available, utilized and surplus capacity hours when 12,000 units of product 'X' are produced.

| Production Department | Available Capacity (Hours) | Capacity Utilization on 9,000 Units | | Balance Capacity Hours | Unit per Hour $\left(\frac{9,000 \text{ units}}{1,800 \text{ hrs.}} \right)$ | Hours Required for 3,000 Additional Units | Surplus Capacity Hours |
|-----------------------|----------------------------|-------------------------------------|---------|------------------------|--|---|------------------------|
| | | (%) | (Hours) | | | | |
| A | 2,400 | 75 | 1,800 | 600 | $\left(\frac{9,000 \text{ units}}{1,800 \text{ hrs.}} \right)$ | 600 | Nil |
| B | 2,400 | 100 | 2,400 | Nil | $\left(\frac{9,000 \text{ units}}{2,400 \text{ hrs.}} \right)$ | 800 | Nil |
| C | 2,400 | 70 | 1,680 | 720 | 5.36 | 560 | 160 |

| | | | | | | | |
|---|-------|----|-------|-------|--|-----|-----|
| | | | | | $\left(\frac{9,000 \text{ units}}{1,680 \text{ hrs.}}\right)$ | | |
| D | 2,400 | 50 | 1,200 | 1,200 | 7.5 $\left(\frac{9,000 \text{ units}}{1,200 \text{ hrs.}}\right)$ | 400 | 800 |

Decision on Choice of Supplier / Customer

Problem-53

A manufacturing company produces a chemical product which passes through two processes factory and finishing. It has the capacity to process an input of 1,00,000 kgs. of raw material. Normal scrap will be 10% and 5% of input in factory and finishing process respectively. The realisable volume of such scrap is ₹ 4 and ₹ 8 per kg. respectively for factory and finishing process to be credited against the cost of respective process.

Relevant cost data for the coming year are:-

| | Factory Process | Finishing Process |
|--------------|-----------------|-------------------|
| | (₹) | (₹) |
| Direct Wages | 6,00,000 | 5,50,000 |
| Overheads | 2,28,000 | 4,22,900 |

There are three possible sources of purchase of raw – materials:

| Supplier | Purchase Price per kg. (₹) | Maximum Quantity (kgs.) |
|----------|----------------------------|--|
| X | 5.00 | 60,000 |
| Y | 5.60 | 80,000 |
| Z | 5.30 | Provided entire quantity of 1,00,000 kgs is ordered, otherwise at ₹ 5.80 per kg. |

In each case the company is required to collect the raw – materials from the Godown of supplier. Variable transport cost depends upon the distance involved. The same are as under:

| Supplier | X | Y | Z |
|-------------------------|----------|----------|----------|
| Transport cost (per kg) | 30 paise | 25 paise | 25 paise |

Fixed transport cost would be ₹ 1,00,000 per annum irrespective of the supplier to be contacted. The output of the finishing process can be sold to three prospective customers, their offer being as follows-

| Customer | Price per kg. of Output (₹) | Trade Discount (%) | Conditions |
|----------|-----------------------------|--------------------|---|
| A | 32.50 | 2 | Maximum quantity 40,000 kgs. |
| B | 32.00 | 2 | Maximum quantity 80,000 kgs. |
| C | 30.90 | - | Provided the entire output is sold to him |

In case of supplies to customers A and B, the fixed delivery costs will be ₹ 1,500 per month and the variable delivery costs will be 65 paise and 36 paise per kg. respectively.

Customer C will collect the entire output from the warehouse of the company.

Required

Indicate with reasoning-

- (i) Choice of supplier with comparative cost tables.
- (ii) Choice of customer with comparative tables of net realisation.

Also prepare the statements showing process costs and overall results.



Solution

- (i) Choice of Suppliers

Comparative Cost Tables of Suppliers

| Particulars | X | Y | Z | |
|--------------------------------------|-------------------|-------------------|-------------------------|---------------|
| | Up to 60,000 kgs. | Up to 80,000 kgs. | Less than 1,00,000 kgs. | 1,00,000 kgs. |
| | (₹) | (₹) | (₹) | (₹) |
| Purchase Price per kg. | 5.00 | 5.60 | 5.80 | 5.30 |
| Variable Transportation Cost per kg. | 0.30 | 0.25 | 0.25 | 0.25 |
| Total Cost per kg. | 5.30 | 5.85 | 6.05 | 5.55 |

Alternatives Available

Either

To purchase 60,000 kgs. from X as the rate offered is cheapest and the balance of 40,000 kgs. from Y.

Or

To purchase the entire quantity of 1,00,000 kgs. from Z.

Cost of Purchase for Above Alternatives

| Supplier | Quantity (kgs.) | Rate (₹) | First Alternative (₹) | Second Alternative (₹) |
|----------|-----------------|----------|-----------------------|------------------------|
| X | 60,000 | 5.30 | 3,18,000 | --- |
| Y | 40,000 | 5.85 | 2,34,000 | --- |
| Z | 1,00,000 | 5.55 | --- | 5,55,000 |
| | | | 5,52,000 | 5,55,000 |

Recommendation

Raw-materials should be purchased 60,000 kgs. from X and 40,000 kgs. from Y as the cost of purchase as per first alternative is less than that of the second alternative.

(ii) **Choice of Customer**

Output to be Sold

| | Kgs |
|---|----------|
| Input in Factory Process | 1,00,000 |
| <i>Less: Normal Scrap (10% of input)</i> | 10,000 |
| Output of Factory Process | 90,000 |
| <i>Less: Normal scrap in Finishing Process (5% of 90,000)</i> | 4,500 |
| Output of Finishing Process | 85,500 |

Relevant Data of Selling Price

| Particulars | Customers | | |
|--|-------------------|-------------------|-------------------|
| | A | B | C |
| | Up to 40,000 Kgs. | Up to 80,000 Kgs. | Up to 85,500 Kgs. |
| | (₹) | (₹) | (₹) |
| Selling Price <i>per kg.</i> | 32.50 | 32.00 | 30.90 |
| <i>Less: Trade Discount (2%)</i> | 0.65 | 0.64 | --- |
| Net Price | 31.85 | 31.36 | 30.90 |
| <i>Less: Variable Cost of Delivery per kg.</i> | 0.65 | 0.36 | --- |
| Net Realization <i>per kg.</i> | 31.20 | 31.00 | 30.90 |

Alternatives Available

Though the rates of customers A and B are favourable in comparison with C, there are fixed costs in case the output is sold to A and B; so alternatives available are-

Either

To supply 40,000 kgs. to A and balance quantity of 45,500 kgs. to B.

Or

To supply the entire quantity of 85,500 kgs. to C.

Net Realisation Based on Above Alternatives

First Alternative

| Customer | Quantity (kgs.) | Rate (₹) | Amount (₹) |
|---|-----------------|----------|------------------|
| A | 40,000 | 31.20 | 12,48,000 |
| B | 45,500 | 31.00 | 14,10,500 |
| <i>Less: Fixed Delivery Costs (₹1,500 × 12)</i> | | | 18,000 |
| Net Realisation | | | 26,40,500 |

Second Alternative

| Customer | Quantity (kgs.) | Rate (₹) | Amount (₹) |
|----------|-----------------|----------|------------|
| C | 85,500 | 30.90 | 26,41,950 |

Recommendation

The entire output be sold to C as the net realisation as per second alternative is better than that under the first alternative.

(iii) **Statement Showing "Process Cost"**

| Factory Process | Quantity (kgs.) | Rate (₹) | Amount (₹) |
|--|-----------------|---------------|------------------|
| Raw – Materials | 1,00,000 | | 5,52,000 |
| Direct Wages | | | 6,00,000 |
| Fixed Transport Cost | | | 1,00,000 |
| Overhead | | | 2,28,000 |
| Total | 1,00,000 | | 14,80,000 |
| <i>Less: Wastage [(10%), ₹4 per kg.]</i> | 10,000 | | 40,000 |
| Cost of Factory Process (transferred to finishing process) | 90,000 | 16.00* | 14,40,000 |

2.141 Advanced Management Accounting

$$* \left[\left(\frac{\text{₹}14,40,000}{90,000\text{kgs.}} \right) = \text{₹}16 \right]$$

| Finishing Process | Quantity (kgs.) | Rate (₹) | Amount (₹) |
|----------------------------------|-----------------|----------|------------|
| Transferred from Factory Process | 90,000 | 16.00 | 14,40,000 |
| Direct Wages | | | 5,50,000 |
| Overhead | | | 4,22,900 |
| Total | 90,000 | | 24,12,900 |
| Less: Wastage [(5%), ₹8 per kg.] | 4,500 | | 36,000 |
| Cost of Output | 85,500 | 27.80* | 23,76,900 |

$$* \left[\left(\frac{\text{₹}23,76,900}{85,500\text{kgs.}} \right) = \text{₹}27.80 \right]$$

(iv) Overall Results for 85,500 Kgs.

| | Rate (₹) | Amount (₹) |
|----------------------|----------|------------|
| Sale to Customer C | 30.90 | 26,41,950 |
| Less: Cost of Output | 27.80 | 23,76,900 |
| Net Results (Profit) | 3.10 | 2,65,050 |

Problem-54

Tista Ltd. has set up a treatment plant at Surat. The company uses raw material 'X' to convert into finished product 'XA' after treatment in its plant having a capacity to treat 60,000 tonnes of 'X' per annum. There is no loss of raw material in the treatment process. The variable costs of treatment are ₹ 5 per tonne and the annual fixed costs amount to ₹ 7,50,000.

The company owns a fleet of vehicles to transport 260 lakhs tonnes-kms. of 'X' to the factory site. The fixed costs of maintaining these vehicles amount to ₹ 10,40,000 per annum and the variable costs amount to 8 paise per tonne-km. The company delivers 'XA' to customers through another transport agency at 15 paise per tonne-km., subject to a minimum annual payment of ₹ 1,25,000. facilities for hiring the transport for incoming of 'X' and outgoing of 'XA' are also available through Chamba Transport Co. at a cost of 18 paise per tonne -km.

The company has three sources of procurement of raw material 'X', the relevant details being :

| | Source of Procurement | | |
|----------------------------------|-----------------------|--------|--------|
| | Town A | Town B | Town C |
| Quantity Available (tonnes p.a.) | 9,000 | 8,000 | 45,000 |
| Distance from Surat (kms.) | 300 | 250 | 500 |
| Price Offered (per tonne) (₹) | 90 | 110 | 78 |

The company has demand of its finished product 'XA' from the following customers :

| Customer | Demand (tonnes p.a.) | Price (per tonne) (₹) | Delivery Terms | Distance from Surat (kms.) |
|----------|----------------------|-----------------------|--------------------|----------------------------|
| L | 6,000 | 200 | At Customer's Site | 9 |
| M | 6,000 | 188 | Ex - Factory Surat | - |
| N | 15,000 | 170 | Ex - Factory Surat | - |
| O | 9,000 | 150 | Ex - Factory Surat | - |
| P | 10,000 | 192 | At Customer's Site | 22 |
| Q | 9,000 | 220 | At Customer's Site | 14 |
| R | 10,000 | 200 | At Customer's Site | 25 |

Required

- (i) Recommend the best proposal for the purchase of raw material 'X'; the break - up of sale of finished product 'XA'; and transport plan for incoming and outgoing goods with a view to maximise the profit.
- (ii) Present a statement to show net profit as per above recommendation.



Solution

- (i) Transport Plan for Incoming Good (Refer to W.N. 1 & 2)

| Sources | Quantities to be Transported (tonnes) | Distance of Source Town from Surat (kms) | Tonnes - km (Lakhs) |
|---------|---------------------------------------|--|---------------------|
| Town A | 9,000 | 300 | 27 |
| Town B | 8,000 | 250 | 20 |
| Town C | 42,600 | 500 | 213* |
| | 59,600 | | 260 |

Total capacity of own fleet is 260 tonnes - km. Therefore, balancing figure from town C would be 213 lakhs tonnes - km or 42,600 tonnes (213,00,000/500 km).

(ii) Best Proposal for the Purchase of Raw Material 'X':

On the basis of the ranking as suggested under working note 2 and (i), the best proposal for the purchase of raw material X, indicating sources of procurement along with their quantities is as under:

| Sources | Annual Quantity to be purchased (Tonnes) |
|---------------------------|--|
| Town A | 9,000 |
| Town B | 8,000 |
| Town C (Balancing Figure) | 42,600 |
| Total | 59,600 |

(iii) Break – up Sales of Finished Product 'XA'

| Customer | Demand Tonnes (p.a.) | Price / Tonne (₹) | Sales Value (₹ in '000) |
|----------|----------------------|-------------------|-------------------------|
| Q | 9,000 | 220 | 1,980 |
| R | 10,000 | 200 | 2,000 |
| L | 6,000 | 200 | 1,200 |
| P | 10,000 | 192 | 1,920 |
| M | 6,000 | 188 | 1,128 |
| N | 15,000 | 170 | 2,550 |
| O | 3,600* | 150 | 540 |
| | 59,600 | | 11,318 |

(iv) Transportation Plan for outgoing goods

| | Alt.1 (₹) | Alt.2 (₹) |
|--|--------------|--------------|
| Cost of 6,50,000 tonne–km, 15p /18p per tonne–km (W.N.- 3) | 97,500 | 1,17,000 |
| Minimum Payment Guaranteed | 1,25,000 | - |
| Transportation Cost | 1,25,000 | 1,17,000 |

So Alternative-2, of M/s Chamba Transport Co. is Cheapest.

Statement of Net Profit based on above statement

| | (₹ in '000) |
|--|-------------|
| Sales [Refer to (iii)] | 11,318.00 |
| Less: Cost of Material ₹8,10,000 (9,000 tonnes × ₹90); ₹8,80,000 (8,000 tonnes × ₹110); ₹33,22,800 (42,600 tonnes × ₹78) | 5,012.80 |

| | |
|---|----------|
| Less: Transportation Cost (260 lakhs tonnes km × 0.08 + ₹10,40,000) | 3,120.00 |
| Less: Processing (treatment) Cost (59,600 × ₹ 5 + ₹ 7,50,000) | 1,048.00 |
| Less: Outward Transportation Cost [Refer to (iv)] | 117.00 |
| Net Profit | 2,020.20 |

Working Notes

1. Choice of Transportations Plan for Incoming Goods with a view to Maximise the Profit

| | |
|---|-------------|
| | (₹) |
| Variable Cost <i>per tonne – km.</i> | 0.08 |
| Share of Fixed Costs <i>per tonne – km.</i> (₹ 10,40,000/2,60,00,000 tonnes km.) | <u>0.04</u> |
| Cost <i>per tonne – km</i> (by using own vehicle) | <u>0.12</u> |

Since per tonne–km. cost of using own vehicles is less than that of other proposal of 18 paise per tonne–km. of Chamba Transport Co., the concern should continue to transport raw material 'X' by using its own fleet of vehicles.

2. Ranking for the Purchase of Raw Material 'X'

| | Town A | Town B | Town C |
|---|-----------------------|-----------------------|-----------------------|
| Distance from Surat (kms.) | 300 | 250 | 500 |
| Price Offered <i>per tonne</i> (₹) | 90 | 110 | 78 |
| Transportation Cost (₹) (Distance × ₹0.08) | 24 (300 km × 0.08) | 20 (250 km × 0.08) | 40 (500 km × 0.08) |
| Total Procurement Cost <i>per tonne</i> (₹) | 114 | 130 | 118 |
| Minimum Selling Price <i>per tonne</i> (₹) (Offered by Customer 'O') | 150 | 150 | 150 |
| Contribution <i>per tonne</i> (₹) | 36 | 20 | 32 |
| Contribution <i>per km.</i> (₹) | 0.12 | 0.08 | 0.064 |
| Ranking | I | II | III |

3. Total Tonne–Kms. of Transportation for Outgoing Goods

| Customer | Demand Tonnes (p.a.) | Distance from Surat Ex –Factory (km.) | Total (tonne–kms) |
|----------|-------------------------|--|----------------------|
| Q | 9,000 | 14 | 1,26,000 |

2.145 Advanced Management Accounting

| | | | |
|---|--------|-----|----------|
| R | 10,000 | 25 | 2,50,000 |
| L | 6,000 | 9 | 54,000 |
| P | 10,000 | 22 | 2,20,000 |
| M | 6,000 | --- | --- |
| N | 15,000 | --- | --- |
| O | 3,600 | --- | --- |
| | 59,600 | | 6,50,000 |

Problem-55

A and B are members of a cartel producing the same product arrangement, they cater to the entire needs of the market.

| | A | B |
|--|---------------|---------------|
| <i>Installed Capacity</i> | 20,000 units | 15,000 units |
| <i>Normal Working Efficiency</i> | 80% | 75% |
| <i>Details of Fixed Costs:</i> | | |
| - Up to 50% of Installed Capacity | ₹ 1,40,000 | ₹ 1,60,000 |
| - Between 51 % and 75% of Installed Capacity | ₹ 1,50,000 | ₹ 1,75,000 |
| - Beyond 75% of Installed Capacity | ₹ 1,80,000 | ₹ 2,00,000 |
| <i>Variable Costs</i> | ₹ 50 per unit | ₹ 45 per unit |

| |
|---|
| <i>Selling Price ₹ 80 per unit</i> |
| <i>Market Demand is 25,000 units</i> <i>(The Demand is Satisfied by A and B in the Ratio of 3 : 2)</i> |

In 2014, it is anticipated that a recession will set in and consequently, the total market demand for the product will only be 50% of the present position. Market price will suffer a reduction by 20%. The members agree that either of them will cater to the needs of the market fully, paying the other 40% of the profits from sales.

You are informed that the additional costs of improving machine efficiency beyond the present limits will be ₹ 15,000 and ₹ 25,000 for A and B respectively.

Required

Ascertain which of the members will find it profitable to work? Workings must form part of your answer.

 Solution

Statement Showing "Anticipated Profits from Sales of 12,500 Units"
(When A and B Individually Cater the Needs of the Market Fully)

| | A | B |
|--|-----------|-----------|
| Selling Price at ₹ 64 per unit (after 20% price reduction) | ₹8,00,000 | ₹8,00,000 |
| <i>Less: Variable Costs</i> | | |
| A (₹50 per unit) | 6,25,000 | --- |
| B (₹45 per unit) | --- | 5,62,500 |
| Contribution | 1,75,000 | 2,37,500 |
| <i>Less: Fixed Costs {W.N.-(ii) & (iii)}</i> | 1,50,000 | 2,25,000 |
| Profits | 25,000 | 12,500 |

The above statement shows that it is profitable for A to work. In case A is authorized to work, he will contribute ₹10,000 (being 40% of ₹25,000) from the profits to B and retain the balance for himself.

Similarly, if B is authorized to work, he will pay ₹5,000 (being 40% of ₹12,500) to A and retain the balance for himself.

Note

It has been assumed that the party not operating during recession will be able to make profitable use of the installed capacity for recovering minimum fixed costs by resorting to an alternative use.

Working Note**Position in 2014**

- (i) Expected Demand is to be 50% of 25,000 units i.e. 12,500 units.
- (ii) Working Efficiency (of installed capacity) required for independent operation to produce 12,500 units:

| A | B |
|---|--|
| $\left[\left(\frac{12,500 \text{ units}}{20,000 \text{ units}} \times 100 \right) = 62.5\% \right]$ | $\left[\left(\frac{12,500 \text{ units}}{15,000 \text{ units}} \times 100 \right) = 83.33\% \right]$ |

(iii) Fixed Cost *to be incurred*:

| | A (₹) | B (₹) |
|--|----------|----------|
| Between 51 % and 75% of Installed Capacity | 1,50,000 | - |
| Beyond 75% of Installed Capacity | - | 2,00,000 |
| Additional Cost <i>on improving machine efficiency</i> | - | 25,000 |
| Total Fixed Cost | 1,50,000 | 2,25,000 |

Marketing Decision

Problem-56

Better and Best Ltd. manufacture only one product. Production is regular throughout the year and the capacity of the factory is 1,50,000 units per annum. The summarized Profit and Loss Account for the year ended 31st December is being reviewed by the Board of Directors.

| | |
|------------------------------------|-----------|
| | ₹ |
| Sales @ ₹ 10 per unit..... | 10,00,000 |
| Cost of sales: | |
| Direct materials..... | 2,50,000 |
| Direct labour..... | 1,50,000 |
| Production overheads: | ₹ |
| Variable..... | 30,000 |
| Fixed..... | 2,30,000 |
| Administrative overheads: | |
| Fixed..... | 1,00,000 |
| Selling and distribution overhead: | |
| Variable..... | 50,000 |
| Fixed..... | 1,50,000 |

- (i) *The Production Director proposed to reduce selling price to ₹ 9 in order to utilize full capacity.*
- (ii) *The Sales Director proposed to increase selling price by 20 percent. By spending ₹ 2,25,000 on advertisement, sales will be increased to 1,20,000 units per annum.*
- (iii) *The Personnel Director pleaded for a change in the method of wage payment. For the present piece rate of ₹ 1.50 per unit, a bonus scheme (for each 2% increase in production over the target, there would be an increase of 1% in the basic wage of each*

employee) will be implemented. A target of 2,000 units per week for the company will be set for 50 week year. Selling price increase by 10%. With an additional advertisement cost of ₹ 1,60,000, 20% increase in present sales will be achieved.

- (iv) The Chairman felt that the packaging of the product required improvement. He wanted to know the sales required to earn a target profit of 10% on turnover with the introduction of an improved packing at an additional cost of 20 paise per unit (no change in selling price).

Required

Evaluate individually the proposals of each of the board member and give your recommendation.



Solution

Workings

Full Capacity: ₹1,50,000 units p.a.

Current Capacity: ₹1,00,000 units p.a. which is equals to 66.67% of full capacity.

Existing Situation

| Particulars | Amount (₹) | Per Unit (₹) |
|-----------------------------------|------------|--------------|
| Sales (1,00,000 units × ₹10) | 10,00,000 | 10.00 |
| Less: Variable Cost | | |
| Direct Material | 2,50,000 | 2.50 |
| Direct Labour | 1,50,000 | 1.50 |
| Production Overheads | 30,000 | 0.30 |
| Selling and Distribution Overhead | 50,000 | 0.50 |
| Contribution | 5,20,000 | 5.20 |
| Less: Fixed Cost | | |
| Production Overheads | 2,30,000 | 2.30 |
| Administrative Overheads | 1,00,000 | 1.00 |
| Selling and Distribution Overhead | 1,50,000 | 1.50 |
| Profit | 40,000 | 0.40 |

Proposal (i) –

Reduce Selling Price to ₹ 9, Capacity Utilization 100%

2.149 Advanced Management Accounting

| Particulars | Amount (₹) |
|--|------------|
| Sales (1,50,000 units × ₹ 9) | 13,50,000 |
| Less: Variable Cost (1,50,000 units × ₹4.80) | 7,20,000 |
| Contribution | 6,30,000 |
| Less: Fixed Cost | 4,80,000 |
| Profit | 1,50,000 |

Proposal (ii) –

Increase in Selling Price by 20%, Additional Advertising Cost ₹ 2,25,000, Sales Volume 1,20,000 units per annum

| Particulars | Amount (₹) |
|--|------------|
| Sales (1,20,000 units × ₹12) | 14,40,000 |
| Less: Variable Cost (1,20,000 units × ₹4.80) | 5,76,000 |
| Contribution | 8,64,000 |
| Less: Fixed Cost | 4,80,000 |
| Less: Advertising Cost | 2,25,000 |
| Profit | 1,59,000 |

Proposal (iii) –

Increase in Selling Price by 10%, Additional Advertising Cost ₹ 1,60,000, 20% Increase in Present Sales and Bonus Scheme (for each 2% increase in production over the target, there would be an increase of 1% in the basic wages of each employee)

| Particulars | Amount (₹) |
|---|------------|
| Sales (1,20,000 units × ₹ 11) | 13,20,000 |
| Less: Variable Cost [1,20,000 units × ₹(2.50 + 1.65* + 0.30 + 0.50)] | 5,94,000 |
| Contribution | 7,26,000 |
| Less: Fixed Cost | 4,80,000 |
| Less: Advertising Cost | 1,60,000 |
| Profit | 86,000 |

Workings

| | | |
|--------------------------|---|------------------------|
| Present Labour Rate | = | ₹1.50 per unit |
| Target Production Volume | = | 2,000 units × 50 weeks |
| | = | 1,00,000 units |

Production above the target volume = 1,20,000 units – 1,00,000 units
 = 20,000 units

Or 20% of Target Production Volume

Bonus (for each 2% increase in production over the target, there would be an increase of 1% in the basic wages of each employee)

$$= \frac{1\%}{2\%} \times 20\%$$

$$= 10\% \text{ increase in basic wages.}$$

It means wages would be ₹ 1.65 (₹ 1.50 × 1.10) per unit.

Proposal (iv) –

Target Profit 10% on Turnover, Additional Packing Cost 0.20 paise per unit, No Change in Selling Price, Sales Volume =?

Let Sales Volumes is K units.

| Particulars | Amount (₹) |
|--|-------------|
| Sales (K units × ₹ 10) | 10K |
| Less: Variable Cost [K units × ₹(4.80 + 0.20)] | 5K |
| Contribution | 5K |
| Less: Fixed Cost | 4,80,000 |
| Profit | 5K-4,80,000 |

Profit equals to 10% of Turnover. It means-

$$5K - 4,80,000 = 10\% \text{ of } 10K$$

$$4K = 4,80,000$$

$$K = 1,20,000 \text{ units}$$

$$\text{Turnover} = 1,20,000 \text{ units} \times ₹ 10$$

$$= ₹12,00,000$$

$$\text{Profit} = 10\% \text{ of } ₹ 12,00,000$$

$$= ₹1,20,000$$

| Particulars | Capacity Utilization | Profit (₹) |
|--------------------|----------------------|------------|
| Existing Situation | 66.67% | 40,000 |
| Proposal (i) | 100.00% | 1,50,000 |
| Proposal (ii) | 80.00% | 1,59,000 |
| Proposal (iii) | 80.00% | 86,000 |
| Proposal (iv) | 80.00% | 1,20,000 |

Problem-57

Neelgagan Ltd. manufactures a range of products which it sells through manufacturer's agents to whom it pays commission of 20% of the selling price of the products. Its budgeted profit and loss statement for 2013 is as follows:

| | (₹) |
|-------------------------------------|-----------|
| Sales | 22,50,000 |
| Prime Costs and Variable Overhead | 7,87,500 |
| Fixed Overhead | 3,62,500 |
| Selling Costs: | |
| Commission to Manufacturer's Agents | 4,50,000 |
| Sales Office Expenses (Fixed) | 20,000 |
| Administration Costs (Fixed) | 3,00,000 |
| Profit | 3,30,000 |

Subsequent to the preparation of the above budgeted profit and loss statement, the company is faced with a demand from its agents for an increase in their commission to 22% of selling price. As a result, the company is considering whether it might achieve more favourable results if it were to discontinue the use of manufacturer's agents and, instead employ its own sales force. The costs that this could involve are budgeted as follows:

| | (₹) |
|--|--------|
| Sales Manager (Salary and Expenses) | 75,000 |
| Salesmen's Expenses (including Travelling Costs) | 20,000 |
| Sales Office Costs (additional to Present Costs) | 50,000 |
| Interest and Depreciation on Sales Department Cars | 35,000 |

In addition to the above, it will be necessary to hire four salesmen at a salary of ₹ 40,000 per annum each plus commission of 5% on sales plus car allowance of ₹1 per kilometre to cover all costs except interest and depreciation.

On the assumption that the company decide to employ its own sales force on the above terms.

Required

- (i) *What is the maximum average kilometre per annum that salesmen could travel if the Company is to achieve the same budgeted profit as would have obtained by retaining the manufacturer's agents and granting them the increased commission they had requested. Assume that sales in each case would be as budgeted.*

- (ii) At what level of sales would the original budgeted profit be achieved if each salesman were to travel an average of 14,000 kilometres per annum. Assume that all other assumptions inherent in the budgets were maintained.
- (iii) What is the maximum level of commission on sales that the company could afford to pay if it wished to achieve a 10% increase in its original budgeted profit and expected a 16% increase in sales (at budgeted selling prices) and average of 16,000 kilometres per annum to be travelled by each salesman.

 **Solution**

- (i) The economics of employing company's own sales force can be determined as under:

| (₹) | |
|--|----------|
| Savings: | |
| Saving in Existing Commission (20% of Sales) | 4,50,000 |
| Saving in Proposed Increase in Commission (2% of Sales) | 45,000 |
| Total Savings in Commission ... (i) | 4,95,000 |
| Additional Costs (excluding Salesman's Car Allowance): | |
| Commission 5% on Sales | 1,12,500 |
| Sales Manager (Salary and Expenses) | 75,000 |
| Salesmen's Expenses (including Travelling Costs) | 20,000 |
| Sales Office Costs | 50,000 |
| Interest and Depreciation on Sales Department Cars | 35,000 |
| Salesmen's Salary (4 × ₹40,000) | 1,60,000 |
| Total Costs ... (ii) | 4,52,500 |
| Net Savings prior to paying Car Allowance ... (i) – (ii) | 42,500 |

The above computations show that there would be a net saving (excluding salesmen's car allowance) to achieve the same budgeted profit as company would have obtained by retaining the manufacturer's agents and granting them increased commission. Since the car allowance of salesmen is ₹1 per km., the maximum total kilometers to be travelled by all the salesmen would amount to 42,500. The number of salesman being 4, the maximum average kilometers per salesman would amount to 10,625 (i.e. 42,500 / 4).

- (ii) Computation of P/V Ratio after employing own sales force:

| | |
|-------|-----------|
| | (₹) |
| Sales | 22,50,000 |

2.153 Advanced Management Accounting

| | |
|---------------------------------|-----------------|
| Less: Variable Production Costs | 7,87,500 |
| Commission (5%) | <u>1,12,500</u> |
| Contribution | 13,50,000 |

P/V Ratio:

$$= \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$= \frac{\text{₹13,50,000}}{\text{₹22,50,000}} \times 100$$

$$= 60\%$$

The Fixed Cost and Profit to be covered are:

| | (₹) |
|--|-----------|
| Original Fixed Costs (₹3,62,500 + ₹20,000 + ₹3,00,000) | 6,82,500 |
| Additional Fixed Cost (₹75,000 + ₹20,000 + ₹50,000 + ₹35,000 + ₹1,60,000) | 3,40,000 |
| Total Fixed Costs | 10,22,500 |
| Car Allowance [(14,000 km × 4) × ₹1] | 56,000 |
| Profit | 3,30,000 |
| Total Contribution Required | 14,08,500 |

Total Required Level of Sales:

$$= \frac{\text{Required Contribution}}{\text{P / V Ratio}}$$

$$= \frac{\text{₹14,08,500}}{60} \times 100$$

$$= \text{₹23,47,500}$$

(iii) Percentage of Variable Production Cost of Sales:

$$= \frac{\text{₹7,87,500}}{\text{₹22,50,000}} \times 100$$

$$= 35\%$$

Economics of New Plan (before commission):

| | (₹) |
|--|-----------|
| Sales (₹22,50,000 + 16% of ₹22,50,000) | 26,10,000 |
| Less: Variable Production Cost (35%) | 9,13,500 |
| Contribution | 16,96,500 |
| Less: Fixed Costs | 10,22,500 |
| Car Allowance [(16,000 km × 4) × ₹1] | 64,000 |
| Margin Available | 6,10,000 |
| Profit Required (₹3,30,000 + 10% of ₹3,30,000) | 3,63,000 |
| Amount Available for Commission | 2,47,000 |

$$\begin{aligned}
 \text{Maximum Level of Commission on Sales} &= \frac{\text{Amount Available for Commission}}{\text{Total Sales}} \times 100 \\
 &= \frac{\text{₹ 2,47,000}}{\text{₹ 26,10,000}} \times 100 \\
 &= 9.46\%
 \end{aligned}$$

Problem-58

The financial controller of ACE Ltd. has prepared the following estimates of working results for the year ending 31st March, 2013:

| | Year ending 31.3.2013 |
|-------------------------------|-----------------------|
| Direct Material (₹ / unit) | 16.00 |
| Direct Wages (₹ / unit) | 40.00 |
| Variable Overheads (₹ / unit) | 12.00 |
| Selling Price (₹ / unit) | 125.00 |
| Fixed Expenses (₹) | 6,75,000 per annum |
| Sales (₹) | 25,00,000 per annum |

During the year 2013-14, it is expected that the material prices and variable overheads will go up by 10% and 5% respectively. As a result of re-engineering of business processes, the overall direct labour efficiency will increase by 12%, but the wage rate will go up by 5%. The fixed overheads are also expected to increase by ₹ 1,25,000.

The Vice-President Manufacturing states that the same level of output as obtained in 2012-13 should be maintained in 2013-14 also and efforts should be made to maintain the same level

2.155 Advanced Management Accounting

of profit by suitably increasing the selling price.

The Vice-President-Marketing states that the market will not absorb any increase in the selling price. On the other hand, he proposes that publicity involving expenses as given below will increase the quantity of sales as under:

| | | | | |
|----------------------------|--------|----------|----------|----------|
| Advertisement Expenses (₹) | 80,000 | 1,94,000 | 3,20,000 | 4,60,000 |
| Additional units of sales | 2,000 | 4,000 | 6,000 | 8,000 |

Required

- Present an Income Statement for 2013-14
- Find the Revised Price and the Percentage of increase in the price for 2013-14, if the views of the Vice-President-Manufacturing are accepted.
- Evaluate the four alternative proposals put-forth by the Vice-President-Marketing. Determine the best output level to be budgeted and prepare an over-all Income Statement for 2013-14 at that level of output.



Solution

- Statement of Income for the Year 2013- 14

| (₹) | |
|--|-----------|
| Sales Revenue (20,000 units × ₹ 125) (W.N.-1) | 25,00,000 |
| Less: Variable Cost (20,000 units × ₹ 67.70) (W.N.- 2) | 13,54,000 |
| Total Contribution | 11,46,000 |
| Less: Fixed Expenses | 8,00,000 |
| Profit | 3,46,000 |

- Statement of Revised Price - the Proposal of Vice-President - Manufacturing

| (₹) | |
|--|-----------|
| Variable Cost (20,000 units × ₹ 67.70) | 13,54,000 |
| Fixed Expenses | 8,00,000 |
| Profit (W.N.-4) | 4,65,000 |
| Desired Sales Revenue | 26,19,000 |
| Revised Selling Price <i>per unit</i> | 130.95 |
| Percentage Increase in Selling Price $\left(\frac{₹130.95 - ₹125.00}{₹125.00} \times 100 \right)$ | 4.76% |

(iii) Evaluation of Alternative Proposals of Vice-President - Marketing

| Additional Units of Sales: | 2,000 (₹) | 4,000 (₹) | 6,000 (₹) | 8,000 (₹) |
|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Total Contribution (W.N.-3) | 1,14,600 (2,000 × ₹57.30) | 2,29,200 (4,000 × ₹57.30) | 3,43,800 (6,000 × ₹57.30) | 4,58,400 (8,000 × ₹57.30) |
| Less: Advertisement Expenses | 80,000 | 1,94,000 | 3,20,000 | 4,60,000 |
| Additional Profit/(Loss) | 34,600 | 35,200 | 23,800 | (1,600) |

Evaluation of Four Alternatives

The Additional Profit is maximum at the Additional Sales of 4,000 units. Hence, the Second Alternative is the best out of the four Alternatives proposed by the Vice-President-Marketing. The concern should Produce and Sell 24,000 units during the year 2013-14.

Overall Income Statement for 2013-14 (Output and Sales: 24,000 units)

| | (₹) |
|---|-----------|
| Sales Revenue (24,000 units × ₹125) | 30,00,000 |
| Less: Variable Cost (24,000 units × ₹67.70) | 16,24,800 |
| Contribution | 13,75,200 |
| Less: Advertisement Expenses | 1,94,000 |
| Less: Fixed Expenses | 8,00,000 |
| Profit | 3,81,200 |

Working Note

- Number of units produced and sold for the year ending 31st March, 2013

$$= \frac{\text{Total Sales Revenue upto 31st March, 2013}}{\text{Selling Price per unit}}$$

$$= \frac{₹25,00,000}{₹125 \text{ per unit}}$$

$$= 20,000 \text{ units}$$
- Variable Cost *per unit*

| Particulars | 2012-13 (₹) | 2013 -14 (₹) |
|-----------------|-------------|----------------------------|
| Direct Material | 16 | 17.60 (₹16 + 10% × ₹16) |

2.157 Advanced Management Accounting

| | | |
|-------------------------------|----|------------------------------------|
| Direct Wages | 40 | 37.50 (₹40 x 100/112 x 105/100) |
| Variable Overheads | 12 | 12.60 (₹12 + 5% x ₹12) |
| Variable Cost <i>per unit</i> | 68 | 67.70 |

3. Contribution *per unit* during 2013-14 = ₹125 - ₹67.70
= ₹57.30
4. Profit in 2012 - 13
Contribution *per unit* = ₹125 - ₹68
= ₹57
- Total Contribution (20,000 units x ₹ 57 per unit) = ₹11,40,000
Less: Fixed Expenses = ₹ 6,75,000
Profit = ₹4,65,000

Problem-59

Thar Ltd. manufactures and markets three products A, B and C in the State of Haryana and Rajasthan. At the end of first half of 2011-12 the following absorption based profit statement has been drawn by the accountant.

(₹ in '000)

| | Haryana | Rajasthan | Total |
|-----------------------------|---------|-----------|-------|
| Sales | 3,000 | 900 | 3,900 |
| Manufacturing Cost of Sales | 2,331 | 699 | 3,030 |
| Gross Profit | 669 | 201 | 870 |
| Administration Expenses (A) | 120 | 36 | 156 |
| Selling Expenses (B) | 184 | 169 | 353 |
| Total Expenses | 304 | 205 | 509 |
| Net Profit | 365 | (-)4 | 361 |

(a) *The expenses are constant and common to both the States. They stand allocated on the basis of sales.*

(b) *The expenses are semi fixed but specifically relate to the respective State.*

The management is worried to note that the decision taken to market the products in Rajasthan to utilise idle capacity has proved wrong and wish to cover only Haryana State. The incharge marketing division is not satisfied with the above way of profit presentation. He is of the firm opinion that sales effected in the State of Rajasthan is contributing profits. For the

next half year he expects no increase in demand in Haryana while for Rajasthan he anticipates to sell B or C more by 50% of existing sales. This will utilise the idle capacity in full.

The product wise relevant details for the first half of 2011-12 are:

| | A | B | C |
|---|-------|-----|-----|
| Sales (in ₹ '000) | | | |
| Haryana | 1,200 | 900 | 900 |
| Rajasthan | 300 | 300 | 300 |
| Variable Costs (as a % on sales) : | | | |
| Manufacturing | 40 | 35 | 30 |
| Selling | 3 | 2 | 2 |
| Specific Fixed Manufacturing Expenses (in ₹ '000) | 570 | 470 | 610 |

Required

- (i) Prepare a State-wise profit statement for the first half of 2011-12 using contribution approach. Also offer your views on the contention of the management and opinion expressed by in charge marketing division.
- (ii) Prepare a product wise profit statement for the same period using contribution approach.
- (iii) Submit your well throughout recommendation as to which product should be produced to utilise idle capacity.



Solution

- (i) State-wise Profit Statement for the First Half of 2011-12 using Contribution Approach

(₹'000)

| | Haryana | Rajasthan | Total |
|-----------------------------|---------|-----------|-------|
| Sales (W.N.-1) | 3,000 | 900 | 3,900 |
| Less: Variable Costs: | | | |
| Manufacturing Cost (W.N.-1) | 1,065 | 315 | 1,380 |
| Selling Costs (W.N.-1) | 72 | 21 | 93 |
| Contribution: | 1,863 | 564 | 2,427 |
| Less: Specified Fixed Cost: | | | |

2.159 Advanced Management Accounting

| | | | |
|--|-------|-------|-------|
| Manufacturing Cost (W.N.-2) | 1,266 | 384 | 1,650 |
| Selling Cost (W.N.-2) | 112 | 148 | 260 |
| Net Contribution | 485 | 32 | 517 |
| <i>Less:</i> Common Fixed Costs (Administration) | | | 156 |
| Net Profit | | | 361 |
| P/V Ratio (in %) | 62.10 | 62.67 | 62.23 |

View

The contention of the management is not valid i.e. the state of Rajasthan shows ₹ 32,000 as contribution to meet the common fixed costs. In case only Haryana state is covered the net profit of the concern would go down from ₹3,61,000 to ₹3,29,000

In view of the above position, the statement made by the in charge of the marketing division appears to be correct.

(ii) **Product-wise Profit Statement for the First Half of 2011 – 12 using Contribution Approach** (₹ in '000)

| | A | B | C | Total |
|---|---------------------|--------------------|-------------------|-------|
| Total Sales of Haryana and Rajasthan | 1,500 | 1,200 | 1,200 | 3,900 |
| <i>Less:</i> Variable Costs: | | | | |
| Manufacturing Cost | 600 (1,500 x40%) | 420 (1,200x35%) | 360 (1,200x30) | 1,380 |
| Selling Cost | 45 (1,500 x3%) | 24 (1,200 x2%) | 24 (1,200 x2%) | 93 |
| Contribution | 855 | 756 | 816 | 2,427 |
| <i>Less:</i> Specified Fixed Costs: | | | | |
| Manufacturing Cost | 570 | 470 | 610 | 1,650 |
| Selling Cost (W.N.-3) | 100 | 80 | 80 | 260 |
| Net Contribution | 185 | 206 | 126 | 517 |
| <i>Less:</i> Common Fixed Administration Exp. | | | | 156 |

| | | | | |
|------------|-----|-----|-----|--------|
| Net Profit | | | | 361 |
| P/V Ratio | 57% | 63% | 68% | 62.23% |

(iii) Recommendation for Utilising Idle Capacity

A review of the above P/V Ratio's shows that the increase of output of Product - C in Rajasthan is the best. The increase of production after utilising the idle capacity in Rajasthan to the extent of ₹1,50,000 (i.e. 50% of ₹3,00,000) would increase the contribution of the company in the state of Rajasthan by ₹1,02,000 (68% x ₹1,50,000).

Working Notes

1. Variable Manufacturing and Selling Costs (in ₹'000)

| Products | Sales | | Mfg. Costs | | | Selling Costs | | |
|----------|-------|-----|------------|-------|-----|---------------|-----|-----|
| | Har | Raj | % | Har | Raj | % | Har | Raj |
| A | 1,200 | 300 | 40 | 480 | 120 | 3 | 36 | 9 |
| B | 900 | 300 | 35 | 315 | 105 | 2 | 18 | 6 |
| C | 900 | 300 | 30 | 270 | 90 | 2 | 18 | 6 |
| Total | 3,000 | 900 | | 1,065 | 315 | | 72 | 21 |

* Percentage of Sales

2. Specified Fixed Expenses (in ₹'000)

| | Manufacturing | | | Selling | | |
|--|---------------|-----|-------|---------|-----|-------|
| | Har | Raj | Total | Har | Raj | Total |
| Total Manufacturing Cost of Sales | 2,331 | 699 | 3,030 | 184 | 169 | 353 |
| Less: Variable Manufacturing and Selling Costs (Refer to W.N.-1) | 1,065 | 315 | 1,380 | 72 | 21 | 93 |
| Specified Fixed Costs | 1,266 | 384 | 1,650 | 112 | 148 | 260 |

3. Product Wise Specified Fixed Selling Expenses (in ₹'000)

| | Total | A | B | C |
|---|-------|-----|----|----|
| Fixed Selling Expenses of Haryana and Rajasthan <i>apportioned in proportion of their sales, viz. (15:12:12)</i> | 260 | 100 | 80 | 80 |

Selling Strategy

Problem-60

Ret Ltd., a retail store buys computers from Comp Ltd. and sells them in retail. Comp Ltd. pays Ret Ltd. a commission of 10% on the selling price at which Ret sells to the outside market. This commission is paid at the end of the month in which Ret Ltd. submits a bill for the commission. Ret Ltd. sells the computers to its customers at its store at ₹ 30,000 per piece. Comp Ltd. has a policy of not taking back computers once dispatched from its factory. Comp Ltd. sells a minimum of 100 computers to its customers.

Comp Ltd. charges prices to Ret Ltd. as follows:

₹ 29,000 per unit, for order quantity 100 units to 140 units.

₹ 26,000 per unit, for the entire order, if the quantity is 141 to 200 units. Ret Ltd. cannot order less than 100 or more than 200 units from Comp Ltd.

Due to the economic recession, Ret Ltd. will be forced to offer as a free gift, a digital camera costing it ₹ 4,500 per piece, which is compatible with the computer. These cameras are sold by another company, Photo Ltd. only in boxes, where each box contains 50 units. Ret Ltd. can order the cameras only in boxes and these cameras cannot be sold without the computer.

In its own store, Ret Ltd. can sell 110 units of the computer. At another far of location, Ret Ltd. can sell upto 80 units of the computer (along with its free camera), provided it is willing to spend ₹ 5,000 per unit on shipping costs. In this market also, the selling price that each unit will fetch is ₹ 30,000 per unit.

Required

- (i) State what is Ret's best strategy along with supporting calculations.
- (ii) Compute the break-even point in units, considering only the above costs.



Solution

| Particulars | Order Qty 100-140 (₹) | Order Qty 141-200 (₹) |
|--|--------------------------|--------------------------|
| I Selling Price / unit | 30,000 | 30,000 |
| II Commission @ 10% | 3,000 | 3,000 |
| III Sales Revenue p. u. [I + II] | 33,000 | 33,000 |
| IV Less: Variable Purchase Cost | 29,000 | 26,000 |
| V Contribution / unit before shipping [III – IV] | 4,000 | 7,000 |
| VI Less: Shipping Cost (Sales > 110 units) | | 5,000 |
| VII Contribution/ units after Shipping [V – VI] | | 2,000 |

- (i) Upto 110 units, Ret Ltd. will earn a contribution of ₹4,000 per unit.
- (ii) Between 110 & 140 units, contribution of ₹4,000 will be wiped out by ₹5,000 on shipping costs. Hence we should not consider 110 – 140 range.
- (iii) 101 – 110 not to be considered since additional costs of ₹2,25,000 on purchase of cameras will not be covered by 10 units.
- (iv) Valid consideration, 100 units or 141 to 190 units.

| | | 100 Units | 141 Units | 150 Units | 190 Units |
|---|--|--------------|--------------|--------------|--------------|
| A | No. of Camera Boxes | 2 | 3 | 3 | 4 |
| B | Cost of Cameras (₹) | 4,50,000 | 6,75,000 | 6,75,000 | 9,00,000 |
| C | Contribution (₹4,000/u) | 400,000 | --- | --- | --- |
| D | Contribution on first 110 units @ ₹7,000/u | --- | 7,70,000 | 7,70,000 | 7,70,000 |
| E | Contribution on balance units @ ₹2,000/u | --- | 62,000 | 80,000 | 1,60,000 |
| F | Total Contribution ... (C)+(D)+(E) | 4,00,000 | 8,32,000 | 8,50,000 | 9,30,000 |
| G | Profit (₹) ... (F) – (B) | (50,000) | 1,57,000 | 1,75,000 | 30,000 |

Best strategy will be to buy 150 units from Comp. Ltd., and sell 110 units at store and remaining 40 units in outside.

Break –even Point (BEP) should be between 151 – 191 units:

| | |
|--|------------------|
| Extra Camera Box Cost beyond 150 units | ₹2,25,000 |
| Less: Profit for 150 units | <u>₹1,75,000</u> |
| Extra Profit to be earned | ₹50,000 |

No. of units to cover this additional costs at contribution 25 units $\left(\frac{₹50,000}{₹2,000} \right)$.

BEP 175 units (150 units + 25 units)

Alternative Solution

The problem involves fixed cost of 50 Cameras i.e. ₹2,25,000 for incremental sale of 50.

| | Units sold | | | |
|--|------------|----------|-----------|-----------|
| | 110 | 140 | 150 | 190 |
| Margin per unit (₹) (Sales Price – Buying Price + Commission) | 4,000 | 4,000 | 7,000 | 7,000 |
| Margin excluding shipping cost (₹) | 4,40,000 | 5,60,000 | 10,50,000 | 13,30,000 |

2.163 Advanced Management Accounting

| | | | | |
|--|------------|--------------------------|---------------------------|---------------------------|
| Shipping Cost for sale beyond 110 units (₹) | --- | 1,50,00 (30 × ₹5,000) | 2,00,000 (40 × ₹5,000) | 4,00,000 (80 × ₹5,000) |
| Contribution (₹) | 4,40,000 | 4,10,000 | 8,50,000 | 9,30,000 |
| Fixed Cost (Cost of Cameras) (₹) | 6,75,000 | 6,75,000 | 6,75,000 | 9,00,000 |
| Profit / (Loss) (₹) | (2,35,000) | (2,65,000) | 1,75,000 | 30,000 |

Best Strategy will be to sale 150 units.

The variations of profit are due to incremental fixed cost.

From the profits at different levels, it is seen that the BEP lies between 151 units and 190 units.

$$\begin{aligned}
 \text{Let Break-even Point (BEP)} &= X \text{ units} \\
 \text{Margin} &= 7,000 X \\
 \text{Shipping Cost} &= (X - 110) \times ₹5,000 \\
 \text{Cost of Cameras} &= ₹9,00,000 \\
 \text{We have, } 7,000 X &= (X - 110) \times ₹ 5,000 + ₹ 9,00,000 \\
 \text{Or } 7X &= 5X - 550 + 900 \\
 \text{Or } 2X &= 350 \\
 \text{Or } X &= 175 \\
 \text{Thus, BEP} &= 175 \text{ units}
 \end{aligned}$$

Labour Related Decisions

Problem-61

MFG Ltd. is producing a component called 'KDK'. Estimated costs are:

| | Fixed Cost per year (₹ '000) | Variable Cost per 'KDK' (₹) |
|--------------|---------------------------------|--------------------------------|
| Production | 32,000 | 3,600 |
| Distribution | 2,000 | 200 |

Direct labour costs are 40% of the variable production costs. In the production department machining and assembling of 'KDK', 90 men work 8 hours per day for 300 days in a year. Each worker can machine and assemble 1 'KDK' per uninterrupted 180 minutes time frame. In each 8 hours working day, 20 minutes are allowed for coffee-break, 30 minutes on an average for training and 22 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters.

MFG Ltd. has been facing industrial relations problem as the workers of company have a very strong union. Company is faced with the possibility of a strike by direct production workers engaged on the assembly of 'KDK'. The trade union is demanding an increase of 15%, back-dated from the beginning of financial year, but the company expects that if a strike does take place, it will last 25 Days after which the union will settle for an increase of 10% similarly back-dated. The only product of the company is being sold at ₹6,000.

If the strike takes place, Sales of 1,300 'KDK' would be lost. The balance that would ordinarily have been produced during the strike period could, however be sold, but these 'KDK' would have to be made up in overtime working which would be at an efficiency rate of 90% of normal. This would entail additional fixed cost of ₹1,00,000 and wage payments at time and one-half.

Required

Give necessary advice to the management to allow the strike to go ahead or to accept the union's demand.

 **Solution**

Alternative-1 with No Strike: (Refer W.N.-2, 3)

Cost of Settlement is 15% Increase i.e. ₹216 per unit

Annual Cost of Settlement

$$= 54,000 \text{ units} \times ₹216$$

$$= ₹1,16,64,000$$

Alternative 2 i.e. if Strike Goes Ahead: (Refer W.N.-1, 2, 3)

| Extra Cost | (₹) |
|---|-------------|
| Annual Incremental Labour Cost (Ex. Strike Days Production) [$\{54,000 \text{ units} - (25 \text{ Days} \times 180 \text{ units per Day})\} \times ₹144.00$] | 71,28,000 |
| Loss of Contribution <i>due to loss of sales</i> [$1,300 \text{ units} \times ₹ 2,200$] | 28,60,000 |
| Incremental Labour Cost for Balance 3,200 units [$\{(25 \text{ Days} \times 180 \text{ units per Day}) - 1,300 \text{ units}\} \times ₹144.00$] | 4,60,800 |
| Overtime Premium [$3,200 \text{ units} \times 1,584 \times 0.5$] | 25,34,400 |
| Payment for Efficiency [$3,200 \text{ units} \times 1/9 \times 1,584 \times 1.5$] | 8,44,800 |
| Additional Fixed Cost | 1,00,000 |
| | 1,39,28,000 |

If there is no strike, it will yield a financial benefit of ₹22,64,000 (₹1,39,28,000 – ₹ 1,16,64,000). Management should accept union's demand.

Working Note

(1) Statement Showing Contribution *per unit* of 'KDK'

| | (₹) |
|--|-------|
| Selling Price | 6,000 |
| <i>Less: Variable Costs:</i> | |
| Labour Cost | 1,440 |
| Production Ex. Wages (₹3,600 – ₹1,440) | 2,160 |
| Distribution | 200 |
| Contribution | 2,200 |

(2) Calculation of Labour Cost

| | |
|--|--------------------------|
| Direct Labour (40% of production costs of ₹3,600) | = ₹1,440 <i>per unit</i> |
| With 15% Increase, Revised Labour Cost (₹1,440 + ₹216) | = ₹1,656 |
| With 10% Increase, Revised Labour Cost (₹1,440 + ₹144) | = ₹1,584 |

(3) Statement Showing Budgeted Production

| | |
|---|---------------|
| Total Time in a Day: (8hrs. × 60 minutes) | = 480 minutes |
| <i>Less: Idle Time</i> | = 48 minutes |
| Coffee Break | = 20 minutes |
| Instructions | = 22 minutes |
| Training | = 30 minutes |
| Productive Time <i>per day</i> | = 360 minutes |

Therefore, 'KDK' to be produced per man per day: $(360/180 \times 1) = 2$ units

Since 'KDK' are produced at the rate of 2 'KDK' per man day, so total yearly production will be 54,000 units (2 units × 90 men × 300 days) of 'KDK'



This problem has been solved by comparing 'Existing Situation' with both 'Alternatives (Strike or Non-Strike)' *independently*. However this problem can also be solved by comparing 'Alternatives (Strike or Non-Strike)' *only* and final answer would be the same.

Students may also solve this problem by taking 'Total Approach' instead of 'Incremental Approach'.

Problem-62

The details of the output presently available from a manufacturing department of Hitech Industries Ltd. are as follows:

Average output per week 48,000 units from 160 employees

Saleable value of output..... ₹ 6,00,000

Contribution made by the output towards fixed expenses and profit..... ₹ 2,40,000

The Board of Director plans to introduce more automation in the department at a capital cost of ₹ 1,60,000. The effect of this will be to reduce the number of employees to 120, but to increase the output per individual employee by 60%. To provide the necessary incentive to achieve the increased output the Board intends to offer a 1% increase in the piece work rate of one rupee per article for every 2% increase in average individual output achieved. To sell the increased output, it will be necessary to decrease the selling price by 4%.

Required

Calculate the extra weekly contribution resulting from the proposed change and evaluate, for the Board's information, the worth of the project.



Solution

Evaluation of the Project & Computation of Extra Weekly Contribution from Automation

| | |
|---|----------|
| Sales (units) [W.N.-1] | 57,600 |
| | (₹) |
| Sales Value (57,600 units × ₹12) [W.N.-3] | 6,91,200 |
| Less: Marginal Cost Excluding Wages (57,600 units × ₹6.50) [W.N.-4] | 3,74,400 |
| Wages (57,600 × ₹1.30) [W.N.-2] | 74,880 |
| Marginal Contribution | 2,41,920 |
| Less: Present Contribution | 2,40,000 |
| Extra Weekly Contribution | 1,920 |

Payback Period for recovering the capital cost is 83.33 Weeks (₹1,60,000 / ₹1,920)

Recommendation

The project can be taken up presuming that increase in overhead, if any, will be less than the increase in contribution as computed above.

Working Notes

1. Present Output
- per employee*
- and Total Future Expected Output:

$$\begin{aligned}\text{Present Output per employee} &= \frac{\text{Total Present Output}}{\text{Total Number of Present Employees}} \\ &= \frac{48,000 \text{ units}}{160 \text{ employees}} \\ &= 300 \text{ units} \\ \text{Estimated Future Output} &= \text{Total Number of Future Employees} \times \text{Present Output per employee} + 60\% \text{ of Present Output} \\ &= 120 \times (300 \text{ units} + 60\% \times 300 \text{ units}) \\ &= 57,600 \text{ units}\end{aligned}$$

2. Present and Proposed Piece Work Rate:

$$\begin{aligned}\text{Present Piece Work Rate} &= ₹1 \text{ per unit} \\ \text{Proposed Piece Work Rate} &= \text{Present Piece Work Rate} + 30\% \\ &= ₹1 + 0.30 \\ &= ₹1.30 \text{ per unit.}\end{aligned}$$

3. Present and Proposed Selling Price
- per unit*
- :

$$\begin{aligned}\text{Present Selling Price per unit} &= ₹12.50 \text{ (₹6,00,000 / 48,000 units)} \\ \text{Proposed Selling Price per unit} &= ₹12 \text{ (₹12.50 - 4\% \times ₹12.50)}\end{aligned}$$

4. Present Marginal Cost Excluding Wages
- per unit*
- :

$$\begin{aligned}&= \frac{\text{Present Sales Value} - \text{Contribution towards (Fixed Expenses \& Profit)} - \text{Present Wages}}{\text{Present Output (units)}} \\ &= \frac{₹6,00,000 - ₹2,40,000 - ₹48,000}{48,000 \text{ units}} \\ &= ₹6.50 \text{ per unit}\end{aligned}$$

Problem-63

In its round of talks with the representatives of the Trade Union, Maxima Ltd. is faced with a Union demand for an increase of 15% on the hourly wage rates, in response to a management offer of 5%.

The management is most reluctant to agree to such a demand but is willing to consider making an increased offer provided that it influences productivity. The suggestion is to offer 5% on basis of hourly rates plus ₹ 0.15 for every standard hour of output produced. If this is agreed to, it is expected that production would increase by 10% within the budgeted hours (normal factory capacity).

In order to sell the increased output, it would become necessary to effect a reduction of 2.5% in the selling price.

The draft budget for the forthcoming year, excluding the wages and sales increase, are:

(Amount in ₹)

| | |
|---|------------------|
| <i>Sales (15,00,000 units)</i> | <i>60,00,000</i> |
| <i>Direct Material</i> | <i>12,00,000</i> |
| <i>Direct Wages</i> | <i>18,00,000</i> |
| <i>Variable Production Overhead</i> | <i>3,00,000</i> |
| <i>Fixed Production Overhead</i> | <i>10,00,000</i> |
| <i>Variable Sales Overhead (5% of turnover)</i> | <i>3,00,000</i> |
| <i>Fixed Sales Overhead</i> | <i>6,00,000</i> |
| <i>Variable Distribution Overhead</i> | <i>1,00,000</i> |
| <i>Fixed Distribution Overheads</i> | <i>1,00,000</i> |
| <i>Fixed Administration Overhead</i> | <i>2,00,000</i> |
| <i>Profit</i> | <i>4,00,000</i> |

Required

Work out the alterations in the budget:

- (i) If the trade union demand is accepted by management.*
- (ii) If the management's proposal of wage increase linked to productivity is accepted by the trade union.*

Also work out the minimum output necessary for the management's proposal to be more rewarding to the labour force than a 15% wage increase.

 Solution

(i) Revised Budget If the Trade Union's Demand is Accepted

(Amount in ₹)

| | |
|--|-----------|
| Sales (15,00,000 units) | 60,00,000 |
| Variable Costs: | |
| Direct Material | 12,00,000 |
| Direct Wages (₹18 lakh + 15% of ₹18 lakhs) | 20,70,000 |
| Variable Production Overhead | 3,00,000 |
| Variable Sales Overhead | 3,00,000 |
| Variable Distribution Overhead | 1,00,000 |
| Fixed Costs: | |
| Fixed Production Overhead | 10,00,000 |
| Fixed Sales Overhead | 6,00,000 |
| Fixed Distribution Overheads | 1,00,000 |
| Fixed Administration Overheads | 2,00,000 |
| Total Costs | 58,70,000 |
| Profit | 1,30,000 |

(ii) Revised Budget If the Proposal of the Management is Accepted

(Amount in ₹)

| | |
|--|-----------|
| Sales (16,50,000 units at ₹3.90) | 64,35,000 |
| Variable Costs: | |
| Direct Material (16,50,000 units at ₹0.80) | 13,20,000 |
| Direct Wages (₹ 18 lakhs × 1.05 + 16.5 lacs × ₹0.15) | 21,37,500 |
| Variable Production Overhead | 3,30,000 |
| Variable Sales Overhead (5% of ₹64,35,000) | 3,21,750 |
| Variable Distribution Overhead | 1,10,000 |
| Fixed Costs: | 19,00,000 |
| Profit | 3,15,750 |

Minimum Output necessary for the management's proposal to be more rewarding to the labour force than a 15% wage increase:

| | |
|---|------|
| Direct Wages at 115% of basic hourly rate | 20.7 |
| Direct Wages 105% of basic hourly rate | 18.9 |
| Difference between the two | 1.8 |

This is the minimum output desired.

Note

It has been presumed that one unit of output denotes one standard hour of output.

Working Notes

- | | | | |
|----|--|---|---|
| 1. | Budgeted Selling Price <i>before increment</i> | = | $\frac{\text{₹}60,00,000}{15,00,000 \text{ units}}$ |
| | | | = ₹4 |
| | Selling Price <i>after reduction of 2.5%</i> | | = ₹4 – 2.5% of ₹4 |
| | | | = ₹3.90 |
| 2. | Direct Material Cost per unit | = | $\frac{\text{₹}12,00,000}{15,00,000 \text{ units}}$ |
| | | | = ₹0.80 |

Problem-64

Marvellous Manufacturers produce a single product. The Company's annual normal production is 5 lakhs units of output on a single shift of eight-hour a day basis in terms of a standard input of 1 lakh direct labour hours. Last year's income statement is given below:

| (₹) | |
|---|-----------|
| Sales (7 lakh units @ ₹ 2.50) | 17,50,000 |
| Less: Variable Expenses | |
| Direct Material | 2,80,000 |
| Direct Labour (1,40,000 hours @ ₹ 3.50) | 4,90,000 |
| Overtime Premium | 1,40,000 |
| Miscellaneous | 2,10,000 |
| Contribution Margin | 6,30,000 |
| Less: Fixed Expenses | 5,30,000 |
| Net Income | 1,00,000 |

Management is concerned about the overtime working done last year (overtime is paid at double the normal rate) and wants to investigate the possibility of working a second shift. The

2.171 Advanced Management Accounting

cost accountant of the company estimates that a second shift would increase costs as follows: an additional factory supervisor at ₹ 30,000 per annum, a night shift allowance of 60 paise per direct labour hour and an increase in security and administrative costs of ₹ 40,500 a year.

Required

Management requires you as their consultant to answer these questions with supporting figures:

- (i) If instead of working overtime a second shift had been introduced at the beginning of last year itself, would profits have been better? If so by how much?
- (ii) At what capacity level it would be advantageous to the company to change from overtime working to a second shift?
- (iii) This year it is estimated that there will be, on last year's figures, 20% increase in units sold, 10% increase in selling price, 5% increase in direct material cost per unit and a direct labour rate increase of ₹ 0.30 per hour. Assuming that the overtime working would be continued, prepare an income statement for the year based on the current estimates; if a second shift working were to be introduced, with an increase in night shift allowance of 6 paise per direct labour hour, what would have been the savings in cost?



Solution

- (i) Comparative Statement of Profitability of Second Shift Overtime Working

(₹)

| | |
|--|----------|
| Overtime Premium Paid (40,000 hrs @ ₹3.50) | 1,40,000 |
| Less: Costs of Second Shift | |
| - Factory Supervisor | 30,000 |
| - Security and Administrative Costs | 40,500 |
| - Night Shift Allowance (40,000 hrs @ ₹ 0.60 paise per hour) | 24,000 |
| Excess of Overtime Premium Over Costs of Second Shift | 45,500 |

Profit would have been higher by ₹45,500, if instead of working overtime, a second shift had been introduced at the beginning of last year itself.

Working Note

$$\begin{aligned}\text{Overtime Worked} &= \text{Actual Direct Labour Hours Worked} - \text{Standard Input of Direct Labour Hours} \\ &= 1,40,000 \text{ hours} - 1,00,000 \text{ hours} \\ &= 40,000 \text{ hours}\end{aligned}$$

- (ii) Capacity Level at which it would be advantageous to change from Overtime Working to a Second Shift.

Let 'M' be the capacity level (in hours) over 1,00,000 hours at which overtime premium and second shift costs are equal.

$$\begin{aligned} \text{Then } M \times ₹ 3.50 &= ₹30,000 + ₹40,500 + ₹0.60 \times M \\ 2.90 M &= ₹70,500 \end{aligned}$$

$$\text{Or, } M = 24,310.34 \text{ hours}$$

The break-even is at 24,310.34 hours.

Thus, at a capacity level of 1,24,311 (i.e., 1,00,000 + 24,311) direct labour hours and above, it would be advantageous to the company to change from overtime working to second shift.

- (iii) (a)

Income Statement for the Current Year
(Assuming that the Overtime Working is to be continued...)

| (₹) | |
|---|-----------|
| Sales (8,40,000 units × ₹ 2.75) | 23,10,000 |
| <i>Less: Variable Expenses</i> | |
| Direct Material (8,40,000 units × ₹ 0.42) | 3,52,800 |
| Direct Labour $\left(\frac{1,40,000 \text{ hrs.}}{7,00,000 \text{ units}} \times 8,40,000 \text{ units} \times ₹ 3.80 \right)$ | 6,38,400 |
| Overtime Premium (68,000 hrs. × ₹3.80) | 2,58,400 |
| Miscellaneous: $\left(\frac{₹ 2,10,000}{7,00,000 \text{ units}} \times 8,40,000 \text{ units} \right)$ | 2,52,000 |
| Contribution Margin | 8,08,400 |
| <i>Less: Fixed Expenses</i> | |
| Net Income | 2,78,400 |

- (b)

Computation of Savings in Cost
(Assuming that Second Shift Working is to be introduced...)

(₹)

| | |
|---------------------------------------|----------|
| Overtime Premium (68,000 hrs @ ₹3.80) | 2,58,400 |
| <i>Less: Costs of Second Shift</i> | |
| - Factory Supervisor | 30,000 |

2.173 Advanced Management Accounting

| | |
|---|----------|
| - Security and Administrative Costs | 40,500 |
| W - Night Shift Allowance (68,000 hrs @ ₹ 0.66 paise per hr.) | 44,880 |
| o Savings in Cost | 1,43,020 |

king Note

Computation of Overtime Hours:

Direct Labour Hrs. Required to Produce 8,40,000 units

$$= \left(\frac{1,40,000 \text{ hrs.}}{7,00,000 \text{ units}} \times 8,40,000 \text{ units} \right)$$

$$= 1,68,000 \text{ hrs.}$$

$$\text{Overtime Hrs.} = 1,68,000 \text{ hrs.} - 1,00,000 \text{ hrs.}$$

$$= 68,000 \text{ hrs.}$$

Preventive Maintenance Vs Break-Down Maintenance

Problem-65

A company has continuous manufacturing process involving an output of 6 tonnes per hour valued at ₹ 70 per tonne. Process wages cost ₹ 60 per hour and raw material, ₹ 35 per tonne of product. Regular maintenance works out to ₹ 750 per week.

The company is experiencing breakdown due to mechanical reason averaging 25 hours a week, costing ₹ 7,500 to repair. It is estimated that these breakdown can be reduced or eliminated if additional maintenance on the following scale were undertaken:-

| Breakdown per week (hours) | 0 | 5 | 10 | 15 | 20 |
|----------------------------|--------|--------|-------|-------|-------|
| Maintenance Cost (₹) | 23,000 | 13,000 | 6,500 | 3,000 | 1,500 |
| Repair Costs (₹) | 0 | 2,500 | 3,000 | 5,000 | 6,500 |

Process labour during stoppages can be used elsewhere upto 10 hours per week.

Required

- (i) Present, in tabular form, the optimum amount of maintenance to be undertaken each week.
- (ii) What is the additional revenue that will be resulting from the optimal level, compared with the present situation?

 Solution

- (i) Statement of Comparative Cost of Repairs and Maintenance *to ascertain the optimum amount of maintenance each week*

| | Breakdown Hours (per week) | | | | | |
|---|----------------------------|--------|-------|-------|-------|-------|
| | 0 | 5 | 10 | 15 | 20 | 25* |
| | (₹) | (₹) | (₹) | (₹) | (₹) | (₹) |
| Maintenance Costs | 23,000 | 13,000 | 6,500 | 3,000 | 1,500 | 750 |
| Repairs Cost | 0 | 2,500 | 3,000 | 5,000 | 6,500 | 7,500 |
| Total | 23,000 | 15,500 | 9,500 | 8,000 | 8,000 | 8,250 |
| Cost of Idle Time (Breakdown hrs - 10 hrs) x ₹60 | --- | --- | --- | 300 | 600 | 900 |
| Total Cost | 23,000 | 15,500 | 9,500 | 8,300 | 8,600 | 9,150 |

* At present

It is seen from the above table that the optimum amount of maintenance is for breakdown of 15 hours a week.

- (ii) Additional Revenue that will Result from the Optimal Level; Compared with Present Situation

| | (₹) |
|---|-------|
| Value of Additional Output (10 hours saved × 6 tonnes × ₹70) | 4,200 |
| Less: Wages (10 hours × ₹60) | 600 |
| Less: Material (10 hours saved × 6 tonnes × ₹35) | 2,100 |
| Add: Saving in Maintenance and Repairs Cost (₹9,150 – ₹8,300) | 850 |
| Total Additional Revenue | 2,350 |

Shut Down or Continue

Problem-66

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

| | |
|----------------------|------|
| | (₹) |
| Direct material..... | 7.80 |

2.175 Advanced Management Accounting

| | |
|-----------------------------|-------------|
| Direct labour..... | 2.10 |
| Variable overhead..... | 2.50 |
| Fixed overhead..... | <u>4.00</u> |
| Production cost / unit..... | 16.40 |

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

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

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

Required

- To advise whether it is more economical to shut down the plant during the quarter rather than operate the plant.
- Calculate the shut down point for the quarter in terms of numbering units.

 **Solution**

$$\begin{aligned}
 \text{Contribution per tin} &= \text{Selling Price} - \text{Variable cost} \\
 &= ₹21 - (₹7.8 + ₹2.1 + ₹2.5 + ₹0.6) \\
 &= ₹8 \text{ per tin}
 \end{aligned}$$

Loss on Operation

$$\begin{aligned}
 \text{Fixed Cost per annum} &= 8 \text{ lakhs (2,00,000 units} \times 4 \text{ per unit)} \\
 \text{Fixed Cost for 1 Quarter} &= 2 \text{ lakhs (8 lakhs / 4)}
 \end{aligned}$$

| (₹) | |
|---|------------|
| Fixed Cost for the quarter | 2,00,000 |
| Less: Contribution on operation (₹8 × 10,000 units) | 80,000 |
| Expected Loss on operation | (1,20,000) |

Loss on Shut Down

| (₹) | |
|---------------------------|----------|
| Unavoidable Fixed Cost | 74,000 |
| Additional Shut Down Cost | 14,000 |
| Loss on Shut Down | (88,000) |

Conclusion

Better to Shut Down and Save ₹ 32,000.

$$\begin{aligned} \text{Shut Down Point (number of units)} &= \frac{\text{Avoidable Fixed Cost}}{\text{Contribution per unit}} \\ &= \frac{\text{₹2,00,000} - \text{₹88,000}}{\text{₹8}} \\ &= 14,000 \text{ units} \end{aligned}$$

Problem-67

G Ltd. produces and sells 95,000 units of 'X' in a year at its 80% production capacity. The selling price of product is ₹ 8 per unit. The variable cost is 75% of sales price per unit. The fixed cost is ₹ 3,50,000. The company is continuously incurring losses and management plans to shut-down the plant. The fixed cost is expected to be reduced to ₹ 1,30,000. Additional costs of plant shut-down are expected at ₹ 15,000.

Should the plant be shut-down? What is the capacity level of production of shut-down point?

 **Solution**

| | If Plant is Continued | If Plant is Shutdown |
|---------------------|-----------------------|----------------------|
| Sales | 7,60,000 | --- |
| Less: Variable Cost | 5,70,000 | --- |
| Contribution | 1,90,000 | --- |
| Less: Fixed Cost | 3,50,000 | 1,30,000 |
| Additional Cost | --- | 15,000 |
| Operating Loss | 1,60,000 | 1,45,000 |

A comparison of loss figures indicated as above points out that loss is reduced by ₹15,000 (₹16,000 - ₹14,500) if plant is shut down.

$$\begin{aligned} \text{Shut Down Point} &= \frac{\text{₹3,50,000} - \text{₹1,45,000}}{\text{₹8} - \text{₹6}} \\ &= 1,02,500 \text{ units} \end{aligned}$$

Capacity Level of Shut Down Point

$$\text{At 100\% Level Production} = 1,18,750 \left(\frac{95,000 \text{ units}}{0.80} \right)$$

2.177 Advanced Management Accounting

$$\text{Capacity Level at Shut Down} = 86.32\% \left(\frac{1,02,500 \text{ units}}{1,18,750 \text{ units}} \right)$$

Problem-68

If Moonlite Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'Meghdoot'. The unit cost of manufacturing at normal capacity is as under:

| | ₹ |
|------------------------|-----|
| Direct material..... | 65 |
| Direct labour..... | 30 |
| Variable overhead..... | 33 |
| Fixed overhead..... | 7 |
| | 135 |

Direct labour cost represents the compensation to highly-skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

The company sells its product for ₹ 200 per unit with variable selling expenses of ₹ 16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹ 1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹ 50,000 and the cost of re-opening will be ₹ 1,00,000.

Required

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹ 40 per labour hour. The additional activity will relate to a job which will be off-loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money)

 Solution
Contribution per unit

| Particulars | (₹) |
|--|-----|
| Selling Price | 200 |
| Variable Cost (₹ 65 + ₹ 33 + ₹ 16) | 114 |
| Contribution per unit (Excluding direct labour, considered irrelevant and fixed) | 86 |

Savings and Earnings if the Plant is Shut Down

| Particulars | (₹) |
|---|------------|
| Savings in Fixed Cost (₹ 14,00,000* – ₹ 1,25,000) | 12,75,000 |
| Contribution from Alternate Activity (₹ 40 × 50% of 2,00,000 hrs) | 40,00,000 |
| Shutting Down and Reopening Cost (₹ 50,000 + ₹100,000) | (1,50,000) |
| Total | 51,25,000 |

* [2,00,000 units x ₹ 7]

Indifference Point: ₹51,25,000 / ₹86 = 59,593 units

Minimum level of production to justify continuation = 59,594 units

Problem-69

Rabi Ltd. is considering the discontinuance of Division C. The following information is given:

| Particulars | Divisions A & B | Division C | Total |
|-------------------------------------|-----------------|------------|-----------|
| Sales (Maximum achievable) | 41,40,000 | 5,17,500 | 46,57,500 |
| Less: Variable cost | 20,70,000 | 2,76,000 | 23,46,000 |
| Contribution | 20,70,000 | 2,41,500 | 23,11,500 |
| Less: Specific avoidable fixed cost | 14,49,000 | 4,14,000 | 18,63,000 |
| Divisional Income | 6,21,000 | (1,72,500) | 4,48,500 |

The rates of variable costs are 90% of the normal rates due to the current volume of operation. There is adequate market demand.

For any lower volume of operation, the rates would go back to the normal rates.

Facilities released by discontinuing Division C cannot be used for any other purpose.

Required

Evaluate the decision to discontinue Division C using relevant cost approach.

 Solution

As given in the problem Rabi Ltd. is considering to discontinue the Division C perhaps by seeing the Division C's income as it is a loss of ₹1,72,500. Discontinuance of Division C might be saving ₹4,14,000 on specific fixed costs to the company but due to this decision company will not only be losing ₹2,41,500 contribution from the Division C but also an additional burden of variable cost of ₹2,30,000 to Divisions A & B and Rabi Ltd. as a whole.

Let evaluate the decision of the Rabi Ltd. with the help of the Relevant Cost approach.

| Particulars | Amount (₹) |
|--|------------|
| Savings Due to Discontinuance | |
| Specific Fixed Cost | 4,14,000 |
| Total ..(A) | 4,14,000 |
| Loss/ Increase in Cost Due to Discontinuance | |
| Loss of Contribution | 2,41,500 |
| Increase in Variable Cost $\left(\frac{₹20,70,000}{90} \times 10\right)$ | 2,30,000 |
| Total ...(B) | 4,71,500 |
| Excess of Loss Over Savings ...(B) – (A) | 57,500 |

In a nutshell considering the above analysis we can conclude that the decision of discontinuing Division C will not be beneficial for the Rabi Ltd and it should review its decision on the basis of relevant cost approach to reach at right decision.

Problem-70

Cold Drinks Ltd. bottles and distributes 'Cola' brand cold drinks. It operates its distribution division as a cost centre. Budgeted cost for the year ending 31st March, 2013 is as follows:

| | |
|---|-----------------|
| | (₹) |
| Cash Operating Costs..... | 21,00,000 |
| Depreciation on Fleet of Vehicles (8 x ₹ 52,500)..... | 4,20,000 |
| Apportioned Corporate Costs | <u>3,00,000</u> |
| | 28,20,000 |

Distribution division has started operation on 1st April, 2011. Each vehicle of the fleet was acquired at a cost of ₹ 2,40,000 and had an estimated economic life of four years. Salvage value of each vehicle at the end of four years (March 31, 2015) was estimated at ₹ 30,000.

Native Distributors Ltd. which has countrywide network for the distribution of food and beverages has offered Cold Drinks Ltd. a three year distribution contract for ₹ 19,50,000 each year. The contract will start on 1st April, 2012.

If Cold Drinks Ltd. accepts the offer, it will close down its own distribution division, and will sell the delivery vehicles. Current (April 1, 2012) disposal price of each vehicle is estimated at ₹ 75,000. Cold Drinks Ltd. will avoid cash operating cost of ₹ 21,00,000.

Security analysts have recommended the purchase of share of Cold Drinks Ltd., security analysts are forecasting a net profit of ₹ 6,60,000 for 2012 – 13 as against an estimated Profit of ₹ 6,30,000 for 2011 – 12, the forecast assumes that the company will continue operation of its distribution division.

Required

- (i) *Tabulate a comparison of all relevant cost for next three years (2012 – 13 to 2014 – 15) for the two alternatives – use of own distribution division or use of Native distributors Ltd. Recommend whether Cold Drinks Ltd. should accept the offer of Native distributors Ltd.*
- (ii) *Why might Cold Drinks Ltd. be reluctant to accept the offer of Native distributors Ltd?*
(Ignore Income – tax and time value of money. Wherever appropriate, suitable assumption to be made by you)

 **Solution**

- (i) **Statement of Relevant Costs, Showing Comparison of Two Alternatives**
(₹ in '000)

| Alternatives Particulars | Own Distribution | | | Native Distributors | | |
|---|------------------|--------------|--------------|---------------------|--------------|--------------|
| | 2012-13 | 2013-14 | 2014-15 | 2012-13 | 2013-14 | 2014-15 |
| Annual Relevant (Cash Out Flows) | | | | | | |
| (i) Cash Operating Costs | 2,100 | 2,100 | 2,100 | --- | --- | --- |
| (ii) Sub Contract Costs | --- | --- | --- | 1,950 | 1,950 | 1,950 |
| Total: (A) | 2,100 | 2,100 | 2,100 | 1,950 | 1,950 | 1,950 |
| One Time Relevant Cash Inflows | | | | | | |
| Sale of Delivery Vehicles on : | | | | | | |
| (i) 01.04.2012 | --- | --- | --- | 600 | --- | --- |
| (ii) 31.03.2015 | --- | --- | 240 | --- | --- | --- |
| Total: (B) | --- | --- | 240 | 600 | --- | --- |
| Net Relevant Cash Outflows:(A) – (B) | 2,100 | 2,100 | 1,860 | 1,350 | 1,950 | 1,950 |
| Total | 6,060 | | | 5,250 | | |

Recommendation

Cold Drinks Ltd. should accept the offer of Native Distributors Ltd. because the acceptance of the offer will reduce cash outflows by ₹8,10,000 (₹60,60,000 – ₹52,50,000).

Assumption

No portion of the common corporate cost of which ₹3,00,000 is apportioned to distribution division will be avoided even if the distribution division is closed down.

(ii) Cold Drinks Ltd. may be *reluctant to accept the offer* of Native Distributors Ltd. due to-

(a) The impact of recognizing book loss on the disposal of the delivery vehicles. The figure of book loss will be as below-

| | (₹) |
|---|-----------|
| Cost of Fleet (8 Vehicles) on 01.04.2011 | 19,20,000 |
| Less: Depreciation for 2011 – 12 | 4,20,000 |
| Book Value as on 01.04.2012 | 15,00,000 |
| Less: Sales Realization (8 Vehicles x ₹ 75,000) | 6,00,000 |
| Book Loss | 9,00,000 |

(b) Reduction in reported net income, as per the forecast of security Analysis, if the offer of Native Distributors Ltd is accepted. The expected operating income figures based on the forecast of Security Analysts are-

(₹ '000)

| | 2011-12 | 2012-13 |
|--|---------|---------|
| Estimated Profit (when Cold Drinks Ltd. uses its own distribution division) | 630 | 660 |
| Net Income (if the offer of Native Distributors Ltd is accepted) | 630 | 330* |
| *Estimated Profit <i>as projected</i> | | 660 |
| Add: Depreciation Avoided | | 420 |
| Add: Saving in Operating Cost (₹2,100 – ₹1,950) | | 150 |
| Less: Book Loss on the Disposal of Delivery Vehicles | | 900 |
| Net Income on the Acceptance of Offer | | 330 |

Hence according to the analysis of Security analyst in capital market, there will

be a reduction in the reported net income to the tune of ₹3,30,000 (₹6,60,000 – ₹3,30,000) in the short run if Native Distributors Ltd.'s offer is accepted.

Security analysts did not recognised the long term benefits of accepting the offer of Native Distributors Ltd.

- (c) Management of Cold Drinks Ltd. may feel that they can better focus on customer needs by operation the distribution function themselves.
- (d) Management of Cold Drinks Ltd. thinks that Native Distributors may acquire its own soft drink subsidiary and they possibly de-emphasize its services to their product.

Problem-71

Tuscan Reel Ltd. manufactures a range of films extensively used in the Cinema industry. The films, once manufactured, are packed in circular containers and stored in specially constructed crates lined with "Protecto". These crates are manufactured and maintained by a special department within the company and the departmental costs last year are as under:

| | (₹) |
|---|----------|
| Direct Materials (including "Protecto") | 1,40,000 |
| Direct Labour | 1,00,000 |
| Overheads: | |
| Department Manager | 16,000 |
| Depreciation of Machine | 30,000 |
| Maintenance of Machine | 7,200 |
| Rent (Portion of Warehouse) | 9,000 |
| Other Miscellaneous Costs | 31,500 |
| Administration Overhead (20% of Direct Costs) | 48,000 |

Max Associates have approached the Tuscan Reel Ltd., offering to make all the crates required on a four-year contract for ₹ 2,50,000 per annum and/or to maintain them for further ₹ 50,000 per annum.

The following data are relevant:

- (i) *The machine used in the department cost ₹ 2,40,000 four years ago and will last for four more years. It could be currently sold for ₹ 50,000.*
- (ii) *The stock of "Protecto" was acquired last year for ₹ 2,00,000 and one-fifth was used last year and included in the material cost. Its originally cost was ₹ 1,000 per ton, but the replacement cost is ₹ 1,200 per ton; and it could be currently sold for ₹ 800 per ton.*

2.183 Advanced Management Accounting

- (iii) *The department has acquired warehouse space for ₹ 18,000 per annum. It uses only one-half of the space; the rest is idle.*
- (iv) *If the department were closed, the manager will be transferred to another department; but all the labour force will be made redundant, and the terminal benefits to be met with amount to ₹ 15,000 per annum. In that event,*

Max Associates will undertake to manufacture and maintain the crates.

If Tuscan Reel Ltd. continued to maintain the crates, but left their manufacture to Max Associates:

- (i) *The machine will not be required.*
- (ii) *The manager will remain in the department.*
- (iii) *The warehouse space requirements will not be reduced.*
- (iv) *Only 10% of all materials will be used.*
- (v) *Only one worker will be dispensed with and taking the terminal benefit to be met into account, the saving will be ₹ 5,000 per annum.*
- (vi) *The miscellaneous costs will be reduced by 80%.*

If Tuscan Reel Ltd. continued to manufacture the crates but left their maintenance to Max Associates:

- (i) *The machine will be required.*
- (ii) *The manager will remain in the department.*
- (iii) *The warehouse space will be required.*
- (iv) *90% of all the materials will be required.*
- (v) *The labour force will continue.*
- (vi) *The miscellaneous cost will be reduced by 20%.*

Assuming that for the four-year period, there is no significant change envisaged in the pattern of other costs.

Required

Evaluate the alternate courses of action with supporting figures of each flows over the four-year period and advise accordingly.



Solution

Evaluation of the Three Alternative Courses of Action

Alternative I - Dept. is closed and Max Associates undertake to manufacture and maintain the Crates.

Alternative II - Tuscan Reel Ltd. continue to maintain the Crates, but leave their manufacture to Max Associates.

Alternative III - Tuscan Reel Ltd. continue to manufacture the Crates but leave their maintenance to Max Associates.

| | Alternative I (₹) | Alternative II (₹) | Alternative III (₹) |
|--|-------------------------|--------------------------|---------------------------|
| INFLOW: | | | |
| <i>Cost Avoided in terms of cash flows:</i> | | | |
| Direct Material Other than "Protecto" (W.N.-1) | 1,00,000 | 90,000 | 10,000 |
| Direct Labour (W.N.-2) | 85,000 | 5,000 | - |
| Maintenance of Machine | 7,200 | 7,200 | - |
| Rent (full) | 18,000 | - | - |
| Other Miscellaneous Costs | 31,500 | 25,200 | 6,300 |
| Total Costs Avoided <i>per annum</i> | 2,41,700 | 1,27,400 | 16,300 |
| Total Cost Avoided in <i>four years</i> | 9,66,800 | 5,09,600 | 65,200 |
| <i>Cash Realisation:</i> | | | |
| Sale of Machine | 50,000 | 50,000 | - |
| Sale of "Protecto" Stock (W.N.-4) | 1,28,000 | 1,15,200 | 12,800 |
| Total Cash Inflow ... (A) | 11,44,800 | 6,74,800 | 78,000 |
| OUTFLOWS: | | | |
| Payment to Max Associates <i>per annum</i> (W.N.-3) | 3,00,000 | 2,50,000 | 5,000 |
| Cash Outflow in <i>4 years</i> ... (B) | 12,00,000 | 10,00,000 | 2,00,000 |
| Profit / (Loss) in terms of Cash Flows ... (A) – (B) | (55,200) | (3,25,200) | (1,22,000) |

Recommendation

The above analysis shows that net cash outflows exceed the amount of costs avoided in the three alternative courses of action. Hence, none of the alternatives is profitable. Tuscan Reel Ltd. should, therefore, continue to manufacture and maintain the crates.

Working Notes

- The total cost of direct materials (including "Protecto") is ₹1,40,000. The cost of "Protecto" used for the last year comes to ₹40,000. Thus, cost of direct materials that

2.185 Advanced Management Accounting

can be avoided in Alternative-I comes to ₹1,00,000 (₹1,40,000 – ₹40,000). The cost of direct materials excluding "Protecto", to be avoided under Alternatives-II and III have been calculated on the basis of this amount.

2. Cost of direct labour that can be avoided under Alternative-I: ₹ 85,000 (₹1,00,000 – ₹15,000) [terminal benefits].
3. The total cash outflow per annum under Alternative-I will amount to ₹3,00,000 (₹ 2,50,000 + ₹50,000).
4. The stock of 'Protecto', in terms of quantity comes to 160 tonnes (₹1,60,000 /1,000).

The amount to be realised from the sale of "Protecto" under different alternatives has been ascertained as follows:

| | |
|------------------|--|
| Alternative I: | ₹1,28,000 (160 tonnes × ₹ 800) |
| Alternative II: | ₹1,15,200 $\left(160\text{tonnes} \times \frac{9}{10} \times ₹ 800\right)$ |
| Alternative III: | ₹12,800 $\left(160\text{tonnes} \times \frac{1}{10} \times ₹ 800\right)$ |

5. The sale proceeds of machinery and stock could have alternatively been added to the avoided costs', in place of deducting them from cash outflow.

Problem-72

'EXE' Ltd. manufactures a product called 'HN-2'. The company is organized into two divisions, viz., Division 'KXA' and Division 'KXB'. Division 'KXA' manufactures 'HN-2' and Division 'KXB', which manufactures the containers, packs 'HN-2' in the containers and stores them by using a special protective material called 'P-6'. The details of the expenses incurred by Division 'KXB' during 2011 are as under:

| | (₹) |
|--|----------|
| Direct Materials including 'P-6' | 5,25,000 |
| Direct Labour | 3,75,000 |
| Supervision | 60,000 |
| Maintenance of Machine | 27,000 |
| Rent of a part of the Warehouse used | 33,750 |
| Depreciation of Machine | 1,12,500 |
| Miscellaneous Overheads | 1,18,125 |
| Administration Overheads apportioned to the Division | 1,80,000 |

'WYE' Ltd. a company engaged in warehousing of a variety of a products, approached 'EXE' Ltd. to undertake to manufacture the containers required on contract basis for a period of four years for ₹ 9,37,500 per annum and/or store the packed product for a further sum of ₹ 1,87,500 per annum.

Division 'KXB' uses a machine for the manufacture of containers This machine was installed four years ago at a capital cost of ₹ 9,00,000 and it has a useful life of four more years. It can be currently sold at ₹ 1,87,500.

Division 'KXB' purchased 'P-6' worth ₹ 7,50,000 during the last year. Out of this, one-fifth was used during the last year and the cost thereof is included in the material cost of 2011. The original purchase price of 'P-6' was ₹ 3,750 per tonne but, if sold now, the stock of 'P-6' would fetch only ₹ 3,000 per tonne. Its current replacement cost is ₹ 4,500 per tonne.

Division 'KXB' hired a warehouse for storage of the product for ₹ 67,500 per annum. It uses only half of the space and has taken only half the amount of rent into account. The remaining space of the warehouse is idle.

Required

Evaluate the following three proposals on a four-year term basis and state recommendations.

- (i) If the contract for manufacture of the containers and the storage of the product, 'HN-2' is given to 'WYE' Ltd. Division 'KXB' will be close down. In that event the supervisory staff will be transferred to another department and there will be 100% saving in direct labour cost.
- (ii) If 'EXE' Ltd. continues to store the product 'HN-2' and leaves the manufacture of the containers to 'WYE' Ltd., The machine in Division 'KXB' will not be required and the storage space requirements cannot be dispensed with. The supervisory staff will be required to be retained in Division 'KXB' and only 10% of all material will be used. The saving on account of labour retrenchment will come to ₹ 18,750 per annum. The miscellaneous overheads will be reduced by 80%.
- (iii) If 'EXE' Ltd. continues to manufacture the containers and leaves the storage of 'HN-2' to 'WYE' Ltd. Division 'KXB' will retain the machine and the warehouse space for use. The supervisory staff will also be retained and 90% of all materials will be required. The labour force will continue and the miscellaneous overheads will be reduced by 20%.



Statement Showing Evaluation of Alternatives

| | Alternative One | Alternative Two | Alternative Three |
|---|-----------------|-----------------|-------------------|
| Manufacture of Containers | 'WYE' Ltd | 'WYE' Ltd | 'EXE' Ltd |
| Storage of Product | 'WYE' Ltd | 'EXE' Ltd | 'WYE' Ltd |
| Cash Inflows (including avoidable cost): | | | |
| Direct Materials <i>other than 'P-6'</i> (W.N.-1) | 3,75,000 | 3,37,500 | 37,500 |
| Direct Labour (W.N.-4) | 3,75,000 | 18,750 | - |
| Rent of a part of Warehouse (W.N.-6) | 67,500 | - | - |
| Maintenance of Machine (W.N.-7) | 27,000 | 27,000 | - |
| Miscellaneous Overhead (W.N.-8) | 1,18,125 | 94,500 | 23,625 |
| Total Cash Inflows p.a. ... (A) | 9,62,625 | 4,77,750 | 61,125 |
| Cash Outflows: | | | |
| Contract Fee to 'WYE' Ltd. | | | |
| For Manufacture | 9,37,500 | 9,37,500 | - |
| For Packing and Storage | 1,87,500 | | 1,87,500 |
| Total Outflow p.a. ... (B) | 11,25,000 | 9,37,500 | 1,87,500 |
| Net Cash Outflow p.a. ... (C) = (A) - (B) | 1,62,375 | 4,59,750 | 1,26,375 |
| Cash Outflows for 4 years [(C) × 4] | 6,49,500 | 18,39,000 | 5,05,500 |
| One Time Income / Inflow: | | | |
| Sale of 'P-6' (W.N.-3) | (4,80,000) | (4,32,000) | (48,000) |
| Sale of Machine (W.N.-5) | (1,87,500) | (1,87,500) | - |
| Net Cash Outflow | (18,000) | 12,19,500 | 4,57,500 |

Therefore it is in the interest of 'EXE' Ltd. to *shut down* Division 'KXB'.

Working Note

(1) Direct Material other than 'P-6'

| | |
|---|------------------|
| Direct material including 'P-6' | ₹5,25,000 |
| Use of 'P-6' 1/5 th of ₹7,50,000 | <u>₹1,50,000</u> |
| | ₹3,75,000 |

Alternative One:

The material will be avoidable cost if Division 'KXB' is closed down.

Alternative Two:

Savings: ₹3,37,500 (₹3,75,000 - ₹37,500) if manufacture is given to 'WYE' Ltd. and storage remains with 'EXE' Ltd.

Alternative Three:

Savings: ₹37,500 [₹3,75,000 - (90% of ₹3,75,000)] if manufacture is done by 'EXE' Ltd. and storage given to 'WYE' Ltd.

(2) 'P-6' -Stock

| | |
|-------------------------------------|------------------|
| Stock in 2011 | ₹7,50,000 |
| Used last year (1/5 th) | <u>₹1,50,000</u> |
| Balance Stock | ₹6,00,000 |

It is given that original price is ₹3,750

Therefore, 160 tonnes (₹6,00,000 / ₹3,750) 'P-6' is there.

(3) 'P-6' -Value

Alternative One:

Manufacturing and Storage is done by 'WYE' Ltd. Therefore it will be sold at ₹3,000 per tonne.

Cash inflow will be ₹4,80,000 (₹3,000 × 160)

Alternative Two:

10% of all material will be used. It means 90% of 160 tonne will be sold.

Cash inflow will be ₹4,32,000 (160 × 0.90 × ₹3,000)

Alternative Three:

In this situation storage is done by 'WYE' Ltd. Therefore only 10% of whole quantity of 160 tonnes will be sold in market at ₹3,000 per tonne.

Cash inflow will be ₹48,000 (16 × ₹3,000)

(4) Direct Labour Cost

Alternative One:

Avoidable Cost, if Deptt. KXB is closed (saving) ₹3,75,000

Alternative Two:

If manufacturing is given to 'WYE' Ltd. and 'EXE' Ltd. continues to store the product, saving on account of labour retrenchment will be only ₹18,750.

Alternative Three:

If manufacturing is done by 'EXE' Ltd. then labour force will continue. It means impact of labour cost in third alternative will be nil.

(5) Machine

Machine is used for manufacturing of containers. It is not required in alternative one and two. Therefore, it will be sold and there will be one time cash inflow of ₹1,87,500 under alternative one and two.

(6) Rent of Warehouse

The hire charge of warehouse is ₹67,500 per annum. The remaining space of the warehouse is idle. It means, when department 'KXB' is closed, cash outflow of ₹67,500 will be avoided. Therefore, cash flow for alternatives two and three will not be disturbed on this account.

(7) Maintenance of Machine

Maintenance of machine is required for manufacturing. It means ₹27,000 will be avoidable cost for alternative one and two. In third alternative this cost will continue to be there.

(8) Miscellaneous Overhead

Miscellaneous overhead of ₹1,18,125 will be avoidable cost for alternative one. For second alternative 80% of this i.e. ₹94,500 will be avoidable cost. For third alternative 20% of ₹1,18,125 i.e. ₹23,625 will be avoidable cost.

(9) Supervisory Staff

Supervisory staff will be transferred to another department in the first alternative. It means cash flow will not be affected. In the second and third alternatives, supervisory staff will be retained and it means no additional cash flow or relevant cost due to decision.

(10) Depreciation

Depreciation does not affect the cash flow. Therefore it is not relevant for these decisions.

Problem-73

SFM Ltd. wants to evaluate the potential elimination of Division 'Z'. The basic information regarding cost and revenue is given below:

| | <i>Division X and Y</i> | <i>Division Z</i> | <i>Total</i> |
|--------------------------|-----------------------------|-----------------------|-------------------|
| <i>Sales</i> | <i>₹ 1,20,000</i> | <i>₹ 15,000</i> | <i>₹ 1,35,000</i> |
| <i>Variable Expenses</i> | <i>(60,000)</i> | <i>(8,000)</i> | <i>(68,000)</i> |

| | | | |
|-------------------------|----------|----------|----------|
| Contribution Margin | 60,000 | 7,000 | 67,000 |
| Traceable Fixed Costs | (42,000) | (12,000) | (54,000) |
| Divisional Income | 18,000 | (5,000) | 13,000 |
| Unallocated Fixed Costs | --- | --- | (6,000) |
| Income before Taxes | | | 7,000 |

Required

- (i) What will be the increase or decrease in profit by eliminating Division 'Z' if all costs traceable to division 'Z' are avoidable? Should the company eliminate?
- (ii) Assume that executives and supervisory personnel in Division 'Z' will be reassigned to other divisions, if division is eliminated. Included in ₹ 12,000 of traceable fixed costs of Division 'Z' are ₹ 6,000 of salaries for these personnel. What is the effect of eliminating division 'Z' with this assumption?
- (iii) Assume that fixed assets of Division 'Z' can be sold for ₹ 1,50,000 if Division 'Z' is eliminated. Remaining life of these assets is 10 years. Company can earn interest of 12% on invested funds. By what amount will this information affect the benefit to eliminate? [PVIFA (12%, 10) = 5.650]



Solution

- (i) **Comparative Profits** assuming that Costs Traceable to Division Z are Avoidable

| Particulars | Total Company Operations, if it | | Benefit / (Cost) to eliminate Z (₹) |
|-------------------|---------------------------------|------------------|-------------------------------------|
| | Keeps Z (₹) | Eliminates Z (₹) | |
| Sales | 1,35,000 | 1,20,000 | (15,000) |
| Variable Expenses | (68,000) | (60,000) | 8,000 |
| Contribution | 67,000 | 60,000 | (7,000) |
| Total Fixed Cost | (60,000) | (48,000) | 12,000 |
| Profit | 7,000 | 12,000 | 5,000 |

- (ii)

| Advantages to Eliminate Division Z | (₹) |
|--|---------------|
| Reduction in Variable Expenses | 8,000 |
| Reduction in Fixed Expenses (₹12,000 – ₹6,000) | 6,000 |
| Total Benefit | 14,000 |

2.191 Advanced Management Accounting

| Disadvantages to Eliminate Z | (₹) |
|--|--------|
| Reduction in Sales | 15,000 |
| Decrease in Profit by Eliminating Division Z | 1,000 |

- (iii) ₹26,549 should be added to the annual benefits of eliminating Division Z. The equivalent annual cash flow of ₹26,549 is computed by using annuity table for an assumed annuity of ten years at 12% with present value of ₹1,50,000.

Cash Flow ₹26,549 ($₹1,50,000 \div 5.650$)

The equivalent annual cash flow of ₹26,549 is the opportunity cost of keeping division Z or alternatively it is a benefit from eliminating the division Z.

Problem-74

TQM Limited makes engines for motor cars for its parent company and for two other motor car manufacturers.

On 31st December, the company has sufficient work order for January and one further order for 21,000 engines. Due to recession in the economy, no further order are expected until May when it is hoped economic prospect for the motor car industry will have improved. Recently factory has been working at only 75% of full capacity and the order for 21,000 engines represents about one month production at this level of activity.

The board of directors are currently considering following two options:

- (i) *Complete the order in February and close the factory in March and April.*

Or

- (ii) *Operate at 25 per cent of full capacity for each of three months of February, March and April.*

The costs per month at different levels of activities are as follows:

| | At 75% (₹) | At 25% (₹) | Idle (₹) |
|--------------------------------|------------|------------|----------|
| <i>Direct Material</i> | 5,25,000 | 1,75,000 | -- |
| <i>Direct Labour</i> | 5,23,600 | 1,73,250 | -- |
| <i>Factory Overhead</i> | | | |
| <i>Indirect Material</i> | 8,400 | 4,900 | 4,900 |
| <i>Indirect Labour</i> | 1,01,500 | 59,500 | -- |
| <i>Indirect Expenses</i> | | | |
| <i>Repairs and Maintenance</i> | 28,000 | 28,000 | -- |
| <i>Others Expenses</i> | 52,500 | 34,300 | 26,600 |

| | | | |
|-------------------------|----------|--------|--------|
| <i>Office Overheads</i> | | | |
| <i>Staff Salaries</i> | 1,48,400 | 98,000 | 67,550 |
| <i>Other Overheads</i> | 28,000 | 19,950 | 11,200 |

Other information is as follows:

- Material cost and labour cost will not be incurred where there is no production.
- On the reopening of the factory, one time cost of training and engagement of new personnel would be ₹65,800 and overhauling cost of plant would be ₹14,000.
- Parent company can purchase engines from open market at reasonable price.

Required

- (i) To express your opinion, along with calculations, as to whether the plant should be shut down during the month of March and April or operate 25% of full capacity for three months.
- (ii) To list and comment on cost / non-costs factors which might be relevant to the discussion.



Solution

(i)

| | Option-I | Option-II |
|-----------------------|--|----------------------------------|
| | At 75% in Feb and Close in March and April (₹) | At 25% each from Feb – April (₹) |
| Direct Material | 5,25,000 | 5,25,000 |
| Direct Labour | 5,23,600 | 5,19,750 |
| Factory Overheads | | |
| Indirect Material | 8,400 | 14,700 |
| Two Months Idle | 9,800 | --- |
| Indirect Labour | 1,01,500 | 1,78,500 |
| Training Cost | 65,800 | --- |
| Repairs & Maintenance | 28,000 | 84,000 |
| Over- hauling Cost | 14,000 | |
| Others Expenses | 52,500 | 1,02,900 |
| Two Months Idle | 53,200 | |

2.193 Advanced Management Accounting

| | | |
|------------------|-----------|-----------|
| Office Overheads | | |
| Staff Salaries | 1,48,400 | 2,94,000 |
| Two Months Idle | 1,35,100 | |
| Other Overheads | 28,000 | 59,850 |
| Two Months Idle | 22,400 | ---- |
| Total Cost | 17,15,700 | 17,78,700 |

The more economic course of action is to operate at 75% capacity for a month only, and close the plant for March and April. This option will save ₹63,000 (₹17,78,700 – ₹17,15,700).

(ii) In regard to the decision on close down of operations or continuing with operations, the factors to be considered are:

- (1) The proposal which involves the lower total costs will be selected.
- (2) If the company has contracted the purchases from high quality and high price suppliers, a change in the procurement policy to 'shop around' may be considered to obtain economics in purchases.
- (3) The services of unskilled labour, if any, who do not require re-training may be dispensed with. They may be recruited and put on work without incurring training cost on re-opening of the factory. This will save training and idle time cost.
- (4) The possibility of wage freeze may reluctantly be considered as an extreme measure.

Miscellaneous

Problem-75

XY Ltd. is manufacturing a consumer product and doing marketing through 200 depots all over the country. The company is considering closing down the depots and resorting to dealership arrangements. The total turnover of the company is ₹ 160 crores per annum. The following information is given for each depot.

₹ in lakhs

Annual turnover.....80.00

Average inventory..... 16.00

Administrative expenses per annum..... 1.60

Staff salary per annum.....2.58

The inventory carrying cost is 16% p.a. which is also the interest rate prevailing in the market for working capital finance. The other fixed cost per annum is ₹ 16 crores. Marketing through

dealers would involve engaging dealers for each area. The dealers will assure Minimum sales for each area. This would result in increasing the capacity utilization from 80% to 100%. At present the company's P/V ratio is 20%. Marketing through dealers would involve payment of commission of 8% on sales. Half of the existing depot staff will have to be absorbed in the company. The dealer will deposit ₹ 3.20 crores with company on which interest at 12% p.a. will be paid.

Required

Work out the impact on profitability of the company by accepting the proposal.

 **Solution**

Comparative Profit Statement Existing Vs Proposed Situation

(₹ In Crores)

| | Existing | Proposed |
|--|----------|----------|
| Sales | 160.00 | 200.00 |
| Less: Variable Cost (80% of Sales) | 128.00 | 160.00 |
| Contribution | 32.00 | 40.00 |
| Less: Administration Expenses (₹ 0.016 × 200 Depots) | 3.20 | --- |
| Staff Salaries (₹ 0.0288 × 200 Depots) | 5.76 | 2.88 |
| Inventory Carrying Cost (₹ 0.16 × 200 Depots × 16%) | 5.12 | --- |
| Other Fixed Costs | 16.00 | 16.00 |
| Commission on Sales (@8%) | --- | 16.00 |
| Profit | 1.92 | 5.12 |
| Add: Savings on Interest on Deposit (₹ 3.20 × 200* × 4%) | --- | 25.60 |
| Total Profit | 1.92 | 30.72 |

The above analysis shows that if Proposal is accepted, the Profit will increase from ₹ 1.92 Crores to ₹ 30.72 Crores.



This Question can also be solved by using 'Incremental' approach. (*) Further, It has been *assumed* that 'total number of dealers' are equal to 'total number of depots' i.e. 200.

Problem-76

A manufacturing unit of ABC Co. Ltd. has presented the following details:

Average units produced and sold per month..... 2,40,000

2.195 Advanced Management Accounting

No. of workers.....80

Sales value..... ₹60 Lacs

Contribution..... ₹24 Lacs

Wage rate..... ₹5 per unit

The production manager proposes to introduce a new automated machine due to which following changes will take place:

1. No. of units produced and sold are expected to increase by 20%.
2. No. of workers will be reduced to 60.
3. With a view to provide incentive for increased production, production manager intends to offer 1 % increase in wage rate for every 3% increase in average individual output achieved.
4. Decrease in selling price by 2%.

Required

Calculate amount of extra contribution after introduction of new automated machine and give your recommendations.

Solution

Workings

Present Average Output per employees per month

$$\begin{aligned} &= \frac{\text{Total Present Output}}{\text{Total Number of Present Employees}} \\ &= \frac{2,40,000 \text{ units}}{80 \text{ Employees}} \\ &= 3,000 \text{ units} \end{aligned}$$

Future Average Output per employees per month

$$\begin{aligned} &= \frac{\text{Total Future Output}}{\text{Total Number of Future Employees}} \\ &= \frac{2,40,000 \text{ units} \times 120\%}{60 \text{ Employees}} \\ &= \frac{2,88,000 \text{ units}}{60 \text{ Employees}} \\ &= 4,800 \text{ units} \end{aligned}$$

Present Piece Work Rate = ₹ 5.00 *per unit*
 Proposed Piece Work Rate = Present Piece Work Rate + Incentive*
 = ₹ 5.00 + ₹ 5 × 20%
 = ₹ 6 *per unit*

Incentive*

1% Increase in 'Wage Rate' for - Every 3% Increase in 'Average Individual Output Achieved'

Change in Output (%) = $\frac{4,800 \text{ units} - 3,000 \text{ units}}{3,000 \text{ units}}$
 = 60%
 Change in Wage Rate (%) = $\frac{60\%}{3\%} \times 1\%$
 = 20%
 Present Sales Price *per unit* = ₹ 25.00
 (₹ 60,00,000 / 2,40,000 units)
 Proposed Sale Price *per unit* = ₹ 24.50
 (₹ 25 - 2% × ₹ 25.00)
 Present Variable Cost = ₹ 60,00,000 - ₹ 24,00,000
 = ₹ 36,00,000
 Present Variable Cost Excluding Wages *per unit* = $\frac{\text{Contribution} - \text{Wages}}{\text{Present output (units)}}$
 = $\frac{₹ 36,00,000 - (2,40,000 \text{ units} \times ₹ 5)}{2,40,000 \text{ units}}$
 = ₹ 10.00 *per unit*

Statement of 'Extra Monthly Contribution'

| Particulars | ₹ |
|---|-----------|
| Sales Value (2,88,000 units × ₹ 24.50) | 70,56,000 |
| Less: Variable Costs Ex Wages (2,88,000 units × ₹ 10) | 28,80,000 |
| Less: Wages (2,88,000 units × ₹ 6) | 17,28,000 |
| Contribution (Proposed Plan) | 24,48,000 |
| Less: Present Contribution | 24,00,000 |
| Increase in Contribution | 48,000 |

Recommendations

The above analysis shows monthly increase in contribution amounting to ₹ 48,000. Hence, the production manager's proposal should be accepted.

Problem-77

R.G. Ltd. has several product lines with a sales manager in charge of each product line and he is paid a bonus based on the net income generated by his product line.

In analysis the performance of one product line, the General Sales Manager noted that the sales declined from ₹ 8 lakhs last year to ₹ 6 lakhs for the current year. However the product line manager received a larger than last year because net income increased from ₹ 90,000 last year to ₹ 1,20,000 for the current year.

The General Sales Manager wonders how the product line manager is entitled to a bonus with a decline in sales. He also wants to know how net income increased, when sales decline.

As a Cost Accountant you are required to prepare the income statements, based which the bonus was paid. Explain with supporting figures why net income increased when sales declined. What do you think of the present method of paying the Bonus? Can you suggest some other method?

The data given in support for the bonus payment are:

| | Year 2 | Year 1 |
|---|----------|----------|
| Units Sold @ ₹ 20 | 30,000 | 40,000 |
| Standard Variable Cost of Production per unit (₹) | 8 | 8 |
| Fixed Factory Overhead Cost (₹) | 2,00,000 | 2,00,000 |
| Selling & Distribution Expenses (assumed to be fixed) (₹) | 1,40,000 | 1,40,000 |
| Standard Fixed Factory Overhead per unit (₹) | 5 | 5 |
| Units Produced | 50,000 | 30,000 |
| Units-Opening Finished Goods Inventory | - | 10,000 |

All factory overhead variances are written off to cost of goods sold.

Solution

Income Statements (Based on which bonus was paid)

(Amount in ₹)

| | Year 1 | Year 2 |
|------------|--------|--------|
| Units Sold | 40,000 | 30,000 |

| | | |
|--|----------|----------|
| Sales @ ₹20 per unit | 8,00,000 | 6,00,000 |
| Cost of Sales: | | |
| Variable Cost | | |
| Year 1 : 30,000 @ ₹8 | 2,40,000 | --- |
| Year 2 : 50,000 @ ₹8 | --- | 4,00,000 |
| Fixed Factory Overhead | 2,00,000 | 2,00,000 |
| Cost of Production | 4,40,000 | 6,00,000 |
| Add: Opening Stock | | |
| Year 1 : 10,000 @ ₹13 | 1,30,000 | --- |
| Year 2 : Nil | --- | --- |
| Less: Closing Stock: | 5,70,000 | 6,00,000 |
| Year 1 : Nil | --- | --- |
| Year 2 : 20,000 @ ₹13 | --- | 2,60,000 |
| Cost of Goods Sold | 5,70,000 | 3,40,000 |
| Add: Selling and Distribution Expenses | 1,40,000 | 1,40,000 |
| Cost of Sales | 7,10,000 | 4,80,000 |
| Income | 90,000 | 1,20,000 |

In the above statements income in year 2 increased in spite of decrease in sale because fixed overheads have been carried over to next year as part of the value of closing stock in year 2.

The above method of paying bonus to sales manager cannot be considered appropriate. It may be appropriate to pay bonus to production manager. The relevant method for paying bonus to sales manager is the contribution method as shown below:

| | Year 1 | Year 2 |
|---------------------|----------|----------|
| | (₹) | (₹) |
| Sales | 8,00,000 | 6,00,000 |
| Less: Variable Cost | 3,20,000 | 2,40,000 |
| Contribution | 4,80,000 | 3,60,000 |
| Less: Fixed Cost | 3,40,000 | 3,40,000 |
| Income | 1,40,000 | 20,000 |

If bonus to sales manager is paid on the contribution method, sales manager cannot get more bonus when sales decline.

SECTION - C

Quantitative Vs Qualitative Factors

Problem-1

Recently, Ministry of Health and Family Welfare along with Drug Control Department have come hard on health care centres for charging exorbitant fees from their patients. Human Health Care Ltd. (HHCL), a leading integrated healthcare delivery provider company is feeling pinch of measures taken by authorities and facing margin pressures due to this. HHCL is operating in a competitive environment so; it's difficult to increase patient numbers also. Management Consultant of the company has come out with some plan for cost control and reduction.

HHCL provides treatment under package system where fees is charged irrespective of days a patient stays in the hospital. Consultant has estimated 2.50 patient days per patient. He wants to reduce it to 2 days. By doing this, consultant has targeted the general variable cost of ₹ 500 per patient day. Annually 15,000 patients visit to the hospital for treatment.

Medical Superintendent has some concerns with that of Consultant's plan. According to him, reducing the patient stay would be detrimental to the full recovery of patient. They would come again for admission thereby increasing current readmission rate from 3% to 5%; it means readmitting 300 additional patients per year. Company has to spend ₹ 25,00,000 more to accommodate this increase in readmission. But Consultant has found blessing in disguise in this. He said every readmission is treated as new admission so it would result in additional cash flow of ₹ 4,500 per patient in the form of admission fees.

Required

- (i) Calculate the impact of Management Consultant's plan on profit of the company.
- (ii) Also comment on result and other factors that should be kept in mind before taking any decision.



Solution

- (i) **Impact of Management Consultant's Plan on Profit of the HHCL
Human Health Care Ltd.**

Statement Showing Cost Benefit Analysis

| Particulars | ₹ |
|--|-----------|
| Cost: | |
| Incremental Cost <i>due to</i> Increased Readmission | 25,00,000 |

| | |
|---|-----------|
| Benefit: | |
| Saving in General Variable Cost <i>due to</i> Reduction in Patient Days [15,000 Patients × (2.5 Days – 2.0 Days) × ₹500] | 37,50,000 |
| Revenue from Increased Readmission (300 Patients × ₹4,500) | 13,50,000 |
| Incremental Benefit | 26,00,000 |

(ii) Comment

Primary goal of investor-owned firms is shareholder wealth maximization, which translates to stock price maximization. Management consultant's plan is looking good for the HHCL as there is a positive impact on the profitability of the company (refer Cost Benefit Analysis).

Also HHCL operates in a competitive environment so for its survival, it has to work on plans like above.

But there is also the second side of a coin that cannot also be ignored i.e. humanity values and business ethics. Discharging patients before their full recovery will add discomfort and disruption in their lives which cannot be quantified into money. There could be other severe consequences as well because of this practice. For gaining extra benefits, HHCL cannot play with the life of patients. It would put a question mark on the business ethics of the HHCL.

Maybe HHCL would be able to earn incremental profit due to this practice in *short run* but it will tarnish the image of the HHCL which would hurt profitability in the *long run*.

So, before taking any decision on this plan, HHCL should analyze both *quantitative as well as qualitative factors*.

Limiting Factor

Problem-2

List out the basis for deciding the priority of selecting the best product in the different circumstances stated below:

- (i) When maximum sales (in value) is a limiting factor.
- (ii) When raw-material is a limiting factor.
- (iii) When labour hour is a limiting factor.
- (iv) When there is a heavy demand for the product.

 Solution

Limiting Factor

| Case | Basis for Selecting Priority of Product |
|--|---|
| If maximum sales (in value) is a limiting factor | Profit Volume Ratio |
| If raw material is a limiting factor | Contribution per unit of raw material required to produce one unit of a product |
| If labour hour is a limiting factor | Contribution per unit of labour hour required to produce one unit of a product |
| If there is a heavy demand for the product | Profit Volume Ratio |

Cost Classification

Problem-3

Marine Diesel Ltd. (MDL) manufactures and sells Diesel Engine. Company appoints Mr. Philips to coordinate shipments of the Diesel Engine from the factory to distribution warehouses located in various parts of the India so that goods will be available as orders are received from customers. MDL is unsure how to classify his annual salary of ₹6,00,000 in its cost records. The company's cost analyst says that Mr. Philips's salary should be classified as manufacturing cost; the finance controllers says that it should be classified as selling cost; and the managing director says that it does not matter which way Mr. Philips's salary cost is classified.

Required

Which view point is correct and why?

 Solution

Selling Costs would include *all costs necessary to secure customer orders and get the finished product into the hands of customers.* The responsibility of Mr. Philips as described in the problem is coordination of shipments of Diesel Engines from the factory to distribution warehouses and same would appear to fall in this class. Accordingly, the finance controller is correct in his view point that the salary cost should be classified as selling cost.

Problem-4

Pick out from each of the following items, costs that can be classified under 'committed fixed costs' or 'discretionary fixed costs'.

- (i) *Annual increase of salary and wages of administrative staff by 5% as per agreement*

- (ii) *New advertisement for existing products is recommended by the Marketing Department for achieving sales quantities that were budgeted for at the beginning of the year.*
- (iii) *Rents paid for the factory premises for the past 6 months and the rents payable for the next six months. Production is going on in the factory.*
- (iv) *Research costs on a product that has reached 'maturity' phase in its life cycle and the research costs which may be needed on introducing a cheaper substitute into the market for facing competition.*
- (v) *Legal consultancy fees payable for patent rights on a new product Patenting rights have been applied for.*

 **Solution**

| Committed Fixed Cost | | Discretionary Fixed Cost | |
|----------------------|--|--------------------------|--------------------------------|
| (i) | Salary and Wage increase. | (ii) | New Advertisement Cost. |
| (iii) | Rents payable for the next 6 months. | (iv) | Research Cost for substitutes. |
| (v) | Legal Fees for filing for patent rights. | | |

Problem-5

State the type of cost in the following cases:

- (i) *Cost associated with the acquisition and conversion of material into finished product.*
- (ii) *Cost arising from a prior decision which cannot be changed in the short run.*
- (iii) *Increase in cost resulting from selection of one alternative instead of another.*
- (iv) *Rent paid for a factory building which is temporarily closed.*

 **Solution**

| Cases | | Type of Cost |
|-------|--|--------------------------------|
| (i) | Cost associated with the acquisition and conversion of material into finished product. | Product Cost |
| (ii) | Cost arising from a prior decision which cannot be changed in the short run. | Committed Cost |
| (iii) | Increase in cost resulting from selection of one alternative instead of another. | Differential/ Incremental Cost |
| (iv) | Rent paid for a factory building which is temporarily closed. | Shut Down Cost |

Problem-6

Classify the following fixed cost as normally being either committed or discretionary.

- (i) Depreciation on assets
- (ii) Advertising
- (iii) Research
- (iv) Employees Training

**Solution****Committed Cost / Discretionary Cost**

| S. No. | Fixed Costs | Committed / Discretionary |
|--------|------------------------|---------------------------|
| (i) | Depreciation on assets | Committed Cost |
| (ii) | Advertising | Discretionary Cost |
| (iii) | Research | Discretionary Cost |
| (iv) | Employees Training | Discretionary Cost |

Problem-7

Identify the type of cost along with the reasons.

- (i) An advertising program has been set and management has signed the non negotiable contract for a year with an agency. Under the terms of contract, agency will create 5 advertisements within the contract duration for the company and company will pay ₹12,00,000 for each advertisement.
- (ii) A manager has to decide to run a fully automated operation that produces 100,000 widgets per year at a cost of ₹1,200,000, or of using direct labour to manually produce the same number of widgets for ₹1,400,000.
- (iii) A Company had paid ₹5,00,000 a Marketing Research company to find expected demand of the newly developed product of the company.
- (iv) A company has invested ₹25 lacs in a project. Company could have earned ₹2 lacs by investing the amount in Government securities.
- (v) A Oil Refining Co. has paid a salary of ₹20,00,000 to the chairman for a particular year. The Company has sold 25 MT of Oil in that particular year.
- (vi) Accountant of a cloth factory paid ₹25,000 for water that has been used for washing clothes before they go for final drying process.



Solution

- (i) **Committed Cost**
Reason: Company cannot negotiate the price of advertisement in future and it has to make payment as soon as advertisement is prepared.
- (ii) **Differential Cost**
Reason: In case of decision making among two alternatives, every manager has to compare the difference in cost involved.
- (iii) **Sunk Cost**
Reason: Research expense has already been incurred and it will not affect any decision making in future.
- (iv) **Opportunity Cost**
Reason: Income from government securities is the amount that company has forgone to earn income from its investment in the project.
- (v) **Period Cost**
Reason: Salary of chairman is paid irrespective of productivity of the company.
- (vi) **Direct Cost**
Reason: Amount paid for water can be directly attributed to the cost of finished product that is clothes.

Problem-8

Buildico, a company that builds houses presents the following facts relating to a certain housing contract that it wishes to undertake:

The CEO's and Marketing Director's food and hotel expenses of ₹ 3,750 were incurred for a meeting with a prospective client.

1,200 kgs of raw material Z will be required for the house. Inventory of Z available is 550 kg. It was purchased at ₹ 580 per kg. It is used by Buildico in other projects. Its current market price is ₹ 650 per kg. Its resale value is ₹ 350 per kg.

The house will require 90 hours of engineer's time. The engineers are paid a fixed monthly salary of ₹ 47,500 per engineer who can work 150 hours a month. Spare time is not available now and an engineer has to be hired for this house for one month. He cannot be used in any other project once he does this contract.

Buildico will use a special earthquake proof foundation material. This was developed by Buildico at a cost of ₹ 30,000 for some other project that had to be abandoned. If it does not use it in this project, it can use it in some other project and charge the client ₹ 50,000 for it.

A list of items is given below:

2.205 Advanced Management Accounting

| S. No. | Item | Type of Cost | Relevant (R)/ Irrelevant (IR) |
|--------|--|--------------|-------------------------------|
| 1 | Food and hotel expenses ₹ 3,750 | | |
| 2. (i) | Material Z : 550 kg × ₹ 580/kg | | |
| (ii) | Material Z : 550 kg × ₹ 650 per kg | | |
| 3. (i) | Engineer's salary ₹ 47,500 | | |
| (ii) | Engineer's free time cost $\frac{60}{150} \times ₹ 47,500$ | | |
| 4. (i) | Design cost ₹ 30,000 | | |
| (ii) | Design cost ₹ 50,000 | | |

Required

Name the type of cost and state whether it is relevant or not in calculating the cost of the given housing project.



Solution

| Sl. No. | Item | Type of Cost | Relevant / Irrelevant |
|---------|---|-----------------------------------|-----------------------|
| 1 | Food and hotel expenses ₹3,750 | Sunk Cost | Irrelevant |
| 2(i) | Material Z: 550 kg × ₹580/kg | Historical Cost / Sunk Cost | Irrelevant |
| (ii) | Material Z: 550 kg × ₹650 per kg | Replacement Cost | Relevant |
| 3(i) | Engineer's salary ₹47,500 | Period Cost | Relevant |
| (ii) | Engineer's free time cost $\frac{60}{150} \times ₹47,500$ | Committed Cost / Unavoidable Cost | Irrelevant |
| 4(i) | Design cost ₹30,000 | Sunk Cost | Irrelevant |
| (ii) | Design cost ₹50,000 | Opportunity Cost | Relevant |

Problem-9

Proposal A is being evaluated against Proposal B. Fill up column IV of the following table:

| I | II | III | IV |
|---------|-------------------------|----------------|--|
| Sl. No. | Type of Cost | Classification | Condition under which the classification happens |
| (i) | Variable cost per unit | Irrelevant | - |
| (ii) | Unavoidable fixed costs | Relevant | - |

| | | | |
|-------|-------------------------------|------------|---|
| (iii) | Out of pocket costs in future | Relevant | - |
| (iv) | Sunk cost | Irrelevant | - |

 **Solution**
Analysis of Costs for Evaluation of Proposal A against the Proposal B

| Sl. No | Condition under which classification happens |
|--------|---|
| (i) | Variable Cost per unit that will not differ between the options/ Variable Cost has already been incurred in the past. |
| (ii) | Fixed Cost that is not committed and differ between the options. |
| (iii) | Additional future cost/ Differs between alternatives. |
| (iv) | Costs already have been incurred and it will not affect any current or future action. |

Problem-10

Some statements are given below. Identify name of the cost with examples and state whether it is relevant/non-relevant in decision making.

- Costs are historical costs which have already been incurred and cannot change by any decision made in future.
- It is measure of benefits foregone by rejecting the second best alternative of resources in favour of the best.
- It is portioning of cost which involves payments to outsiders i.e., it gives rise to cash expenditure as opposed to such costs as depreciation.
- Total cost is changed (increase or decrease) due to change in the level of activity, technology or production process or method of production.
- Cost used in evaluation of a product to reflect the use of resources but that have no observable cost.

 **Solution**
Relevant / Not Relevant

| S.No. | Name of the Cost | Example | Relevant / Not Relevant |
|-------|------------------|--|----------------------------------|
| (i) | Sunk Cost | Written down value of machine already purchased. | Not Relevant in decision making. |
| (ii) | Opportunity Cost | Funds invested in business or deposited into bank. | Useful in decision making. |

2.207 Advanced Management Accounting

| | | | |
|-------|--------------------|---|---|
| (iii) | Out of Pocket Cost | Commission to salesman on sales, Carriage inward. | Relevant for decision making. |
| (iv) | Differential Cost | Include all fixed and variable cost which are increased /decreased. | Relevant in specific decision making. |
| (v) | Notional Cost | Notional Rent for use of space. | Relevant, if company benefit by using resource alternatively. |

Problem-11

ANZB Financial Services Limited is an Indian banking and financial services company headquartered in Chennai, Tamil Nadu. Apart from lending to individuals, the company grants loans to micro, small and medium business enterprises. Listed below are several costs incurred in the loan division of ANZB Financial Services Limited.

- (i) *Remuneration of the loan division manager.*
- (ii) *Cost of Printer Paper, File Folders, View Binders, Ink, Toner & Ribbons used in the loan division.*
- (iii) *Cost of the division's MacBook Pro purchased by the loan division manager last year.*
- (iv) *Cost of advertising in business newspaper by the bank, which is allocated to the loan division.*

Cost Classification

| | | |
|--|---|---------------------------|
| <i>Controllable by the loan division manager</i> | <i>Direct cost of the loan division</i> | <i>Sunk Cost</i> |
| <i>Uncontrollable by the loan division manager</i> | <i>Indirect Cost of the loan division</i> | <i>Out of Pocket Cost</i> |

Required

For each Cost, indicate which of the above mentioned Cost Classification best describe the cost.

Note

More than one classification may apply to the same cost item.

 Solution

Cost Incurred – Cost Classification

| S. No. | Cost Incurred | Classification 1 | Classification 2 | Classification 3 |
|--------|--|--|-------------------------------------|---------------------|
| (i) | Remuneration of the loan division manager. | Uncontrollable by the loan division manager. | Direct cost of the loan division. | Out of Pocket Cost |
| (ii) | Cost of Printer Paper, File Folders, View Binders, Ink, Toner & Ribbons used in the loan division. | Controllable by the loan division manager. | Direct cost of the loan division. | Out of Pocket Cost |
| (iii) | Cost of the division's MacBook Pro purchased by the loan division manager last year. | Controllable by the loan division manager. | Direct cost of the loan division. | Sunk Cost |
| (iv) | Cost of advertising in business newspaper by the bank, which is allocated to the loan division. | Uncontrollable by the loan division manager. | Indirect Cost of the loan division. | Out of Pocket Cost |