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PAPER 5

Advance Management Accounting (AMA)

Costing & OR Theory Book

DKC *Dani Ki Costing*

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His teaching method is so simplified that over a period the Cost Accountancy subject is known amongst students as Dani ki Costing.

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I recommend him as a true friend of all CA students.

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ADVANCE MANAGEMENT ACCOUNTING

CA Final OLD Course

Paper-5 Group-II

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CA.FINAL
COSTING THEORY NOTES

Q.348 In what circumstances it may be justifiable to sell at a price below marginal cost?

Answer: It may be justifiable to sell at a price below marginal cost for a limited period under the circumstances:

1. Where materials are of perishable nature.
2. Where stocks have been accumulated in large quantities and the market prices have fallen.
3. To popularize a new product.
4. Where such reduction enables the firm to boost the sale of other products having larger profit margin.
5. To capture foreign markets.
6. To obviate shut down costs.
7. To retain future market.

Q.349 Enumerate the factors involved in decision relating to expansion of capacity?

Answer: The factors involved in decision relating to expansion of capacity are enumerated as below:

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

Q.350 Mention any four important factors to be considered in Marginal Costing Decisions and Distinguish between Marginal and Absorption Costing & Limitations of Absorption Costing?

Answer: In all recommendations of marginal costing decisions; the following factors are to be considered:

1. Contribution: Whether the product or productions line in question makes a contribution.
2. Specific *fixed cost, if any:* Where a choice is to be made between two courses of action, the additional fixed overhead, if any, should be taken into account.
3. CVP relationship: The effect of increase in volume on profits, and the rate of earning additional, Profits should be analysed.
4. Incremental contribution: Where additional quantities can be sold only at reduced prices, incremental contribution will be more effective in decision making, as it takes into account the additional sale quantity and additional contribution per unit.
5. Capacity: Whether acceptance of the incremental order, or additional product line is within the firm's capacity or whether key factor comes into play, should be analysed.
6. Non-cost factors: Non-cost factors should also be considered, wherever applicable.

The difference between *Marginal Costing and Absorption Costing can be narrated as below:*

Absorption Costing	Marginal Costing
1:- It is a total cost technique i.e. both variable and fixed costs are charged to products, processes or operations.	Here only variable costs are charged to products, processes or operations. Fixed costs are charged as period costs to be profit statement of the same period in which they are incurred.
2:- Fixed factory overheads are absorbed by the production units on the basis of a predetermined fixed factory overheads recovery rate based on normal capacity. Under/ over absorbed overheads are adjusted before arriving at the figure of profit for a particular period.	The cost of production under this method does not include fixed factory overheads and therefore, the value of closing stock comprises of only variable costs. No part of the fixed expenses is included in the value of closing stock and carried over to the next period.
3:- In spite of best possible forecast and equitable basis of apportionment / allocation of fixed costs, under or over recovery of fixed overheads generally arises.	Since fixed overheads are not included in the cost of production, therefore the question of their under/over recovery does not arise.
4:- Managerial decisions under this costing technique are based on profit i.e. excess o sales value over total costs, which may at times lead to erroneous decisions.	Here decisions are made on the basis of contribution i.e. excess of sales price over variable costs. This basis of decision making results in optimum profitability.

Absorption Costing: Limitations:

1. Fixed cost treated as product cost.
2. Fixed Cost is included in closing stock.
3. Entire fixed cost is not written off.
4. Net profit/ Depreciation/ Dividend/ Tax -All wrong.
5. The more the production, the more the profits.

Q.351 What are the advantages of Marginal Costing and limitations of Marginal Costing?

Answer:

1. **Pricing decisions: -** Since marginal cost per unit is constant from period to period within a short span of time, firm decisions on pricing policy can be taken, If fixed cost is included, the unit cost will change from day to day depending upon the volume of output This will make decision task difficult.

2. **Overhead Variances: -** Overheads are recovered in costing on the pre-determined rates. This creates the problem of treatment of under or over-recovery of overhead, if fixed overhead were included Marginal costing avoids such under or over recovery of overheads.

3. **True profit: -** It is argued that under the marginal costing technique, the stock of finished goods and work-in-progress are carried on marginal cost basis and the fixed expenses are written off to profit and loss account as period cost. This shows the true profit of the period.

4. **Break-even analysis: -** Marginal costing helps in the preparation of break-even analysis, which shows the effect of increasing or decreasing production activity on the profitability of the company.

5. **Control over expenditure: -** Segregation of expenses as fixed and variable helps *the management to* exercise control over expenditure. The management can compare the actual variable expenses with the budgeted variable expenses and take corrective action through variance analysis.

6. **Business decision-making:-** Marginal costing helps the management in taking a number of business decisions like make or buy, discontinuance of a particular product, replacement of machines etc.

Limitations of Marginal costing:-

1. Marginal Costing assumes that all costs can be classified into fixed and variable. But it is not so, as there are costs which are neither fixed nor variable. For example, various amenities provided to workers may have no relation either to volume of production or time factor.
2. Contribution of a product itself is not a guide for optimum profitability unless it is linked with the key factor,
3. Marginal Costing ignores time factor and investment. For example the marginal cost of two jobs may be the same but the time taken for their completion and the cost of machines used may differ. The true cost of a job, which takes longer time and uses costlier machine would be higher. This fact is not disclosed by marginal costing.

4. The overheads of fixed nature cannot altogether be excluded particularly in large contracts while valuing work-in-progress. In order to show the correct position, fixed overheads have to be included in work-in-progress.
5. In the long run, the selling prices should be based on total cost i.e. inclusive of fixed cost also. In the short run or in special situations when a product is sold below the total cost. Customers may insist on the continuation of reduced prices forever which may not be possible in all cases. Further, sales staff may mistake marginal cost for total cost and sell at a price which will result in loss or low profit. Hence sales staff should be cautioned while giving marginal cost.
6. The main assumption regarding behavior of costs is not true. The variable costs do not remain constant per unit of output. There may be changes in the prices of raw materials, wage rates etc. after a certain level of output has been reached due to shortage of material shortage of skilled labour, concessions of bulk purchases etc. Similarly the fixed cost does not remain static. They may change from one period to another. For example salaries bill may go up because of annual increments or due to change in pay rate etc.

Q352. What are the reasons to determine capacity?

Answer: Main reason for the determination of capacity are as follows:-

1. Selecting a base activity for overhead rate determination or overhead distribution.
2. It is required in connection with Schedule VI of the Companies Act for indicating the licensed and installed capacity and also the actual production.
3. It is necessary for the Cost Auditor to give his comments on capacity utilization.
4. It helps to compare the actual capacity utilization with the budgeted capacity utilization and to analyze the deviations for taking corrective action.
5. Capacity utilization is an important factor in price fixation.
6. It enables the company to analyze the under or over absorption of overheads for proper treatment.
7. Capacity determination helps in preparation of flexible budgeting and achieving overall control over the operation of business.

Q.353 Write short notes on the Break Even Point (BEP) & Assumption and Limitations?

Answer: The Break-even point to a business is the point or a business situation at which there is neither a profit nor a loss to the firm. In either word, at this point, the total contribution equals fixed costs.

Assumptions underlying break-even analysis are as below:

1. All costs can be easily classified into fixed and variable components.
2. Both revenue and cost functions are linear over the range of activity under consideration.
3. Prices of output and input remain unchanged.
4. Productivity of the factors of production will remain the same.
5. The state of technology and the process of production will not change.
6. There will be no significant change in the level of inventory.
7. The Company manufactures a single product.
8. In the case of a multi-product company, the sales mix will remain unchanged.

Limitations of a Break-even chart

The limitations of break even chart are as follows:-

1. While preparing a break-even chart, it is assumed that revenue and costs can be represented with the help of straight lines. It is not always be true.
2. The preparation of a break-even chart requires the Segregation of semi-variable costs into fixed and variable components. It may not always be possible to segregate semi-variable costs into fixed and variable elements accurately. There may be situations when semi-variable costs cannot be split.
3. A break-even chart assumes that selling price and variable cost per unit are constant at all levels of activity. It may not always be true. Selling price as well as variable cost may either increase or decrease with the change in volume. Fixed costs also tend to vary beyond a certain output.
4. When a firm produces a number of products the appointment of fixed expenses over various products may be different and often it may be done arbitrarily.
5. A Breakeven chart assumes that business condition will not change. This is hardly so.
6. A break-even chart does not consider the amount of capital employed in the business, a very important factor for determining profitability of a concern.

Q.354 Write short notes decisions involving dropping or adding a product line.

Answer: Since the objective of any business organization is to maximize its profits, the firm can consider the economies of dropping the unprofitable products, and adding a more remunerative product(s).

In such cases, the firm may have two alternatives as under:

(a)To drop the unprofitable product and to leave the capacity unutilized.

(b)To drop the unprofitable product and to utilize the capacity for the manufacture of a more remunerative product.

For this purpose, the contribution approach is adopted, taking the following factors into account:

1. Contribution from unprofitable product (i.e. Sale Revenue Less Variable Costs)
2. Specific fixed costs of the unprofitable product, which can now be avoided or reduced.
3. Contribution from the other profitable product, which is proposed to produced with the balance capacity.

Q.355 State the relative economics of the "Make or Buy" decision in Management Control?

Answer: The relative economics of the "make or buy" decision is management control. Generally for taking a make vs. buy decision comparison is made between the suppliers 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 but a component instead of making it under following situations:

1. If it costs less to buy rather than to manufacture it internally.
2. If the return on the necessary investment to be made to manufacture is not attractive enough.
3. If the company does not have the requisite skilled manpower to make.
4. If the concern feels that manufacturing internally will mean additional labour problem.
5. If adequate managerial manpower is not available to take charge of the extra work of manufacturing;

6. If the component shows much seasonal demand resulting in a considerable risk of maintaining inventories.
7. If transport and other infrastructure facilities are adequately available.

8. If the process of making is confidential or patented.
9. If there is risk of technological obsolence for the component such that it does not encourage capital investment in the component.

Q.356 State non-cost factors to be considered in make/ buy decision.

Answer: Non-cost factors in make/buy decisions:

1. Possible use of released production capacity and facility as a result of buying instead of making.
2. Sources of supply should be reliable and they are capable of meeting un-interruptedly the requirement of the concern.
3. Assurance about the quality of goods supplied by outside supplier.
4 Reasonable certainty from the side of suppliers about, meeting the delivery dates.
5. The decision of buying the product/component from outside suppliers should be discouraged, if the technical knowhow used is highly secretive.
6. 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 utilized elsewhere in the concern.
7. The decision of manufacturing product / component should not adversely affect the concern's relationship with suppliers.
8. Ensure that more than one supplier of product / component is available to reduce the risk of outside buying.
9. In case the necessary technical expertise is not available internally then it is better to buy the requirements from outside.

Q.357 List a few non-cost considerations in a Shut down or Continue decision

Answer:

1. Loss of market share to competition. (Effect on Goodwill)
2. Strain in labour-management relations
3. Availability of skilled labour on re-opening
4. Risk of obsolescence of machinery
5. Need to maintain machine in operating condition
6. Arrangement of finance for compensation payable, if any.

Q.358 Indicate the possible disadvantage of treating divisions as profit centers.

Answer: The possible disadvantage of treating divisions as profit centers are as follows:

1. Divisions may compete with each other and may take decisions to increase profits as the expense of other divisions thereby overemphasizing short term results.
2. It may adversely affect co-operation between the divisions and lead to lack of harmony in achieving. Organizational goals of the company. Thus it is hard to achieve the objective of goal congruence.
3. It may lead to reduction in the company's overall total profits.
4. The cost of activities which are common to all divisions may be greater for decentralised structure than for centralized structure. It may thus result in duplication of staff activities.
5. Top management delegates decision making to divisional managers. There are risks of mistakes committed by the divisional managers which the top management, may avoid.
6. Series of control reports prepared for several departments may not be effective from the point of view of top management.
7. It may under utilize corporate competence.
8. It leads to complications associated with transfer pricing problems.
9. It becomes difficult to identify and define precisely suitable profit centers.
10. It confuses division's results with manager's performance.

Q.359 What is Opportunity Cost? Give Examples.

Answer: Opportunity cost is defined as the cost of the alternative foregone. It is the prospective change in cost following the adoption of an alternative machine, process, raw materials, specification or operation.

It is the cost of opportunity lost by diversion of an input factor from one use to another.

The Opportunity cost or the value of opportunity foregone is taken into consideration when alternatives are compared. When a number of alternatives are available, the highest of the opportunity cost will be considered for decision-making. For example, a firm could either sell a dead stock item for Rs. 4 or substitute it for another component costing Rs.5. The opportunity cost of using this item in a specific contract will be Rs.5, since the firm would otherwise have opted for substitution (and not sale).

Some examples of opportunity cost:

(a) A Firm operates at full capacity. The opportunity cost of making a component (earlier/ bought outside) will equivalent to contribution foregone on sales of the main product.

(b) The opportunity cost of funds invested in a project is the interest that could have been earned by investing the funds in bank deposit or other –risk free modes.

Q.360 Explain Concept of Shadow Price?

Answer: Shadow Price: - It refers to the opportunity cost of one unit of resource for the organization. The concept is of particular relevance in a situation of scarce resources. For instance, if machine hours are a scare resource and the firm could have increased its contribution margin by Rs. 10 by having additional production in one machine hour, the shadow price of one hour's production is Rs. 10. In other words, the shadow price quantities benefit a firm can expect through increasing its capacity.

Q.361 How can margin of safety be improved?

Measures for improving margin of safety

Margin of safety can be improved by taking the following measures:

1. Increasing the selling price, provided the demand is inelastic so as to absorb the increased prices.
2. Reduction in fixed expenses.
3. Reduction in variable expenses
4. Increasing the sales volume provided capacity is available.
5. Substitution or introduction of a product mixes such that more profitable lines are introduced.

Q.362. What is JIT? What are the steps involved in JIT?

Answer: Operation of JIT (Just -in-time) concept:

A JIT approach is a collection of ideas and philosophy that streamline a company's production process activities to such an extent that waste of all kinds viz. material and labour is systematically driven out of the process.

Just in Time Technique enables a company to ensure that it receives products / spare parts / materials from its suppliers on the exact date and at the exact time when they are needed. JIT refers to a system in which materials arrive exactly as they needed.

With a JIT system a company must ensure that it receives materials from its supplier on the exact date and at the exact time when they are needed. For this reason the purchasing staff must investigate and evaluate every supplier, eliminate those that could not keep up with the delivery dates.

The steps- involved are:

Supplier Evaluation: The Purchasing Department must evaluate and investigate every supplier and eliminate those who could not keep up with the delivery dates.

Supplier Assistance: The engineering staff must visit supplier sites and examine their processes, not only to see if they can reliably ship high-quality parts but also to provide them with engineering assistance to bring them up to a higher standard of product.

Supplier Information System: The firm must install a system, which is as simple as a fax machine or as advanced as an electronic data interchange system or linked computer systemic that communicates with suppliers as to exactly how much of specified parts are to be sent to the company.

Direct Delivery: Deliveries should be sent straight to the production floor for immediate use in manufactured products, so that no time spent in inspecting the parts for defects. Drivers, who bring supplies of materials, drop them off at the specific machines that will use the materials first.

This can be illustrated with the example of three machines. Parts are first processed by machine, A which feed to machine B. Then B processes these parts and then C. Kanbans are located between the machines. As long Kanban containers are not full the workers at machine A continues to produce parts placing them in Kanban container. When the Kanban container is full, the worker stops producing and recommences when a part has been removed. A similar process applies between the operation of machine B and C. This process can result in idle time to a certain extent within the ceil, but the JIT philosophy is based on the thinking that it is more beneficial to absorb short run idle time than adding inventory during these periods. During idle time workers perform preventive maintenance on their machine.

Q.363. How does JIT help in shortening set-up and operation times?

Answer: Outline the JIT approach for shortening set-up and operation times.

Long set-ups and operation time involve indirect costs like product obsolescence, inventory carrying costs, and many defective products (because problems may not be discovered until a large number of items have already been completed). This problem will be resolved under JIT by adopting the following steps.

Test data: A of a typical set is prepared for analysis purposes. A team of industrial engineers and machine users examine this tape; spotting and gradually that contribute to a lengthy set-up.

Motion and time Study: By eliminating unnecessary production steps and improving others after a number of iterations, it is possible to achieve substantially lower set-up times than before.

Effects: Reaction in set-up time has the following effects:

Reduction in the amount of work-in-process,

Reduction in the number of products that can be produced before, defects are identified and fixed, thereby reducing scrap costs.

Q.364 Explain in brief the JIT approach for reducing WIP inventory.

Answer: JIT approach for reducing WIP inventory:

At times, there *may be huge differences between the operating speeds of different machines.*

This affects cost in following manner:

- Work-in-process inventory builds up in front of the slowest machines.
- Defective parts produced by an upstream machine may not be discovered until the next downstream machine operator finds them later. By that time, the upstream machine may have created more defective parts, all of which must now be destroyed or reworked in JIT philosophy, there are two ways to resolve the above problems.

1. Kanban Card: It is a notification, card that a downstream machine sends to each upstream machine that feeds it with parts, authorizing the production of just enough components to fulfill the production requirements. This is also known as "pull" system, since these cards are initiated at the end of the production process pulling work authorizations through the production system. WIP cannot pile up since it can be created only with kanban authorization.

2. Working Cells: A Working cell is a small cluster of machines, which can be run by a single machine operator. The establishment of working cells has the following advantages:
   - ❖ The individual machine operator takes each output part from machine to machine within the cell, and thus there is no way for WIP to build up between machines.
   - ❖ The operator can immediately identify defective output which otherwise is difficult for each machine of the cell. The smaller machines used in a machine cell are generally much simpler than the large automated machinery they replace. Hence maintenance costs are reduced.
   - ❖ It is much easier to reconfigure the production facility when it is necessary to produce different products, avoiding the large expense of carefully repositioning and aligning equipment.

Q.365."Employee Training and Development is a pre-requisite for JIT implementation" Explain.

Employee Training and Development is a pre-requisite for JIT implementation:

JIT focuses on waste reduction, inventory management and product quality. The focus of attention shifts away from performance based to high production volumes and quality. In order to make JIT effective, employee participation and co-operation is a must. For this purpose, the HR department must prepare and organize training classes to teach to employees:

How to operate a multitude of different machines?

How to perform limited maintenance on the machines without having to call in the maintenance staff?

How to spot product errors?

How to relate one's role in the entire system flows? and

When to halt the production process to fix problems?

The effects of proper training of employees will be: Versatility in handling operations Reduction in maintenance by maintenance staff Reduction in time and increase in quality output.

Q.366. State in brief the Benefits associated with JIT system.

Answer: Benefits associated with JIT system.

1. Reduction in Inventory levels: Unnecessary piling up of Raw Materials, WIP and finished goods are avoided. The focus is on production and purchasers per the firm's requirements.
2. Reduction in Wastage of Time: Wastage of time in various ways like inspection time, machinery set-up time, storage time, queue time, defectives rework time etc., are reduced.
3. Reduction in Scrap Rates: There will be sharp reductions in the rates of defectives or scrapped units. The workers themselves identify defects and take prompt action to avoid their recurrence.
4. Reduction in Overhead Costs: By reducing unnecessary (non value-added) activities and the associated time and cost-drivers, overheads can be greatly reduced e.g. material handling costs, rework costs, facility costs etc.

Q.367 Explain in brief the role of JIT in time reduction.

Answer: Role of JIT in time reduction:

The key focus of any JIT system is on reducing various kinds of wastage of time, so that the entire production process is concentrated on the time spent in actually producing products. By reducing wastage of time, the firm effectively eliminates activities that do not contribute to the value of a product which in turn reduces the costs associated with them. Time reduction can be achieved in the following manger.

1. **Inspection Time:** All inspection time is eliminated from the system as operators conduct their own quality cheeks. Suppliers assistance and quality checks at supplier's factory eliminate the need for separate inspection or QC department in the firm.
2. **Handling Time:** All movement, which involves shifting inventory and work in process throughout the various parts of the plant, can be eliminated by clustering machines together in logical groupings called Working Cells.
3. **Queue Time:** Queue time is eliminated by not allowing inventory to build up in front of machines. Kanban cards serve this purpose.

Q.368.EXPLAIN IN BRIEF THE EFFECT OF JIT ON OVERHEAD COSTS.

Answer: JIT effect on Overhead Costs

Overhead Costs are greatly reduced with JIT operation. This is because of the following reasons:

Elimination of non value-added activities and improvement in value-added activities.

Reduction of time

Reduction in Inventory levels and associated costs

Reduction / Elimination of unnecessary cost drivers

Introduction of "Machine Cells" to identify direct costs than overhead expenses.

The effect of JIT philosophy on Overhead is three-fold:

1. Thorough reduction in Overhead Costs
2. Shift between Overhead Costs and Direct Costs, due to introduction of Machine Cells
3. Scientific Allocation of common overheads based on Machine Cells and Cost Drivers

Examples

The costs of material handling, facilities, and quality inspection decline when a JIT system is installed.

The reduction of all types of inventory results in a massive reduction in the amount space required for warehouse facility. Hence costs associated with warehousing are reduced when the costs of staff equipment, fixed assets, facilities, and rent associated with the warehouse are sharply cut back.

A machine ceil generally produces only a small range of products, hence it is easy to assign the entire cost of each machine ceil to these items. This means that the depreciation, maintenance, labour and utility costs of each cell can be charged straight to a product, which is preferable than traditional absorption costing.

Q.369. Explain the Impact of JIT on Product Prices.

Answer: Impact of JIT on Product Prices:

When a company achieves a higher level of product quality, along with ability to deliver products on the dates required, customers may be willing to pay a premium. If customers are highly sensitive-to quality or delivery reliability (which are the benefits of JIT), it may be possible to increase price substantially.

If customers place a higher degree of importance on other factors, then there will be no opportunity for a price increase.

In case all firm in an industry adopt JIT, they offer the same level of quality and service JIT philosophy, in such cases, just keeps a company from losing sales to its competitors. The impact of a JIT system on product pricing is primarily driven by customers' perceived need for higher product quality and ^liable delivery times, as well as the presence of competitors with JIT system, the same installation, and operational base.

Identification of Machine Cells under JIT for systematic OH Cost Allocation

a. A working Cell or a machine Cell is a small cluster of machines, which can be run by a single machine operator.
b. It designed to produce either a single product or a single component that goes into a similar product line. Therefore all costs generated by the machine cell can be charged directly to the only product it produces.
c. When a company completely changes over to the use of machine cells in all locations, the cost related to all the cells can now be changed directly to products. The balance costs left may be assigned to the Overhead Cost Pool and identified with the products through Activity Based Costing. This results in more accurate product costs.

Some examples of shift from Overheads to Direct Machine Cell Costs are:

a. Depreciation: Depreciation of each machine in a cell can be changed directly to a product. It may be possible to depreciate a machine based on its actual use, rather than charging off a specific amount per month.
b. Electricity: Power used by the machine in a cell can be separately metered and charged directly to the products that pass through the cell. Excess electricity cost charged to the facility as whole has to be charged to an overhead cost pool for allocation.
c. Material handling: In a JIT system, most material handling cost are limited since machine operators move parts around within their machine cells. Only costs for materials handling between cells and charged to an overhead cost pool for allocation.

d. Operating Suppliers: Supplies are used mostly with the machine cells to the majority of items in this expense category can be separately tracked by individual cell and charged to products directly.

e. Repairs and maintenance: All maintenance costs incurred for machinery can be grouped into machine cells. By having the maintenance staff, charge their time and materials to these cells, these costs can be charged straight to products. Maintenance work on the facility will be charged to an Overhead cost pool.

f. Supervision: If supervision is by machine cell, the cost of the supervisor can be split among the cells supervised. However the cost of general facility management as well as of any support staff must still be charged to an overhead cost pool. With such a higher proportion of direct costs associated with each product managers have much more relevant information about the true cost of each product manufactured.

Q.370. What is Back Flush Accounting? Characteristics & Criticism of Backflush Costing?

What are Difficulties of Back flush Costing?

Answer: Back flush Accounting (Back flush Costing)

1. Companies may have some inventory despite using Just-in-time (JIT) production method Companies that record costs directly in cost of goods sold can use a method called back flush costing to transfer any costs back to the inventory accounts, if necessary.
2. Back flush costing is a method that works backward from the output to assign manufacturing costs to work-in-progress inventories.
3. The term 'back flush' is used because costs are flushed back through the production process to the points at which inventories remain.
4. Back flush costing avoids detailed accounting transaction.
5. In convention product costing system costs are assigned with the movement of the products from direct materials to work-in-progress to finished goods. However, in back flush costing, we focus first, on the output of the organization and work backwards to allocate costs between costs of goods sold and inventories. No separate accounts are maintained for work-in-progress in back flush accounting.
6. CIMA defines it as "Cost Accounting system. Which focuses on the output of an organization and then works back to attribute costs to stock and cost of sales.
7. Traditional casting systems use sequential tracking i.e. costing methods are synchronized, with physical sequences of purchases and production. Back flush costing

which is also referred to as delayed costing or post deduct costing focuses on output and then works back to apply manufacturing costs to units sold and to inventories.

There are two basic justifications for the system:

(i) To remove the incentive for managers to produce for inventory. In conventional system managers try to add to operating income by producing units not sold. In absorption costing, fixed overhead costs which would otherwise be expenses for the period, get inventories.

(ii) To increase the focus of the managers on plant-wide goal rather than on individual sub-unit goals. For example, a production manager may be interested in increasing machine utilization at an individual work center and this step may not be compatible to overall organizational objective.

Criticism of Back flush Costing

Costing system does not strictly adhere to generally accepted principles of external reporting. The advocates of back flush costing cite the materiality concept to counter argue these charges. They claim, that if inventories are low or not subject to, Significant change from one accounting period to the next, the results of back flush costing will not differ materially from results of the system that adhere to generally accepted accounting principles.

Characteristics of companies adopting Back Flush Costing

The companies adopting back flush costing often meet the following three conditions:

1. Management wants a simple accounting system and no detailed tracking of direct material and direct labour through a series of operations is required.
2. Each product has a set of standard cost.
3. Material inventory levels are either low or constant

If inventories are low the bulk of manufacturing costs will flow into costs of goods sold and it is not deferred as inventory cost. Back flush costing is especially attractive in companies that have low inventories resulting from JIT.

Difficulties of back flush Costing

1. Back flush costing does not strictly adhere to generally accepted accounting Principles of external reporting.
2. The critics of back flush costing Primarily emphasis on the absence of audit Tralls.
3. It does not pinpoint the use of resource at each step of the production process.
4. Back flush costing is suitable only for JIT Production system will Virtually no direct material inventory and minimum work-in-process inventories. It is less Feasible Otherwise.

Back flushing in a JIT System: Back flushing requires no data entry of any kind until a finished product is completed. At that time total amount of information of finished product is entered into computer. Information is also fed based on bill of materials, which shows list of components that should have been used in the production process. This is subtracted from the beginning inventory balance to arriving at the amount of inventory that should have been left now in hand. Back flushing is good because data entry occurs once in the entire production process. However there are some serious limitations of back flushing that must be corrected before it will work properly:

1. **Production reporting:** The total production figure entered must be correct or otherwise wrong component types and quantities will be subtracted from stock.

This is a particular problem when there is high turnover or a low level of training to the production staff that records that information, which leads to errors.

2. **Scrap reporting:** All abnormal scrap must be diligently tracked and will not be charged to inventory. Since scrap can occur anywhere in a production process, a lack of attention by any of the production staff can result in an inaccurate inventory. Once again, high production turnover or a low level of employee training increases this problem.

3. **Lot tracing:** Lot tracing is almost very difficult in back flushing system. It is required when a manufacturer needs to keep records of which production lots were used to create a product in case all items in a lot must be recalled. Only a picking system can adequately record this information. Some computer system allows picking and back flushing system to coexist, so that picks transactions for lot tracing purpose can still be entered in the computer. Lot tracing may then still be possible if the right software is available; however this feature is generally present only on high-end systems.

4. **Inventory accuracy:** It becomes difficult to know accurately the inventory balance, as in a back flushing system; data is fed into the system only once day. This makes it difficult to maintain an accurate set of inventory records in the warehouse.

Back flush costing eliminates separate raw material and work-in-progress account. There is single Raw material in process Account (RIP). The RIP account is used only for tracking of the cost of raw materials. Under JIT system, materials are immediately placed into process. For this reason there is no need to record it under separate inventory account. Combining direct labour and overhead into one category is a second feature of back flush costing. Back flush costing combines labour costs with overhead costs in a temporary account called conversion cost control. This account accumulates the actual conversion cost on debit side and applied conversion cost on the credit side.

Q.371. Define Material Requirement Planning (MRP).

Answer:

1. Material Requirement Planning is a computerized Production Scheduling System providing a basis for production decisions.
2. It progressively translates the forward schedule of final product requirements (the master production schedule) into the numbers of sub assemblies, components and raw materials required at each stage of the manufacturing cycle.
3. In other words, MRP involves input planning based on output budget.

Q.372 List the aims and benefits (objectives) of Material Requirement Planning.

Answer:

1. To determine quantity and timing of finished goods production as per the master production schedule.
2. To ascertain quantity of raw materials, sub-assemblies and components required for budgeted production, based on bill of materials.
3. To compute the inventories, work-in-progress, batch sizes and manufacturing and packaging lead items.
4. To control inventory by ordering bought-in components and raw materials in relation to the orders received or forecast.
5. To forecast the inventory position period-by-period for a future time period of a manufacturing operation.
6. To serve as an inventory information system helpful in planning for raw materials and components parts.
7. To generate purchase requisition notes and purchase orders through computer system automatically.

Q.373. List the data input required operating a MRP System.

Answer: The Prominent data requirements for a MRP system are :

1. Master Production Schedule: The specifies the quantity of each finished product to be produced, the time at which such items will be required for dispatch to customers.
2. Bill of Materials (BOM: The specifies the consumption requirements of sub-assemblies, components and materials, for each unit of finished goods.
3. Inventory file / Stores Ledger: This contains the inventory details of each sub-assembly, components and materials required for each finished good.
4. Routine File: This provides details on the sequence of operations required to manufacture components, sub-assemblies and finished goods.
5. Master Parts File: This contains information on the production time of sub-assemblies and components produced internally and lead times for externally acquired items.

MRP presupposes the use of computers and hence the above information will be required as system data files.

Q.374. What are the benefits of ERP?

Answer: The benefits arising from ERP are:

- Product Costing: ERP system supports advances costing methods like Standard Costing Actual Costing. Activity based costing thereby help in determination of cost of products accurately.
- Cost Monitoring and Control: ERP can integrate all costing methods and information with finance. This provides the company with essential financial information for monitoring and controlling costs.
- Planning and Managing: The ERP system simplifies complicated logistics and helps in planning for and managing different divisions in different locations as a single unit.
- Information Flow: The advanced utility of the ERP system helps in processing the flow a product and financial information in several different ways.
- Efficient Database Management: The ERP system aids in the efficient managing of data on warehouses, suppliers, customers etc. required to run an organization effectively and profitably.
- Inventory Management: Inventory reporting supports all reporting of specific and general types of stock transactions, like stock transfers, re-classification, ID changes and physical inventory results. Also ERP can manage stock and purchase requisitions, selection of appropriate locations for receipts, inventory valuation, warehouse management and cost accounting.
- Customer Satisfaction: ERP system defines the logistic processes flexibly and efficiently to deliver the right product from the right warehouse to the right customer at the right time-every time, thereby satisfying the customers. It also support planning, transportation, confirmation, dispatch, and proof of delivery processing. Additionally, it ensures better after sales service.
- Competitive Edge: ERP system helps a company to gain the competitive Edge by (a) Enabling the company to respond quickly and accurately to change in market conditions; (b) improving business process; (c) ensuring quality control; (d) improved and objective production planning and (e) Offering internet Extranet Solutions.

TOTAL QUALITY MANAGEMENT

Q.375. Define the terms (a) Quality control; (b) Quality Assurance ;(c) Quality Management. (OR) Define Total Quality Management (TQM) what are the core concepts of TQM?

Answer: Total Quality Management

1. (TQM) is defined as a set of concepts and tools for getting all employees focused on continuous improvements in the eyes of the customer. Since TQM focuses the attention of an organization on quality, thus it helps to provide the customer with much higher quality.
2. Prudent expenditure on cost of preventing errors can often lead to larger reduction in cost of failure and consequently with lead to reduce the total cost. The organization strives for improvement so that more and more value can be added through improved quality of product at lower cost.
3. Many companies have adopted a term used to describe a situation which all business functions are involved in a process of continuous quality improvement.
4. The TQM approach highlights the need for a customer oriented approach to management reporting, eliminating some or more of traditional reporting practices.
5. TQM seeks to increase customer satisfaction by finding the factors that limit current performance.
6. The emphasis of TQM is to design and build quality in the product rather than allow defectives and then inspect and rectify them. The focus is on the cause's father than the symptoms of poor quality.

The three core concepts of TQM are:

1. Quality Control (QC): It is concerned with the past, and deals with data obtained from previous production, which allows action to be taken to stop the production of defective units.
2. Quality Assurance (QA): It deals with the present and concerns the putting in place of systems to prevent defects from occurring.
3. Quality Management (QM): It is concerned with the future, and manages people in a process of continuous improvement to the products and services offered by the organization.

Q.376. What are the various stages / steps to be taken in the implementation of TQM?

Stages	Description
1	Identification of customers / Customers groups
2	Identifying customer expectation
3	Identifying customer decision-making requirements and product utilities;
4	Identifying perceived problems in Decision making process and produced utility
5	Comparison with other organization and benchmarking
6	Customer feed-back
7	Identification of improvement opportunities.
8	Quality improvement process through (a) New strategies; (b) Elimination of deficiencies and (c) identifying solutions

State 1: Identification of customers / customers groups : Through a team approach (a technique called Multi voting), the firm should identify major customer groups. This helps in generating priorities in the identification of customers and critical issues in the provision of decision-support information.

State 2: Identifying customer expectations: Once the major customer groups are identified, their expectations are listed. The question to be answered is what does the customer expect from the firm?

Stage 3: Identifying customer decision-making requirements and product utilities: Where the focus is on quality improvement, the overriding need is to stay close to the customers and Follow their suggestions. In this way, a decision support system can be developed, incorporating both financial and non-financial and non-financial information, which seeks to satisfy user requirements. Hence, the firm finds out the answer to what are the customer's decision-making requirements and product utilities? The answer is sought by listing out managerial perceptions and not by actual interaction with the customers.

Stage 4: Identifying perceived problems in decision-making process and product utilities: Using participative processes such as brainstorming and multi voting the firm seeks to list out areas of weakness where the greatest impact could be achieved through the implementation of improvements. The firm identifies the answer to the question. What problem areas to we perceive in the decision-making process?

Stage 5: Comparison with other organization and benchmarking: Detailed and systematic internal deliberations allow the firm to develop a clear idea of their own strengths and weaknesses and of the areas of most significant deficiency. The benchmarking exercise allows the firm to see how other companies are coping and with similar problems and opportunities.

Stage 6: Customers Feedback: Stages 1 to 5 provide an information base development without reference to the customer. This is rectified at Stage 6 with a survey of representative customers, which embraces their view on perceived problem areas, interaction with the customers and obtaining their views help the firm in correcting its own perceptions and refining its processes.

Stage 7 and 8: The identification of improvement opportunities and implementation of Quality Improvement Process: The outcomes of the customer survey, benchmarking and internal analysis, provides the input for stages and * i.e. identification of improvement opportunities and the implementation of a formal improvement process. This is done through a six-step process called PRAISE, for short.

Q.377 Explain in brief the fundamental requirements (Critical Success factor) for the implementation of the TQM process.

Answer: In the opinion of Sri C.K. Prahlad the strategic guru.

TQM is a continuing process to ensure that an enterprise is constantly creating new paths to improve its products processes, people by embedding quality consciousness within the organization.

The essential requirements for successful implementation are described as the six C's of TQM. These are:-

1. **Commitment:** If a TQM culture is to be developed, total commitment must come from top management. It is not sufficient to delegate 'quality' issues to a single person. Quality expectation must be made clear by the top management, together with the support and training required for its achievement.
2. **Culture:** Training lies at the center of effecting a change in culture and attitudes. Negative perceptions must be changed to encourage individual contributions and to make 'quality' a normal part of everyone's job.
3. **Continuous Improvement:** TQM should be recognized as a continuous process. It is not a "one-time programme". There will always be room for improvement, however small.
4. **Co-operation:** TQM visualizes Total Employee involvement (TEI). Employee involvement and cooperation should be sought in the development of improvement strategies and associated performance measures.
5. **Customer focus:** The needs of external customers (in receipt of the final product or service) and also the internal customers (Colleagues who receive and supply goods, services or information's) should be the prime focus.
1. **Control:** Documentation, procedures and awareness of current best practice are essential if TQM implementations are to function appropriately. Unless control procedures are in place, improvements cannot be monitored and measured nor deficiencies corrected.

Q.378. What is Pareto Analysis? Outline its use.

Answer:

1. PARETO ANALYSIS is a rule that recommends focus on the most important aspects of decision making in order to simplify the process of decision making.
2. It is based on the 80:20 phenomenon, first observed by Vilfredo Pareto, an Italian economist. He noticed that 80% of the wealth of Milan was owned by 20% of its citizen. This pattern of 80:20 or approximations like 70:30 can be observed in many different business situations.
3. Main point is that a very small proportion of items usually accounts for the majority of value. By concentrating on small proportion of stock items, which jointly account for 80% of the total value, a firm may be able to control most of its monetary investment in stocks.
4. This phenomenon can be observed in many business situations, The management can use this analysis in a number of different circumstances to attract management attention to the key control mechanism.
5. The analysis of the company's estimated total sales revenue might indicate that approximately 80% of its total sales revenue is earned from about 20% of its product.
6. This analysis is based on observations by Pareto that a small proportion of items usually account for fee majority of value.
7. The management can use it in a number of different circumstances to direct management attention to the key control mechanism or planning aspects. It helps clearly establish top priorities and to identify both profitable and unprofitable targets.

A.

- 80% of Result generated from 20% of Act.
- 80% of Revenue generated from 20% of products.
- 80% of cost of stock generated from 20% of cost of inventory.
- 80% of total cost generated from 20% of cost Drives.
- 80% of Reported problem are generated by 20% of underlying causes.

B. Usefulness of Pareto Analysis: Pareto analysis is useful to.

√ Prioritize problems, goals and objectives
√ Identify root causes.
√ Select and define key quality improvement programs.
√ Select key customer relations and service programs,
√ Select Key employee relations improvement programs.
√ Select and define key performance improvement programs.
√ Maximize research and product development time.
√ Verify operating procedures and manufacturing processes
√ Sales/distribution of products or services,
√ Allocate physical, financial and human resources.

Q.379. Briefly describe some business situations where Pareto Analysis can be applied.

Answer: Pareto analysis is applicable in the presentation of performance Indicators data through selection of representative process characteristics that truly determine or directly or indirectly influence or confirm the desired quality or performance result or outcome. It is generally applicable to the following business situations:

1. **Product Pricing:** Where a firm sells a number of products, it may not be possible to analyse cost-volume--price-profit relationship for all products.

HOW PARETO ANALYSIS IS HELPFUL IN PRICING OF PRODUCT IN THE CASE OF FIRM DEALING WITH MULTI PRODUCTS??

Pareto Analysis is used for analyzing the firm estimated sales revenues from various products, and it might indicate that approximately 80% of its total sales revenue is earned from about 20% of its products.

This helps top management to delegate the pricing decision for approximately 80% of its products to the lower managerial levels. Top management can concentrate on pricing decision for the important 20% products, which are essential for the company's survival.

Sophisticated pricing methods can be adopted for the important products while for other products, cost based pricing methods may be used.

2. **Customers Profitability Analysis:** The modern business thinking is to recognise the customer and satisfy his requirements. Hence instead of analysing products, customers can be analysed for their relative profitability to the organisation.

It is often found that approximately 20% of customers generates 80% of the profit.

Such analysis is useful for evaluation of the portfolio of customer profile and decision-making such as whether to continue serving a customer group. What is the extent of promotion expenses to be incurred etc.

3. **ABC Analysis-Stock Control:** In Raw Material stock control, it is found that only a few of the goods in stock make up most of the value.

About 80% of the materials value is due to high priced materials, which constitute only 20% of the quantity. These materials are classified into A, B and C Categories based on their importance. Control is directed primarily over "A" Category items by setting EOQ, Stock Levels, Surprise stock Verification procedures etc. The outcome of such analysis is that by concentrating on small proportion of stock items that jointly account for 80% of the total value, a firm will be able to control most of the monetary investment in stocks.

4. **Activity Based Costing:** Activity Based Costing involves the identification of cost drives for various items of Overhead expenses.

Generally 20% of the firm's cost drivers are responsible for 80% of the total cost.

By analyzing, monitoring and controlling those cost drivers that attribute to high costs, a better control and understanding of overheads will be obtained.

5. **Quality Control:** Pareto analysis can be extended to discover from an analysis of defect report or customer complaints which "Vital Few" causes are responsible for most of the reported problems. Generally, 80% of reported problems are traceable to 20% of the underlying causes. By concentrating one's efforts on rectifying the vital 20% one can have the greatest immediate impact on product quality.

Pareto Analysis indicates how frequently each type of failure (defect) occurs. The purpose of the analysis is to direct management attention to the area where the best returns can be achieved by solving most of quality problems, perhaps just with a single action.

Q.380 What is Penetration pricing? What are the circumstances in which this policy can be adopted?

Answer: Penetration Pricing: -

1. This pricing policy is in favor of using a low price as the principal instrument for penetrating mass markets early.
2. It is opposite to skimming pricing.
3. The low pricing policy is introduced for the sake of long-term survival and profitability and hence it has to receive careful consideration before implementation.
4. It needs an analysis of the scope for market expansion and hence considerable amount of research and forecasting are necessary before determining the price.
5. Penetration pricing means a price suitable for penetrating mass market as quickly as possible through lower price offers.
6. This method is also used for pricing a new product. In order to popularize a new product penetrating pricing policy is used initially.
7. The company may not earn profit by resorting to this policy during the initial stage. Later on, the price may be increased as and when the demand picks up.
8. Penetrating pricing policy can also be adopted at any stage of the product life cycle for products whose market is approached with low initial price.
9. The use of this policy by the existing concerns will discourage the new concerns to enter the market. This pricing policy is also known as. "stay-out -pricing".

Circumstances for adoption: -

The three circumstances in which penetrating pricing can be adopted are as under:-

1. When demand of the product is elastic to price. In other words, the demand of the product increases price is low.
2. When there are substantial savings on large-scale production, here Increase in demand is sustained by the adoption of low pricing policy.
3. When there is threat of competition. The prices fixed at a low level act as an entry barrier to the prospective competitors.

Q.381. What is Skimming pricing policy?

Answer: Skimming price: - This term is used in pricing a new product. Basically there are two alternatives in pricing a new product. One, which calls for a relatively high price, is called "Skimming price", and other, which calls for relatively low price, is called "Penetration price". The product should have some special features involving drastic departure from accepted ways, of performing the service. For example, Prestige Cooker was priced very high when it was first introduced in the country. The product is introduced with high price coupled with large promotional expenses in the early stages and lower prices at later stages. Skimming pricing provides funds for financing expansion scheme. Early higher prices may safeguard profits at early stages, but it may prevent quick sales to many potential buyers on whom company's future depends. A policy of skimming pricing is adopted under conditions such as

(a) a new product is introduced in the market;

(b) there are a few producers;

(c) demand is inelastic and

(d) A sophisticated product for use of rich and affluent customers.

Q.382. Define Price Discrimination?

Answer: Price discrimination means charging different prices and it takes various forms according s whether the basis is customer, product, place or time.

Conditions: Price discrimination is possible if the following conditions are satisfied:

1. **Segment able market***:* The market must be capable of being segmented for price discrimination.
2. **No resale:** The customers should not be able to resell the product of the segment paying higher prices should not be possible
   - The competitors underselling is not possible
3. Forms of Price Discrimination:
   a. Based on Customers: The same product is charged at different prices to different customers. It is however potentially disruptive of customer relations.
   b. Based on product version: A slightly different product is charged at different price regardless of its cost. Price relationship, e.g., a table with wooden top is sold at Rs. 4,000, whereas a table with sunmica top is sold at Rs. 6,000. The higher premium for improved products may not be only due to higher production cost.
   c. Based on place: An example of this method is the seats in Cinema Theater where the front seats are charged at lower rates than the back seats.
   d.Based on time: An example of this method is the practice of giving, off-season concession in sale of fans or refrigerators just after the summer season. The higher prices charged during the season periods are called Peak load Prices.

Q.383. Explain the term "Life-cycle" costing?

Answer: It focuses on total cost (capital cost + revenue cost) over the products life including design.

CIMA defines life cycle costing as the practice of obtaining over their life time, the best use of physical asset at the lowest cost of entity.

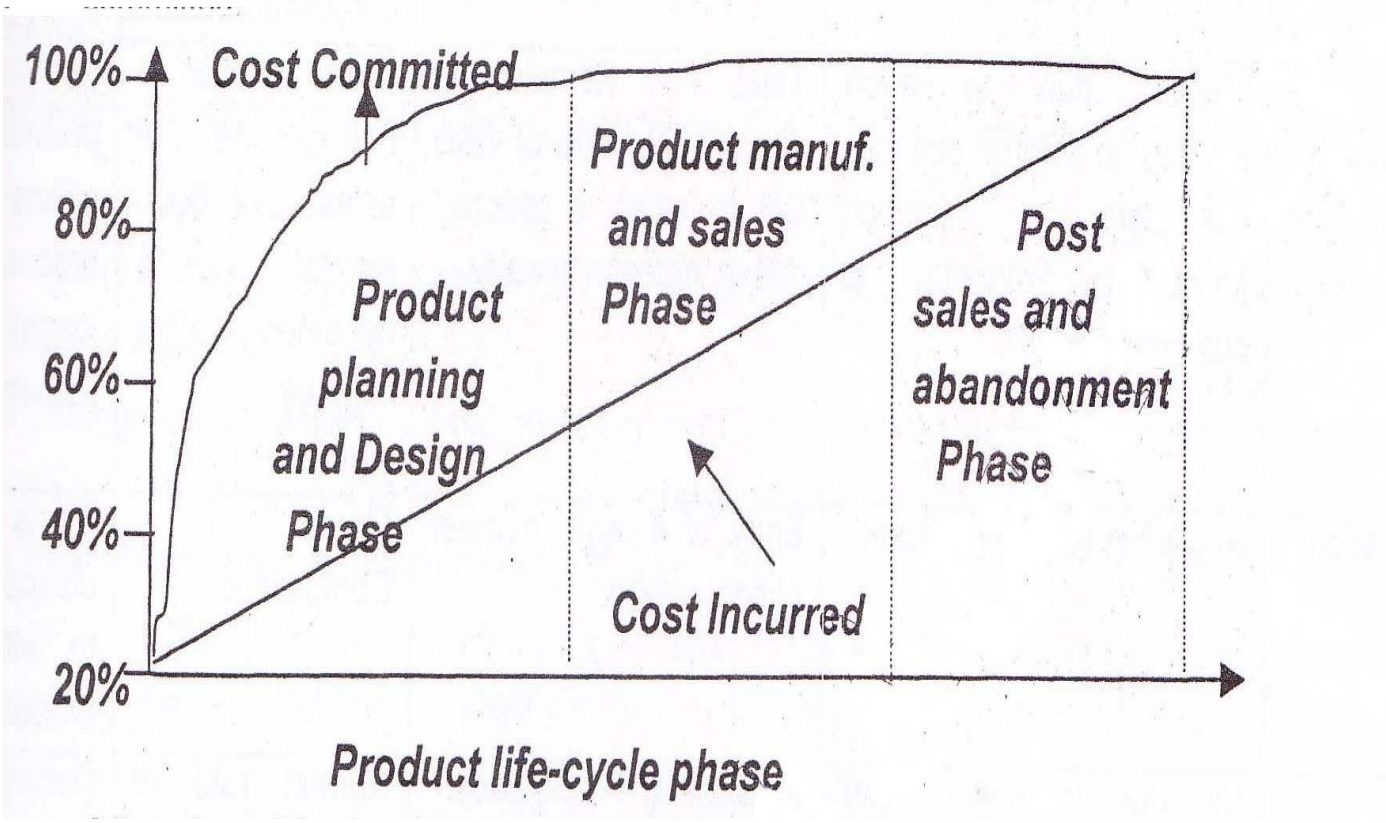
"The term "Life Cycle cost" has been defined as follows," It includes the costs associates with acquiring, using, caring for and disposing of physical asset including the feasibility studies, research, design, development, production, maintenance, replacement and disposal as well as

Support, training and operating costs, generated by the acquisition use, maintenance and replacement of permanent physical assets."

1. Life cycle costing estimates and accumulates costs over a products entire life cycle.
2. The objective is to determine whether costs incurred at different stages of development, (planning, designing, & testing) manufacturing (conversion activities) and marketing (advertising distribution, & warranty) of the product will be recovered by revenue to be generated by the product over its life cycle.
3. Life cycle costing provides an insight, useful for understanding and managing costs over the life cycle of the product.
4. In particular it helps to evaluate the viability of the product, decides on pricing of the product at different stages of product life cycle and often helps to estimate the value of the product to its users.
5. When used in conjunction with target costing, life cycle costing becomes a important tool for cost management.
6. Life cycle costing estimates and accumulates costs over a products entire life cycle in order to determine whether the profits earned during the manufacturing phase will cover the costs incurred during the pre-and post manufacturing stages.
7. Identifying the costs incurred during the different stages of a product's life cycle provides an insight into understanding and managing the total costs incurred throughout its life cycle. In particular, life cycle costing helps management to understand the cost consequences of developing and making a product and to identify areas in which cost reduction efforts are likely to be most effective.
8. Most accounting systems report on a period-by-period basis, and product profits are not monitored over their life cycles. In contrast product life cycle reporting involves tracing costs and revenues on a product-by-product basis over several calendar periods throughout their life cycle.

9. A typical pattern of cost commitment and cost incurrence during the three stages of product's life cycle-the planning and design stage, the manufacturing stage and the service and abandonment stage.
10. Committed or locked in cost are those cost that have not been incurred but that will be incurred in the future on the basis of decisions that have already been made. Costs are incurred when a resource is used or sacrificed.
11. Costing system record costs-only when they have been incurred. It is difficult to significantly alter costs after they have been committed. For example the product design specifications determine a product's material and labour inputs and the production process. At this stage costs become committed and broadly determine the future costs that will be incurred during the manufacturing stage.
12. That approximately 80% of a product's costs are committed during the planning and design stage. At this stage product designers determine the product's design and the production process. In contrast the majority of costs are incurred at the manufacturing stage, but they have already become locked in at the planning and design stage and are difficult to alter.

Cost Management can be most effectively exercised during the planning and design stage and not at the manufacturing stage when the product design and processes have already been determined and costs been committed.



Stages of Product life Cycle:-

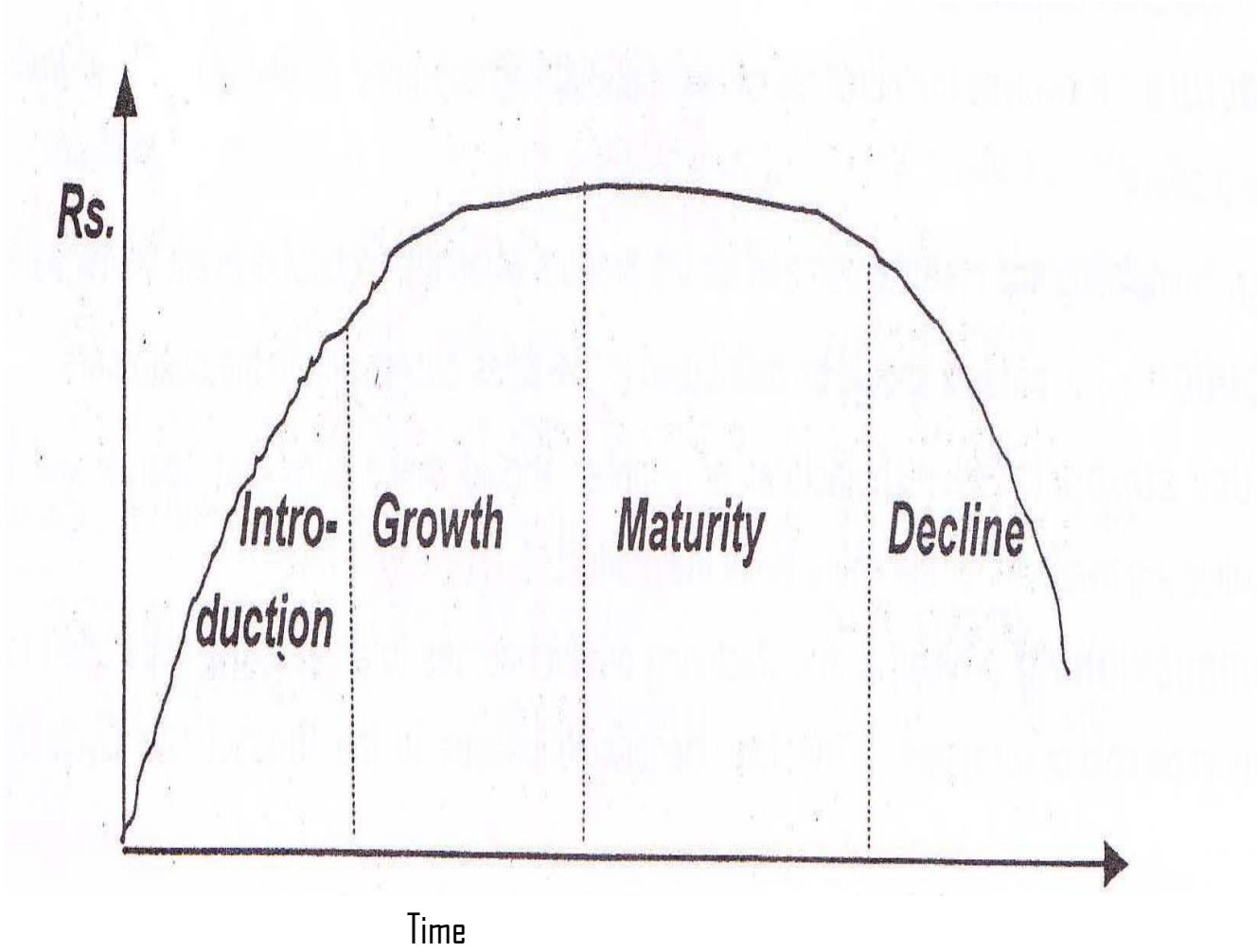
1. Market research: It identifies the products which customers wants, how much they are prepared to pay for it and how much quantity they intend to buy.
2. Specification: It Provides details such as required life, maximum permissible maintenance costs, manufacturing, units required delivery dates expected performance of the product.
3. Design: Proper drawings and Process schedules are defined.
4. Prototype manufacture: Prototype may be used to develop the product and eventually to demonstrate that it meets the requirements of the specifications.
5. Development: Testing and changing to meet the requirements after the initial run as a product when first made rarely meets the specifications.
6. Tooling: Tooling up for production means building a production line, building expenses jigs, buying the necessary tool and equipments.
7. Manufacture: It involves the purchase of raw material and components use of labour to make and assemble the product.
8. Selling: Stimulating and creating demand for the product when the product is available for sale.
9. Distribution: The product should be distributed to the sales outlets and to the customers.
10. Product support: The manufacturer or supplier should make sure that spares and expert servicing facilities are available for the entire life of the product.
11. Decommissioning: When a manufacturing product comes to an end, the plant used to build the product must be sold or scrapped. The four identifiable phases in the Product Life Cycle are (a) Introduction (b) Growth (c) Maturity and (d) Decline.

A comparative analysis of these phases is given below:

Particular	**Introduction**	**Growth**	**Maturity**	**Decline**
Phase	**I**	**II**	**III**	**IV**
Sales Volumes	Initial stages, hence low	Rise in sales levels at increasing rates	Rise in sales levels at decorates	Sales level off and then start decreasing.
Prices of Products	High levels to cover initial costs and. promotional exps.	Retention of high-level prices except in certain cases.	Prices fall closer to cost, due to effect of competition.	Gap between price and cost is further reduced.
Ratio of Promotion expenses to sales	Highest due to effort needed to inform potential customers, Launch products, distribute to customers etc.	Total exp. Remain the same while ratio of S&D OH to sales is reduced due to increase in sales.	Ratio reaches normal % of Sales. Such normal % becomes industry standard.	Reduced sales promotional efforts as the product is no longer in demand.
Competition	Negligible and insignificant	Entry of a large number of competitors	Fierce Competition	Starts disappearing due to withdrawal products.
Profits	Nil, due to heavy initial costs.	Increase at a rapid pace.	Normal rate of profits since costs and prices are normalized.	Declining profits due to price competition, entry of new products etc.

In the growth stage, the firm will maintain the prices at high levels, in order to realize maximum profits. Price reduction will not be undertaken unless (a) the low prices will lead to

market penetration, (b) the firm has sufficient production capacity to absorb the increased sales volume and (c) competitors enter the market.



LIFE CYCLE COSTING: LIFE CYCLE COSTS ARE INCURRED FOR BOTH:

(I) Product arid services from design stage through development to market launch, production and sale and their eventual withdrawal from market.

(2) Product life cycle is a pattern of expenditure, sale level, revenue and profit over the period from new idea generation to the deletion of product from product range.

(3) Product life cycle spans the time from initial. R&D on a product to when customer servicing and support is no longer offered for the product. For products like motor vehicle this time span may rang from 5 to 7 years. For some basic pharmaceuticals, the time span may be 7 to 10 years.

Q.384. What is Activity Based Cost Management (ABM) & Describe its Stages?

Answer: ABC Supplies the information while ABM uses the information in various analysis designs to yield continuous improvement.

1. The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Cost Management (ABM).
2. Through various analyses, ABM manages activities rather than resources. It determines what drives the activities of the organization and how these activities can be improves to increase the profitability.
3. ABM utilizes cost information gathered through ABC.

4. ABM is a discipline that focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing this value. This discipline includes (a) Cost Driver analysis; (b) Activity analysis and (c) Performance measurement.

Stages	Activities
1	Identification of the activities that have taken place in the organization.
2	Assigning costs to cost pool for each activity.
3	Spreading of support activities across the primary activities.
4	Determining cost driver for each activity.
5	Managing the costs of activities.

Q.385. What are the customer needs that ABM seeks to satisfy?

Answer: The goal of ABM is to satisfy customer needs while making fewer demands for resources. ABM seeks to satisfy the following needs of customers: -

1. Lower costs
2. Higher quality.
3. Faster response time.
4. Greater innovation.

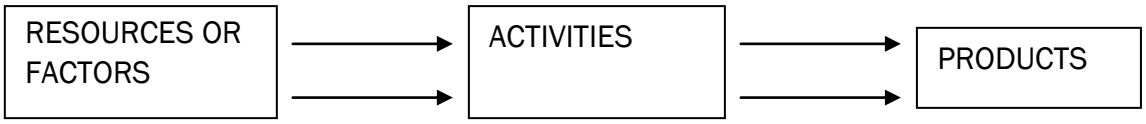
Q.386. Explain the concept of Activity Based Costing?

Answer: Activity Based Costing (ABC)

The Activity-Based Costing (ABC) is a costing system, which focuses on activities performed to produce products. ABC is that costing in which costs are first traced to activities and then to products. This costing system assumes that activities are responsible for the incurrence of costs and create the demands for activities. Costs are charged to products based on individual product's use of each activity. In traditional product costing system, costs are first traced not to activities but to an organizational unit, such as department or plant and then to products. It means under both, ABC and traditional costing system the second and final stage consists of tracing costs to the product.

ABC aims at identifying as many costs s possible to be subsequently accounted as direct costs of production. Any cost that is traced to a particular product via its consumption of activity becomes direct cot of the product. For instance, in conventional costing system, cost of setup and adjustment time is considered as factory overhead and subsequently assigned to different products on the basis of direct labour hours. But in ABC, setup and adjustment time is determined for each product and its costs are directly charged to each product. Thus, by emphasing activities.

ABC tries IS ascertain the factors that cause each major activity, cost 0 such activities and the relationship between activities and products produced. The relationship between activities and products has been show in figure:-



As stated earlier, there are two primary stages in ABC - first tracing costs to activities; second tracing activities to product.

The different Steps in the two stages of ABC are explained below:

Step1: Identify the main activities in the organization. Examples Include: materials handling, purchasing, receipts, dispatch, machining, assembly and so on.

Step 2: Identify the factors, which determine the costs of an activity. These are known as cost drivers. Example includes, number of purchase orders, number of orders delivered, Number of set-ups and so on.

Step 3: Collect the costs of each activity. These are known as cost Pools and are directly equivalents to conventional cost centers.

Step 4: Charge support overheads to products on the basis of their usage of the activity, expressed in terms of the chosen cost driver(s). For example, if the total costs of purchasing were Rs. 2, 00,000 and there were 1,000 purchase orders (the chosen cost driver), products would be charged Rs. 200 pr purchase order. Thus a batch generating 3 purchase orders would be charged 3 X Rs. 200 = Rs. 600 for purchasing overheads.

To arrive at more accurate cost more accurate cost mainly for decision-making purpose. It is based on two principles:

i. Activities consume resources.

Ii These resources are also consumed by product services.

Activity cost is the ratio of resource consumed by an activity to the output resulting in the activity. The goal of ABC is to trace cots to products/services instead of arbitrary allocating them. ABC may be used with ton both job order costing and process costing. Activity-analysis and selection of cost driver for each activity are the prerequisites.

Q.387 What are the purposes and benefits of ABC?

Answer: The Purposes and benefits of ABC are as under:

1. To link the cost to its causal factor - i.e., the cost Driver.
2. To identify costs of activities rather than cost centers.
3. To ascertain product costs with greater accuracy by relating overheads to activities.
4. To overcome the inherent limitations of traditional absorption costing & use of blanked overhead rates.

Q.388. State the need for emergence of ABC

Answer: The need for emergence of ABC:-

A. Traditional product costing systems were designed when company's manufactured arrow range of deducts.
B. Direct material and direct labour were dominant factors of production then.
C. Companies were in seller's Market.
D. Overheads were relatively small and distortions due to inappropriate treatment were not significant.
E. Cost of processing information was high.
F. Today companies produce a wide range of products,
G. Overheads are significant in value. Simple methods of apportioning overheads on direct labour or machine hours basis is not justified.
H. Companies are in buyer's market.
I. Non volume related activities like material handling, set up etc. are important and their costs cannot be apportioned on volume basis.
J. Cost of processing information is low.

Q.389 What are the areas in which activity based information is used for decision making?

Answer: The areas in which activity based information is used for decision making are as under: -

PRICING

Market segmentation and distribution channels.

Make or buy decisions and outsourcing

Transfer Pricing

Pant closed down decisions

Evaluation of offshore production

Capital investment decisions

Product line profitability.

Q.390. Distinguish between ABC and ABM.

ABC	ABM
ABC refers to the technique of determining the test of activities and the cost of output that those activities produce.	It refers to the management philosophy that focuses on the planning, execution and measurement of activities as the key to competitive advantage.
The aim of ABC is to generate improved cost data for use in managing a company's activities.	The ABM is a much broader concept. Its aim is to use information generated by ABC, for effective business processes and profitability.

ABC is a logical distribution of overhead i.e. overhead should be distributed on the consumption of resources consumed by producer & services.

Q.391 What do you understand by Benchmarking?

What are the suggested Benchmarking codes of Conduct?

Answer:

1. Benchmarking is the process of identifying and learning from the best practices anywhere in the world.
2. It is a powerful tool for continuous improvement in performance.
3. It involves comparing firm's products, services or activities against other best performing organizations, either internal or external to the firm. The objective is to find out how the product, service or activity can be improved and ensure that the improvements are implemented.
4. It attempts to identify an activity that needs to be improved and finding a non-rival organization that is considered to represent world-class best practice and studying how it performs the activity. Suggested Benchmarking Codes of Conduct:

1. Principle of Legality
2. Principles of Exchange
3. Principle of Confidentiality
4. Principle of Use
5. Principle of first part Contact
6. Principle of Third Party Contact
7. Principle of Preparation

Q.392 What are the stages in the process of Benchmarking?

Answers: The process of benchmarking involves the following stages:

Stage	Description
1	Planning: • Determination of benchmarking goal statement • Identification of best performance. • Establishment of the benchmarking of process improvement team. • Defining the relevant benchmarking measurement
2	Collection of Data and information
3	Analysis of the findings based on the data collected in Stage 2
4	Formulation and implementation of recommendations
5	Constant monitoring and reviewing.

Q.393 What are the types of Benchmarking?

Answer: Types of Benchmarking:- The benchmarking is a versatile tool that can be applied in variety of ways to meet a range of requirements. The distinct types of benchmarks have been over a period of time. Each has its own benefits and shortcomings, and therefore, each is appropriate in certain circumstances then others. The Benchmarking is of following:

1. Competitive benchmarking.
2. Strategic benchmarking.
3. Global benchmarking.
4. Process Benchmarking.
5. Functional Benchmarking or Generic Benchmarking.
6. Internal Benchmarking.
7. External Benchmarking

1. **Competitive Benchmarking:** it involves the comparison of competitors products, process and business results with own. Benchmarking partners are drawn from the same sector. However to protect confidentiality it is common for the companies to undertake this type of benchmarking through trade associations or third parties.

2. **Strategic Benchmarking:** It is similar to the process benchmarking in nature but differed in its scope and depth. It involves a systematic process by which a company seeks to improve their overall performance by examining the long-term strategies. It involves comparing high-level aspects such as developing new products and services core competencies etc.

3. **Global benchmarking:** It is a benchmarking through which distinction in international culture, business processes and trade practices across companies are bridged and their ramification for business process improvement are understood and utilized. Globalization and advances in information technology leads to use this type of benchmarking.

4. **Process benchmarking:** It involves the comparisons of an organization critical business processes and operations against best practice organizations that performs similar work or deliver similar services. For example how do best practice organization process customer orders.

5. **Functional benchmarking:** This type of benchmarking is used when organizations look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes. This sort of benchmarking can lead to innovation and dramatic improvements.

6. **Internal Benchmarking:** Internal benchmarking involves seeking partners from within the same organization. For example, form business units located in different areas. The main advantages of internal benchmarking are that access to sensitive data and information are easier; standardized data is often readily available; and usually less time and resources are needed. There may be fewer barriers to implementation as practices may be relatively easy to transfer across the same organization. However real innovation may be lacking and best in class performance is more likely to be found through external benchmarking.

7. **External Benchmarking:** External benchmarking involves seeking help of outside organizations that are known to be best in class; External benchmarking provides opportunities of learning from those who are at the leading edge, although it must be remembered that not every best practice solution can be transferred to others. In addition, this type of benchmarking may take up more time and resource to ensure the comparability of data and information, the credibility of the findings and the development of sound recommendations.

The benchmarking can be categorized into: -

1. **Intra-group Benchmarking:** In Intra group benchmarking the groups of companies in the same industry agree that similar units within the cooperating companies will pool data on their process. The processes are benchmarked against each other at or operational level." Improvement task forces" are established to identify and transfer best practice to all members of the group.

2. **Inter-industry benchmarking:** In inter-industry benchmarking a non-competing business with similar process is identified and asked to participate in a benchmarking exercise. For example a publisher of schoolbook may approach a publisher of university level books to establish a benchmarking relationship. Although two publishers are not in direct competition but there are obviously many similarities in their business with respect to sources of supply, distribution channels. Each will be able to benefit from the experience of other and establish 'best practices' in their common business processes.

Q.394. Discuss. What is ZERO BASE BUDGETING?

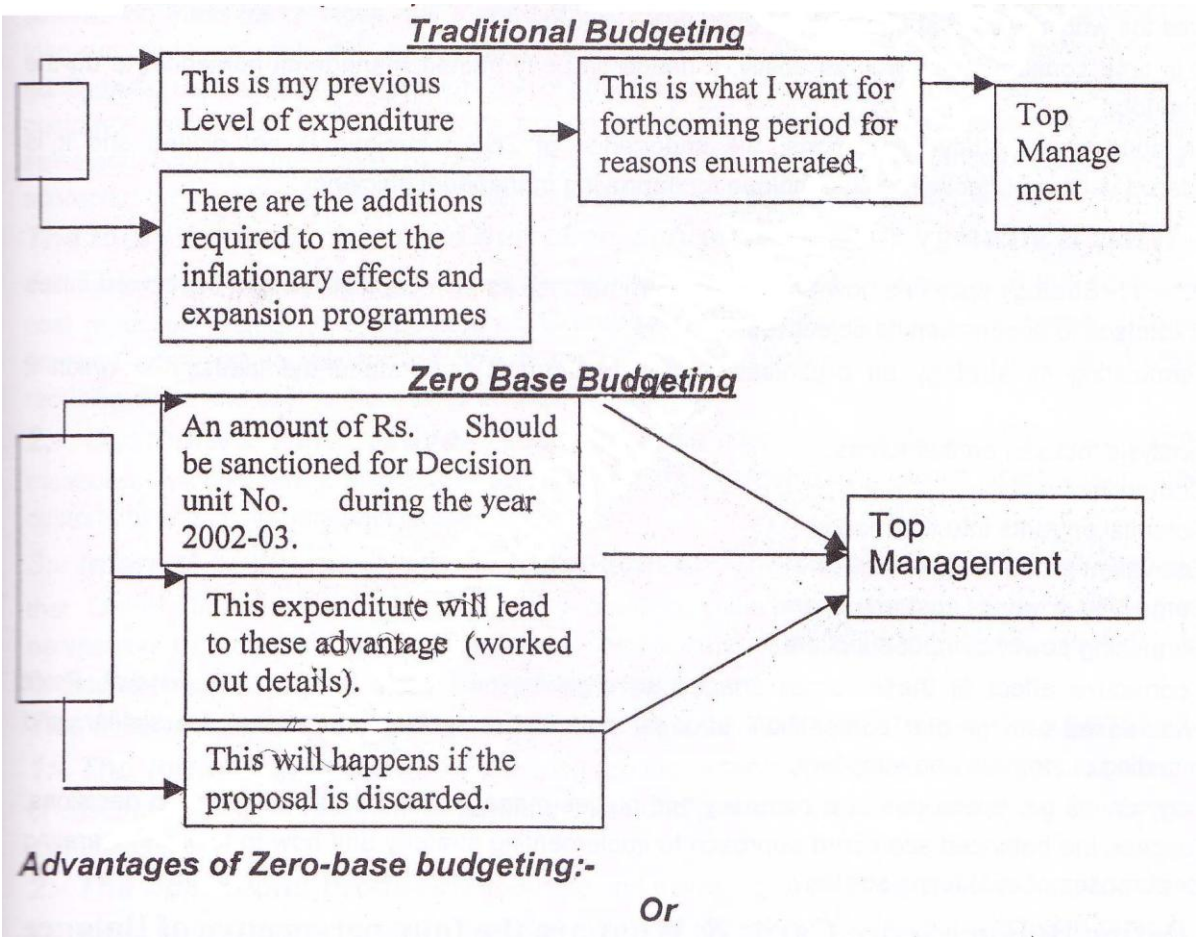
Answer:

1. Zero-base budgeting reverses the working process of traditional budgeting. Traditional budgeting starts with previous year expenditure level as a base and then discussion is focused to determine the "cuts" and "additions" to be made in previous year spending. The top management finally accords it verdict after going into the argument for and against the "additional" or "cuts".
2. In Zero-base budgeting no reference is made to previous level of expenditure.
3. A convincing case is made for each decision unit it justify the budget allotment for that unit during that period. Each decision unit is subjected to though analysis to determine the relative priorities between different items included in it.
4. Zero-base budgeting is a technique, by which manager of each decision unit is to justify his entire budget request in complete detail with a Zero-base.
5. The manager of the decision unit has to isolate each item of his budget in order to analyse it in separate decision packages, which are ranked in order of importance.
6. Zero-base budgeting is completely indifferent to whether total budget is increasing or decreasing. What it does is to identify alternatives, so that if more money is required to be spent in one department, it can be saved in another area.
7. CIMA has defined it "as a method of budgeting whereby all activities are Re-evaluated each time a budget is set. Discrete levels have each activities are valued and a combination chosen to match funds available." Following are the main features of Zero base Budgeting:
    1. Manager of a decision unit has to completely justify why there should be at all any budget allotment for his decision unit. This justification is to be made a fresh without making reference to previous level of spending in his department.
    2. Activities are identified in decision packages.
    3. Decision packages are ranked in order of priority.
    4. Packages are evaluated by systematic analysis.
    5. Under this approach there exists a frank relationship between superior and subordinates. Management agrees to fund for a specified service and manager of the decision unit clearly accepts to deliver the service.
    6. Decision packages are linked with corporate objectives, which are clearly laid down.
    7. Available resources are directed towards alternatives in order of priority to ensure optimum results.

Traditional Budgeting vs. Zero-Base budgeting:-

Following are the points of difference between traditional budgeting and Zero-base budgeting.

1. Traditional budgeting is accounting-oriented. Main stress happens to be on previous level of expenditure. Zero-base budgeting makes a decision oriented approach. It is very rational in nature and requires all Programmes, old and new to compete for scarce resources.
2. In traditional budgeting first reference is made to past level of spending and then demand is made for inflation and new programmes. In Zero base budgeting a decision unit is broken into understandable decision packages, which are ranked according to importance to enable top management to focus attention only on decision packages, which enjoy priority to others.
3. In traditional budgeting, some managers deliberately inflate their budget requests so that after the cuts they still get what they want. In Zero-base budgeting a rational analysis of budget proposals is attempted. The managers, who unnecessarily try to inflate the budget requests, are likely to be caught and exposed. Management accords its approval only to a carefully devised result, oriented package.
4. in traditional budgeting. It is for top management to decide why a particular amount should be spent on a particular decision unit. In Zero-base budgeting, this responsibility is shifted from top management to the manager of decision unit.
5. Traditional budgeting is not as clear and as responsive as Zero-base budgeting is.
6. Traditional budgeting makes a routine approach. Zero-base budgeting makes a very straight forward approach and immediately spotlights the decision packages enjoying priority over others.



Zero base budgeting is superior to traditional budgeting in the following Manner: -

1 It provides a systematic approach for the evaluation of different activities and ranks them in order of preference for the allocation of scare resources.
2. It ensures that the various functions undertaken by the organization are critical for the achievement of its objective and are being performed in the Best possible way.
3. It provides an opportunity to the management to allocate resources for various activities only after having a thorough cost-benefits analysis. The chances of arbitrary cuts and enhancement are thus avoided.
4. The areas of wasteful expenditure can be easily identified and eliminated.
5. Departmental budgets are closely linked with corporate objectives.
6. The technique can also be used for the introduction and implementation of the system of management by objective.' Thus, it cannot only be used for fulfillment of the objectives of traditional budgeting but it can also be used for a variety of other purposes.
7. It helps in the introduction of a system of management by objectives.

Even though ZBB is very beneficial for the efficiency and effectiveness of the organization, it suffers from the following limitations:

Limitations of Zero-base budgeting: The limitations of Zero-base budgeting are as follows:-

1. Various operational problems are likely to be faced in implementing the technique of ZBB. It requires the wholehearted support from the top management.
2. It is time consuming as well as costly. It needs properly trained managerial personnel to do the required job.
3. In spite of the above limitations, the importance of ZBB technique is not diluted and it is considered to be an effective tool/ technique for improving managerial efficiency.

Q.395. What is strategy?

Answer:

1. Strategy specifies how an organization matches its own capabilities with the opportunities in the marketplace to accomplish its objectives.
2. In Formulating its strategy an organization must thoroughly understand the industry in which it operates.

   Industry analysis focuses on five forces:

   - Competitors
   - Potential entrants into the market.
   - Equivalent products.
   - Bargaining power of customers, and
   - Bargaining power of input suppliers.
3. The corrective effect of these forces shapes an organisation's profit potential. In general, .Profit potential decreases with greater competition, stronger potential entrants products that are similar, and more demanding customers and suppliers.
4. Strategy drives the operations of a company and guides managers short-run and long run decisions. We will describe the balanced scorecard approach to implementing strategy and how to analyse operating income for purposes of evaluating strategy.

Q.396. Define Balance score Cards &
What are the four perspective of Balance Score card?

Answer: A Scorekeeper, the management accountant designs reports to help managers track progress in implementing strategy. Many organisations have introduced a balanced score card approach to manage the implementation of their strategies.

The Balanced Scorecard: -

The balanced scorecard translates an organization mission and strategy into a set of performance measures that provides the framework for implementing the strategy. The balanced scorecard does not focus solely on achieving financial objectives. It also highlights the non-financial objectives that an organisation must achieve to meet its financial objectives. The Scorecard measures' an organisation performance from four perspectives:

- Financial
- Customer
- Internal business processes and
- Learning and growth

A Company's strategy influences the measures it uses to track performance in each of this perspective.

It's called the balanced scorecard because it balances the use of financial and non-financial performance measures to evaluate short-run and long-run performance in a single report. The balanced scorecard reduces managers emphasis on short-run financial performance such as quarterly earnings. That's because the non-financial and operational indicators, such as product quality and customer satisfaction measure changes that a company is making for the long run. The financial benefits of these long-run changes may not appear immediately in short- run earnings, but strong improvement in non-financial measures is an indicator of economic value creation in the future. For example an increase in customer satisfaction, as measured by customer surveys and repeat purchases, is a signal of higher sales and income in the future. By balancing the mix of financial and non-financial measures, the balanced scorecard broadners management's attention to short-run and long-run performance.

The four Perspectives of the Balanced Scorecard:-

1. **Financial Perspective:** This perspective evaluates the Profitability of the strategy. Because cost reduction relative to competitors costs and sales growth are chipset's key strategic initiatives, the financial perspectives focuses on how much of operating income and return on capital results from reducing costs and selling more units of CX1.

2. **Customers Perspective:** This perspective identifies the targeted market segments and measures the company's success in these segments. To monitor its growth objectives, number of new customers and customers satisfaction.

3. **Internal business process Perspective:** This perspective focuses on internal operations that further the customer's perspective by creating value for customers and further the financial perspective by increasing shareholder value. Chipset determines internal business process improvement targets after benchmarking against its main competitors.

The internal business process perspective comprises three sub processes:-

1. **The innovation process:** Creating products, services and processes that will meet the needs of customers. Chipset is aiming at lowering costs and promote growth by improving the technology of its I manufacturing.

2. **The operations process:** Producing and delivering existing products and services that will meet the needs of customers. Chipset's strategic initiatives are (a) improving manufacturing quality. Reducing delivery time to customers and (c) Meeting specified delivery dates.

3. **Post sales Service:** Providing service and support to the customer after the sale of a product of service. Although customers do not require much post sales service. CX1 monitors how quickly and accurately CX1 is responding to customer's service requests.

Learning and Growth Perspectives: This perspective identifies the capabilities the organisation must excel at to achieve superior internal processes that create value for customers and shareholders. Chipset's learning and growth perspectives emphasizes three capabilities

1. Employee Capabilities measured using employee education and skill levels.
2. Information system capabilities, measured by percentage of manufacturing processes with real-time feedback and
3. Motivation measured by employee satisfaction and percentage of manufacturing and sales employees (line employees) empowered to mange processes.

Q.397. What is the feature of Good Balanced Scorecard?

Answer: A good balanced scorecard design has several features:

1. It tells the story of a company's strategy by articulating a sequence of cause-and-effect relationships.
2. It helps to communicate the strategy to all members of the organization by translating the strategy into a coherent and linked set of understandable and measurable operational targets.
3. It places strong emphasis on financial objectives and measures in for-profit companies. Non-financial measures are regarded as part of a Program to achieve future financial performance.
4. It limits the number of measures to only those that are critical to the implementation of strategy.
5. It highlights sub optimal tradeoffs that managers may make when they fail to consider operational and financial measures together.

Q.398 Define Target costing?

Answer: Target costing is defined as "a structure approach to determining the cost at which a proposed product with specified functionality and quality must be produced, to generate a desired level of profitability at its anticipated selling price".

Target Costing V/S Traditional Costing:

Target Costing	Traditional Costing
Production Specification ↓ Target Price and volume ↓ Target profit ↓ Target cost ↓ Product design	Production Specification ↓ Product design ↓ Estimated cost ↓ Target cost ↓ Target price

Target costing is a systematic approach to establish product cost goals based on market driven standards. It is a strategic management process for reducing costs at early stages of product planning and design. Target costing begins with identifying customer needs and calculating an acceptable target sales price for the product. Working backward from the sales price, companies establish an acceptable target profit and calculate the target cost as follows: -

Target Cost = Target Price - Target profit

Target costing is different from standard costing. While target costs are determined by market driven standards (target sales price – target profit= Target cost). Standard costs are determined by design driven standards with less emphasis on what the market will pay (engineered costs + desired markup = desired sales price).

Target costing is a common practice in Japan where markets are extremely competitive. The market determines the price of products and there is a little opportunity for the individual organizations to set prices. Therefore, controlling cost is extremely important.

There are three cost reduction methods generally used in target costing: (i) reverse engineering (ii) value analysis and (iii) Process improvement. Reverse engineering tears down the competitors products with the objective of discovering more design features that create cost reductions. Value analysis attempts to assess the value placed on various placed on various product functions by customers. If the price customers are willing to pay for a particular function is less than its cost, the function is a candidate for elimination. Another possibility is to find ways to reduce cost of providing the function, e.g. using common components. Both reverse engineering and value analysis focus on product design to achieve cost reductions. The processes used to

produce and market the product are also source of potential cost reduction. Thus, redesigning processes to improve their efficiency can also contribute to the achieving the needed cost reductions.

Q.399 The main features of Target Costing System.

Answer: The basic idea beneath target costing is that all product costs are pre-determined before a product even reaches the production floor. For example, types of materials to be used in production method, etc. can be determined before actual production.

In these types of situation cost reduction focus of any company should be to review the costs of products, while they are still in the design stage. Every effort at the design stage is done to keep these costs to a minimum.

Target costing has been described as a process that occurs in a competitive environment. In which cost minimization is an important component of profitability? It is based on the promise that cost planning, cost management and cost reduction must necessarily occur in the design development process of the product to minimize the total life cycle cost of the product. All acceptable definition of target costing does not exist; following important definitions have been given:

Sakurai says, "Target costing can be defined as a cost management tool for reducing the overall of a product over its entire life cycle with the help of production engineering, research and design, marketing and accounting departments".

The main Features practices followed in Target Costing are:

Step	Description
1	Develop a product that statistics the needs of potential customers.
2	Choose a target price based on customer's perceived value for the product and the prices competitors charge.
3	Derive a target cost by subtracting the desired profit margin from the target price.
4	Estimate the actual cost of the product.
5	If estimated actual cost exceeds the target cost, investigate ways of driving down the actual cost to the target cost.

Q.400 Customer, Market and profit consideration dominate the first stage in Target Costing. Discuss, OR

Explain the first four steps in Target costing Procedure.

Answer: Target costing is viewed as an integral part of the design and introduction of new products. It is part of an overall profit management process, rather than simply a tool for cost reduction and cost management.

The first stage of the target costing process is driven by customer, market and profitability considerations.

STEP 1:- CUSTOMER - Product Design Specification:-

The customer's requirements as to the functionality and quality of the product are of prime importance. The design specification of the new product is based on customer's tastes, expectation and requirements: The offerings of competitors and the need to have extra features over competitor's product are also recognized. But at the same time, the need to provide improved products, without significant increases in' price, should be considered, as charging a price premium may not be sustainable in view of competitive conditions.

STEP 2 & 3:- Market -Target Selling price and Production Volume:

The target-selling price is determined using various sales forecasting techniques,

The Price is also influenced by the offers of competitors, product utility, prices volumes and margins.

In view of competition and elasticity of demand, the firm has to forecast the price-volume relationship reasonable certainty. Hence the target-selling price is market driven and should encompass a realistic reflection of the competitive environment.

Establishment of target production volumes is closely related to target selling price, given the relationship between price and volume.

Target volumes are also significant in computation of unit costs, particularly capacity related costs and fixed costs. Product costs are dependent upon the production levels over the life cycle of the product.

Step 4:- Profitability - Target Profit Margin:

Since profitability is critical for survival, a target profit margin is established for all new products.

The target profit margin is derived from the company's long-term business plan, objectives and strategies.

Each product or product line is required to earn at least the target profit margin.

Cost accountant's role in a Target Costing Environment:-

1. The cost accountant should be able to provide for the other members of the design team a running series of cost estimates based on initial design sketches and activity-based costing reviews.
2. The cost accountant helps the project team in capital budgeting decisions.
3. The cost accountant works with the design team to help it understand cost-benefit-trade offs of using different design or cost options in the new product.
4. The cost accountant continues to compare a product's actual cost to the target cost even after the design is completed.

Advantages of Target costing: -

Following advantages ensue. When a company follows target costing:

1. **Forced planning:** Target costing ensures proper planning well ahead of actual production and marketing.
2. **Competitive atmosphere:** Target costing starts with customer's study or market study. It cannot work properly till a company has got a charged competitive atmosphere. Ways and means are found out to succeed in competition.
3. **Cohesive team spirit:** For success of target costing, a inter-function team is essential. Therefore! it promotes cohesive team spirit in the organization. This spirit implies the team members to attempt higher-level performance.

Q.401 Define Value Engineering?

Answer:

1. Value engineering aims to reduce non-value - added costs by reducing the quantity of cost drivers of non-value - added activities. For example to reduce rework costs. The Company must reduce rework-hours.
2. Value engineering also seeks to reduce value - added costs by achieving greater efficiency in value - added activities. For example to reduce direct manufacturing labor costs.
3. A Value - added cost is a cost that if eliminated would reduce the actual or perceived value or utility (usefulness) customers obtain from using the product or service.
4. A Non-value added cost is a cost that, if eliminated would not reduce the actual or perceived value or utility (usefulness) customers obtain from using the product or service. It is a cost that the customer is unwilling to pay for Examples of non-value - added costs are costs of reworking and repaying products.
5. Value engineering is a systematic evaluation of all aspects of the cost structure of a product or service, including research and development, design of products and processes, production, marketing, distribution and customer service with the objective of reducing costs while satisfying customer needs.
6. It differs from traditional approaches to cost reduction and cost control in that its focus is on the elimination of non value- added activities (e.g. waste) from the processor-
7. Value engineering focuses on improving those qualities that the customer desires while reducing or eliminating unnecessary moves, queses setup and other actuates that the customer will not pay for.
8. The process is re-engineered to eliminate non-value added work and thereby enhance the value of the process to the customer.

Q.402 Briefly discuss on curvilinear CVP analysis.

Answer: In CVP analysis, the usual assumption is that the total sales line and variable cost line will have linear relationship, that is, these lines will be straight lines .However, in actual particle it is unlikely to have a linear relationship for two reasons namely:

- After the saturation point of the exiting demand the sales value may show a downward trend.
- The average unit variable cost declines initially .reflecting the fact that, as output increase the firm will be able to obtain bulk discounts on the purchase of raw materials and can also benefit from division of labour. When the plant is operated at further higher levels of output, due to bottlenecks and variable cost per unit will tend to increase. Thus the law of increase costs may operate and the variable cost per unit may increase after reaching a particular level of output.

In such cases, the contribution will not increase in linear proportion i.e. based on the phenomenon of diminishing marginal productivity; the total cost line will no be straight, points as assumed but will be of curvilinear shape. This optimum profit is earned at the point where the distance between sales and total cost is the greatest.

Q.403. What do you understand by CVP analysis. Discuss briefly the assumptions underlying concept?

Answer: As the name suggests cost volume profit (CVP) analysis is the analysis of three variables cost, volume and profit. Such an analysis explores the relationship between costs, revenue, activity levels and the resulting profit. It aims at measuring variations in cost and volume. CVP analysis is based on the following assumptions:

1. Changes in the levels of revenues and costs arise only because of changes in the number of product (or service)units produced and old-for example, the number of television sets produced and sold by SONY Corporation or the number of packages delivered by overnight Express. The number of output units is the only revenue driver and the only cost driver just as a cost driver is any factor that affects costs, a revenue driver is a variable such as volume that casually affects revenues
2. Total costs can be separated into two components; a fixed component that does not vary with output level and a variable component that changes with respect to output level. Furthermore, variable costs include both direct variable costs and indirect variable costs of a product. Similarly, fixed costs include both direct fixed costs and indirect fixed costs of a product.

3. When represented graphically the behaviors of total revenues and total costs are linear (meaning they can be represented as a straight line) in relation to output level within a relevant range (and time period).
4. Selling price, variable cost per unit and total fixed cost(within s relevant range and time period) are known and constant.
5. The analysis either covers a single product or assumes that the production of different products when multiple products are sold will remain constant as the level of total units sold changes.
6. All revenues and costs can be added, subtracted and compared without taking into account the time value of money.

Assumptions of cost-volume -profit analysis.

The assumptions of cost-volume -profit are as follows:-

1. All variables remain constant per unit.
2. A single product or constant sales mix.
3. Fixed costs do not change.
4. Profits are calculated on variable cost basis.
5. Total costs and total revenues are linear functions of output
6. The analysis applies to relevant range only.
7. Costs can be accurately divided into fixed and variable components.
8. The analysis applies only to short-term horizon.

Q.404 What are the preliminary steps prior to the installation of a standard costing system?

Answer: Installation of a Standard costing system involves the following preliminary steps.

1. **Establishment of Responsibility Centers:** The key areas of operation in the enterprise should be identified into responsibility centers with clearly, defined roles, e.g. cost control, Revenue maximization etc. such responsibility center may be identified either through (1) Departmentation or (2) Activity based costing.
2. **Classification of Accounts:** The various heads of expense accounts should be classified and codified for collection and comparison of actual costs with standard costs. This will also help the process of mechanized computerized accounting.
3. **Selection of a suitable type of standard:** For operational requirements, a suitable type of standard should be selected.
4. **Length of the period of use:** The duration, for which the standards are to be used, should be determined.

Q.405 Cost is <u>not only criterion</u> for deciding in favor of shut down -

Briefly explain write a brief note on shut Down Point.

Answer: Cost is not only criterion for deciding in the favour of shut down. Non cost factor worthy of consideration in this regard are as follows.

(i) Interest of workers, if the workers are discharged, it may become difficult to get skilled workers latter on reopening of the factory. Also shutdown may create problems.

(ii) In the face of the competition it may be 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 to be incurred on re- opening.

Shut Down Point indicates the level of operations (sales), below which it is not justifiable to pursue production. For this purpose, fixed costs of a business are classified into (a) Avoidable or Discretionary fixed costs and (b) Unavoidable or committed Fixed Costs. A firm has to close down if its contribution is insufficient to recover the avoidable fixed cost.

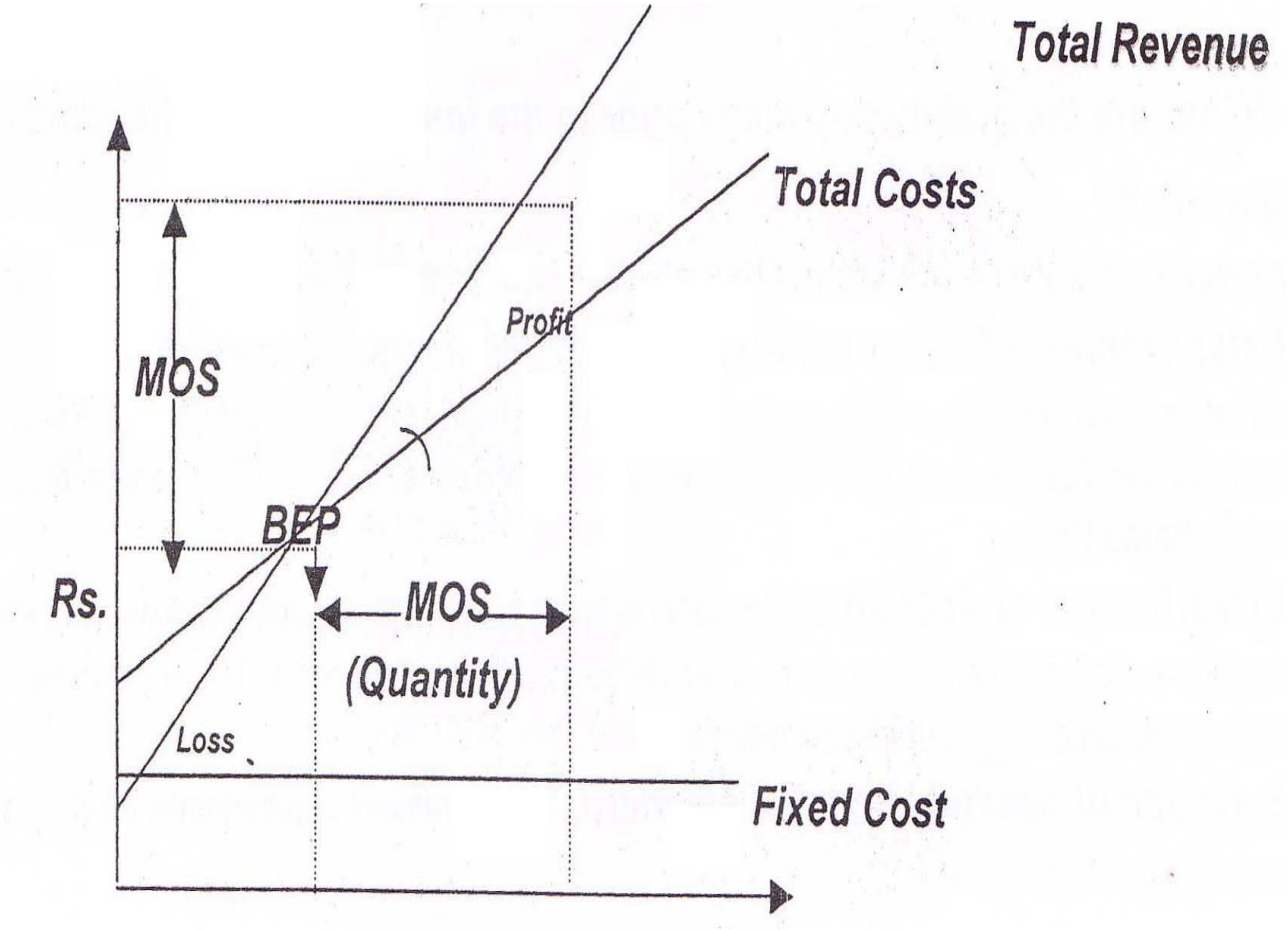
The focus of shutdown point is to recover the avoidable fixed costs in the first place4. By suspending the operations, the firm may save as also incur some additional expenditure. The decision is based on whether contribution is more than the difference between the fixed expenses incurred in normal operation and fixed expenses incurred when plant is shut down.

Formula:

Shut Down Point (in Rs.) $= \frac{Avoidable\ Fixed\ \ Costs - Extra\ fixed\ cost}{PV\ Ratio}$

Shut Down Point (quantity) $= \frac{Avoidable\ FIxed\ Costs - Extra\ fixed\ Cost}{Contribution\ per\ unit}$

Where Avoidable Fixed Costs = Total Fixed Costs Less Minimum/
Unavoidable Fixed Costs. Total Revenue



Significance of BEP:-

BEP represents the Cut- Off point for profit or loss of the business. At the BEP, the profit or loss equals Zero.

The significance of shut Down Point and consequent decisions can be understood from the following:

LEVEL OF SALES	DECISON	REASON
Below Shut Down Point	Close Down Operations	Avoidable fixed Costs are not fully recovered. It is better to close down and save additional expenditure.
At Shut Down Point	Continue Operations	Avoidable Fixed costs are To recovered
Above Shut Down Point	Continue Operations	Avoidable Fixed Costs are recovered. Further contribution leads to recovery of balance fixed costs.

Q.406 What is the meaning of Master Budget?

Answer: Master Budget is the "summary Budget, incorporating its component functional budgets, which is finally approved, adopted and employed". Master budget gathers together all the budget gathers together all the budgets all the budgets of various departments and makes a Summary of them.

Master budget is prepared in two parts; Forecast income statement and Forecast Balance Sheet. In the former part, the principal items of revenue, expenses, losses and profit are shown. In the Forecast Balance Sheet the items of Balance sheet i.e., fixed assets, current assets, total capital employed and liabilities are shown.

Master Budget is an outlay showing the proposed activity and the anticipated financial results during the coming year or budgeted year. It is presented before the Board of Directors for adoption and approval. After approval of the Master Budget, various functional budgets are sent to the concerned departments, so that, they can plan their working according to their budgets.

Q 407 Write the Difference between Fixed & Flexible Budget?

Particulars	Fixed Budget	Flexible Budget
1. Definition	It is a Budget designed to remain unchanged irrespective of the level of activity actually attained.	It is a Budget, which is by recognizing the difference between fixed, semi-variable and variable costs is designed to change in relation to level of activity attained.
2. Rigidity	It does not change with actual volume of activity achieved. Thus it is known as rigid or inflexible budget.	It can be re-casted on the basis of activity level to be achieved. Thus, it is not rigid.
3. Level of Activity	It operates on one level of activity and under on set of conditions. It assumes that there will be no change in the prevailing conditions, which is unrealistic.	It consists of various budgets for different levels of activity.
4. Effect of variance analysis.	Variance Analysis does not give useful information as all Costs (fixed, variable and semi-variable) are related to only one level of activity.	Variance Analysis provides useful information as each cost is analysed according to its behavour.
5. Use for Decision making	If the budgeted and actual activity levels differ significantly, then aspects like cost ascertainment and price fixation do not give a correct picture.	It facilitates the ascertainment of cost, fixation of Selling Price and submission of quotations.
6. Performance Evaluation	Comparison of actual performance with budgeted targets will be meaningless especially when there is a difference between two activity levels.	It provides a meaningful basis of comparison of the actual performance with the budgeted targets.

Q.408. What is the Meaning of Angle of Incidence?

Answer: ANGLE OF INCIDENCE: Angle of incidence is formed at the inter-section of total cost tine and total sales line. As a matter of fact there are two angles of incidence.

(i) The angle formed on the right side of the break-even point.

(ii) The angle formed on the left side of the break-even point.

The angle formed on the right side of the break-even point indicates the profit area white that formed on the left side indicates the loss area. The size of the angle of incidence is indication of the quantum of profit or loss made by the firm at different output/sales levels. For example, if this angle of incidence is narrow to the right side of the BEP it indicates that the quantum of profits made by the firm is also low. Similarly, if it is narrow to the left side of the BEP it indicates that the quantum of loss made by the firm is also low. In other words, a narrow angle of incidence shows a slow rate of profit earning while a wider angle of incidence indicates a swift rate of profit earning capacity of the firm. A narrow angle also indicates that the variable cost as a proportion to sales is quite high, and therefore, very little has been left by way of contribution.

A study of angle of incidence, break-eyen point and margin of safety can help the management in having a better understanding about profitability, stability and incidence of fixed and variable costs on the performance of the firm. This can be understood by taking the following four different situations:

(i) HIGH MARGIN OF SAFETY, LARGE ANGLE OF INCIDNECE AND LOW BREAK-EVEN POINT:-This is the most favorable condition of the business. It indicates that the business is fairly sound and steady in financial terms. It also shows that the firm is making high profits over a large range of output

(ii) HIGH MARGIN OF SAFETY, SMALL ANGLE OF INCIDENCE AND LOW BREAK-EVEN POINT:- This situation is similar to the first except that indicates that the firm is making a low rate of profit over large range of output.

(i) LOW MARGIN OF SAFETY LARGE ANGLE OF INCIDENCE AND HIGH BREAK-EVEN POINT. Such a situation shows that the business has heavy losses with a small decline in output of sales.

(ii) LOW MARGIN OF SAFETY, SMALL ANGLE OF INCIDNECE AND HIGH BREAK-EVEN POINT: This is the worst situation. This shows that the business has high fixed costs and it is financially unsound.

Q.409 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:

1. The costs should be expected as future costs.

2. The costs differ among the alternatives courses of action.

While making decision about product mix using the facilities and other available resources, the end results should always aim at profit minimization. Variable costs are relevant costs in product mix decisions and consequently contribution plays a major role in minimizing the 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:-

1. The available production capacity.
2. The limiting factor (s).
3. Contribution per unit of the limiting factor.
4. Market demand for the products.
5. Opportunity costs.

Q.410 What do you mean by philosophy of continuous process improvement? What are its challenges?

Answer: Philosophy of Continuous process improvement: In a process industry production of a product moves from one process (or department) to the next till it is completed. Each, production department performs some part of the total operation on the product and transfers its completed production to the next process department, where it becomes the input for further processing. The completed production of the last department is transferred to the finished goods stock.

Philosophy of continuous process improvement believes in encouraging every member of the organisation to continuously strive to serve their customers more efficiently. The customers may be either external e.g. major purchases of the product or internal, such as next operator on the assembly line. The objective of continuous process improvement is to sustain the improvement moments within an organization one time and to align improvement activities in support of strategic objectives.

Challenges of continuous process improvement. - The challenges of continuous process improvement are to promote activities that continuously modify processes, procedures, task, content and process interfaces to achieve complete customer satisfaction as well as to reduce costs and to increase product quality.

Q.411 Differentiate between "Cost-indifference-point" and "Break-even point"?

Answer: Distinction between Cost indifference point and Break-even point:

Cost indifference point: It is the point at which total cost lines under the two alternatives intersect each other.

Cost indifference point is calculated as under: Difference in fixed costs/ Difference in PV ratio.

Break-even point: It is the point where the total cost line and total revenue lines for a particular alternative interest each other. Break-even point is calculated as under:

Fixed costs / Contribution per unit or the fixed costs/ PV ratio.

The following are the main points of distinction between cost indifference point and break-even point.

1. The cost indifference point is the activity level at which total cost under two alternatives are equal. Whereas break-even point is the activity level at which the total revenue from a product or product mix is equal to its total cost.
2. Cost indifference point is used to choose between two alternative processes for achieving the same objective. The choice depends on the estimated activity level. Break-even point is used for profit planning.

Q.412 Distinguish between "Cost reduction" and "Cost management"?

Answer: Distinction between Cost reduction and Cost management:

Cost reduction is the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product. It uses the techniques like value analysis, work-study, standardization, simplification etc. It is a continuous process of critical cost examination, analysis and challenges of established standards. Each aspect of the business namely a product, processes, methods, procedures is critically examined and reviewed with a view to improving the efficiency and effectiveness so that costs are reduced. It presumes the existence of concealed potential savings in norms or standards. It is a corrective action.

Cost management is a broader concept. It aims at optimal utilisation of resources to enhance the operating income of the firm. It does not consider product attributes as given. It does not focus oh costs independent of revenue. Cost management systems establish linkage between costs and revenues. It relates costs and revenues with product attributes to have an insight into how various attributes generate revenue and creates demand on resources. It provides information to manage product attributes to optimize resource utilization.

Traditional cost reduction system focus on products, while cost management systems focus on products, markets and customers.

Q.413 How are variances disposed off in a standard costing system? Explain.

Answer: There is no unanimity of opinion among cost accountants regarding the disposition of variances. The following are commonly used methods for their disposition.

1. Transfer all variances to Profit and loss account. Under this method, stock of work-in-progress, finished stock and cost of sales are maintained at standard cost and variances arising are transferred to profit and loss account.
2. Distributing variances on Pro-data basis over the cost of sales, work in progress and finished goods, stocks by using suitable basis.
3. Write off quantity variance to profit and loss account and spread price variance over to cost of sales, work in progress and finished goods. The reason behind apportioning price variance to inventories and cost of sales, is that they represent costs although they are derived as variances.

Q.414 State the Features of Partial plan of Standard cost accounting procedure.

Answer: Features of Partial Plan of Standard cost accounting procedure:

Standard cost operations can be recorded in the books of account by using partial plan. Features

Of partial plan of standard costing procedure are as follows:

(i) Partial plan system uses current standards in which the inventory will be valued at current standard cost figure.

(ii) Under this method WIP account is charged at the actual cost of production for the month and is credited with the standard cost of the month production of finished product.

(iii) The closing balance of WIP is also shown at standard cost. The balances after making the credit entries represent the variance from standard for the month.

Q.415 Write a brief note on Theory of Price & factors influencing pricing Decision?

Answer: In micro-economic theory the term optimum price refers to the price, which yields the maximum profits (excess of total revenues over total costs). The basic assumption of the pricing

Theory is that firm's main objective is to maximise its profits. It also assumes that the firm takes into consideration the position of demand and cost function and that the firm produces one product. The economic theory of price can be analyses under two different assumptions:

1. Sale of unlimited quantities at an uniform selling price per unit.
2. Sale of additional quantities at reduced prices.

FACTORS INFLUENCING PRICING DECISIONS

Pricing of a product or service refers *o* the fixation of a selling price to a product or service provided by the firm. Selling price is the amount for which customers are charged for some product manufactures or for a service provided by the firm. The pricing decisions are influenced by both internal and external factors. Some such factors (determinants) are as follows: -

1. Cost data of the product, which may be actual, replacement, standard or any other cost base.
2. Firm's profit and other objectives.
3. Demand for the product or service and its elasticity.
4. Nature of product and its life expectancy.
5. Pricing decision as a long-run decision or short- term decision or a one-time spare capacity decision.
6. Type of competition for the product or service and availability of close substitutes.
7. Number of suppliers in the market.
8. Economic and political climate and trends and likely changes in them in future.
9. Type of industry to which the product belongs and future outlook of the industry.
10. Governmental guidelines, if any.

Q.416 What is Transfer Pricing?
Define the concept of Transfer Pricing.

Answer:

1. A Transfer price is that notional value at which goods and services are to be transferred by the supply division to the Receiving division. The goods that are produced by the buying division and sold to the outside world are known as final products.
2. The Department that supplies the goods is called Supply Division.
   The Department that receives the goods is called Receiving Division.
3. Transfer Price becomes Revenue for Supply Division
   Transfer Price becomes Cost for the Revenue Division.

General Rule is that:

TRANSFER PRICE: VARAIBLE COST+ CONTRIBUTION LOST

4. Goods and services, which are the outputs of the one division, would be transferred to another division as inputs. It may be: -
   (i) From one factory to another under the same company or
   (ii) From one division to another division.
   (iii) From a subsidiary to holding company and vice versa, In such cases, there is a need to set "Price" for the goods or services sold/transferred. Such a price, which applies within an organisation, is called Transfer Price.
5. Transfer Price becomes cost to the unit receiving the goods/services and revenue to the unit providing the goods/ services. It is therefore, obvious that the profitability of the two units involved would be dependent upon the transfer Price.
6. Transfer Price is different from sale price as in transfer price goods are to be transfer from one department to another but remain within in Company But in sale Goods are to be sold to outside customer.
7. Transfer Price: Goods are not sold but called change of location of goods within the same company.
8. Transfer price is a Notional Price.
9. Fixation of Transfer Price are to be in such a manner that the overall profit of the Company should not be reduced.
10. Transfer pricing it the pricing of internal transfer of goods or services between profit centers of an organisation.
11. It can be said that the problem of suitable transfer prices arises only when division do business with one another.

12. Ideally the transfer prices should promote goal congruence (i.e. a profit canter's goal should be consistent with the corporate objective), enable effective performance appraisal and maintain divisional autonomy.
13. It should also motivate internal transfers rather than buying from outside.
14. Transfer prices should always be based on the outlay costs of the supplying division plus an opportunity cost to the organization as a whole.
15. Typically Transfer prices are market based, cost based or negotiated.
16. For some transferred goods there may not be any market or the market may be imperfect on the prices considered unrepresentative. If cost based systems are used, then it is preferable to use standard costs to avoid transfer division's inefficiency.
17. Full cost or cost plus transfer pricing may be equally inefficient: Negotiated transfer prices will only be appropriate if there is equal bargaining power and if negotiations are not protracted. Imposed transfer prices and/ or lack of buying and selling options (lack of motivation) severally limit the significance of any form of divisional performance appraisal.

Q.417 What are the methods of Transfer Pricing?

Answer: There are three bases available for determining transfer prices, but many options are also available within each base. These methods are:

1. Market Prices.
2. Cost-based Prices
   (a) Variable cost
   (b) Actual full cost
   (c) Full cost plus profit margin
   (d) Standard full cost
   (e) Opportunity cost
3. Negotiated Prices
4. Dual Prices.

1. Market-Based Prices:-

Under this method the transfer prices are based on market prices. The major merits of this method

are: -

a. **Maximum Prices:** In a competitive market, goods/services cannot be transferred to its users at a higher price, Hence market prices constitute the basis for efficient production.

b. **Demand and Supply Forces:** Market prices take into account the forces of demand and supply intermediate products are freely saleable, in the long run, market prices will provide a good indicator of the overall efficiency of the various divisions.
c. **Opportunity Cost Recovery:** Opportunity costs of transferring divisions are fully recovered. Hence there is sufficient incentive for internal transfer for transferring divisions operating at full capacity.
d. **Objective:** Market prices provide reliable measures of divisional income because there processes are established independently rather than by individuals who have an interest in the results.

Q.418. What transfer price should be used if the market for the product to be transferred is perfectly competitive?

In perfectly competitive markets, there is no idle capacity and division managers can buy and sell as much as they want at the market price. Setting the transfer price at the market price motivates division managers to transact internally and to take exactly the same actions as they would if they were transacting in the external market.

Describe three criteria you would use to evaluate whether a management control system is effective.

To be effective, management control systems should be

(a) Closely aligned to an organization's strategies and goals,
(b) Designed to fit the organization's structure and the decision-making responsibility of individual managers, and
(c) Able to motivate managers and employees to put in effort to attain Selected goals desired by top management.

2. Cost Based prices:-

When external markets do not exist or are not available to the company or when information about external market prices is not readily available, companies may decide to use some forms of cost-based transfer pricing system.

As stated earlier, cost-based transfer prices may be in different forms such as variable cost, actual full cost, full cost plus profit margin, standard full cost, opportunity cost.

A: Variable Cost:-

1. Variable cost-based pricing approach is useful when the selling division is operating below capacity.
2. Variable cost method does not provide any profit to the supply division.
3. Variable cost = Direct Material + Direct Labour + Variable Fixed Overhead.
4. It does not consider opportunity cost
5. Not suitable for transferring division which operates at full capacity.

B: Actual Full cost:-

1. In actual full cost approach, transfer price is based on the total product cost per unit which will include direct materials, direct labour and factory overhead.
2. When full cost is used for transfer pricing, the selling division cannot realize a profit on the goods transferred. This may be disincentive to the selling division.
3. Further, full cost transfer pricing can provide perverse incentives and distort performance measures.
4. A full cost transfer price would have shutdown the chances of any negotiation between divisions about selling at transfer prices.

C: Full cost plus profit Margin:-

1. Full cost plus mark up (or profit margin)overcomes the weaknesses of full cost basis transfer pricing system.
2. The full cost plus price include the allowed cost of the item plus a mark up or other profit allowance.
3. With such a system, the selling division obtains a profit contribution on units transferred
4. The basic question in full cost plus mark up is what should be the percentage of mark-up. It can be suggested that the mark up percentage should cover operating expenses and provide a target return on sales or assets.

FULL COST = TOTAL COST + RETURN

D: Standard Costs:-

Under this method transfer price will be fixed based on standard cost which is predetermined based on scientific analysis:-

1. Simple and easy to operate when compared to actual cost based method.
2. Inventories are carried at Standard costs in transferring & receiving Division.
3. Does not consider opportunity cost.

4. This encourages efficiency in the selling division because inefficiencies are not passed onto the buying division. Otherwise the selling division can transfer cost inefficiencies to the buying division.
5. Use of standard cost reduces risk to the buyer. The buyer knows that standard Costs will be transferred and avoids being charged with supplier's cost overruns.

E: Opportunity cost: The transfer pricing based on opportunity cost identifies the minimum price that a selling division would be willing to accept and the maximum price that the buying division will be willing to pay. These minimum and maximum prices correspond to the opportunity costs of transferring internally. The opportunity cost approach is used in situations where the market is imperfect. Also, this transfer price is suitable when selling and buying divisions cannot sell and buy all they want in perfectly competitive markets. The opportunity cost based transfer Prices for each division are as follows:-

- Selling Division: - For the selling division, the opportunity cost of transferring is the greater of

(a) The outside sales value of the transferred product.

(b) Differential production cost for the transferred product.

- Buying Division: - For the buying division the opportunity cost of transfer is the lesser of;

A: - The price that would be required to purchase from the outside.

B: - The profit that would be lost from product the final product if the transferred unit could not be obtained at an economic price.

A transfer is in the best economic interest of the company if the opportunity cost for the selling division is less than the opportunity cost for the buying division. As long as the transfer price is greater than the opportunity cost of the selling division and less than the opportunity cost of the buying division, a transfer will be encouraged."

3. Negotiated Prices:-

Under this method both the division will negotiate for determination of transfer prices so that these will not be any undue advantages over the other division & in addition to that the overall profitability will be kept in mind.

- Negotiated Transfer Pricing refers to the determination of transfer prices based on active participation, involvement, co- ordination and agreement of the managers of the transferring and recipient divisions.
- In this method, each decentralised unit is considered as an independent unit. Such units decide the transfer price by negotiations or bargaining.
- Divisional Managers have full freedom to purchase their requirement from outside if the prices quoted by the transferring division are not acceptable to them.

Advantage:-

1. **Proper Decision-Making:-** Negotiated prices lead to business like attitude amongst divisions of the company. The buying division may purchase from outside sources if the outside prices are lower than the internal division's price.
2. **Autonomy and Motivation Value:-** Each sub-unit is considered as an independent unit. Buyers and sellers are completely free to deal outside the company. This promotes sub-unit autonomy and motivates managers.
3. **Overall Company Profitability:-** Through properly directed negotiations, managers will be able to determine the appropriate transfer prices that satisfy the requirements of the divisions and is in the best interest of the Company as a whole.

LIMITATIONS:-

1. **Sub-optimal:-** The agreed transfer price may depend on the negotiating skills and bargaining powers of the managers involved. The final result may not always be optimal
2. **Conflicts:-** Rather than agreement on transfer prices, negotiations can lead to conflict between divisions and may require top-management mediation.

3. **Defeat of Performance evaluation criteria:-** Transfer prices dependent on Manager's negotiations skill will defeat the very purpose of performance evaluation,
4. **Time and Cost:-** Negotiations are time consuming for the managers involved, particularly when the number of transactions and interdependencies are large.

In order to have an effective system of transfers pricing; the following points should be kept in view: -

1. Prices of all transfers in.and out of a profit centra should be determined by negotiation between the buyer and the seller.
2. Negotiations should have access to full data on alternative sources and markets and to public and private information about market prices.
3. Buyers and sellers should be completely free to deal outside the company.

Q.419 What are the benefits of Transfer Pricing Policy?

Answer: An ideal transfer pricing policy will benefit the organisation in the following ways:-

- Divisional performance evaluation is made easier.
- It will develop healthy inter- divisional competitive spirit.
- Management by exception is possible.
- It helps in co-ordination of divisional objectives in achieving organisational goals.
- It provides useful information to the top management in making policy decisions like expansion, sub-contracting closing down of a division make or buy decisions etc.
- Transfer price will act as a check on supplier's prices.
- It fosters economic entity and free enterprise system.
- It helps in self - advancement and generates high productivity and encouragement to meet the competitive economy.
- It optimises the allocation of company's financial resources based of the relations performance of various profit center which in turn are influenced by transfer pricing policies.

Q.420 What are Requisites of a sound Transfer Pricing System?

Answer: The requisites of a sound transfer pricing system are as follows:

1. It should be simple to understand and easy to operate.
2. It should enable fixation of Fair transfer prices for the output transferred or service rendered. A divisional manager who considers the transfer price to be unfair to the division would be de-motivated.
3. Ideally, the business unit divisional manager must be given autonomy and freedom to sell in the open market. This does not, however mean that without complete autonomy, a system of transfer pricing and evaluation of division on the basis of profits contributed by them cannot exist. Frequently divisional mangers will have restrictions in this regard. Even when there is compulsion to sell the products or provide services to an internal division, it is profitable to allow the divisional managers to sell a small quantity (5-10 percent) to customers outside the organizations or to buy small quantities from sources outside it.
4. The business unit / division should have free access to various sources of market information.
5. There should be a negotiation for transfer prices between the business unit/ divisional managers of the selling business unit/division and the buying unit/ division. Negotiated

transfer prices are far more motivating than the prices imposed by the top management or determined by the finance department.

6. Sound transfer pricing ground rules must be framed to guide negotiations between business unit/division managers. These rules would not only promote consistency in transfer pricing decision, but also minimize interdivisional conflicts. For instance, if transfer prices have been arrived at through negotiations, divisional managers cannot blame the system or each other if one of them later finds the prices unfavorable to the unit.
7. A system of arbitration with ground rules must also be established. In case of failures relating to transfer pricing these should be resolved through arbitration by a higher level executive-vice-president or director, fiancé. The decisions should be timely as well as consistent across cases as far as possible.
8. Top management should discourage prolonged arguments between business unit/divisional managers.
9. Transfer prices can be reviewed annually or as dictated by the demand and supply conditions in the market. Transfer pricing guidelines must state the circumstances under which a revision of transfer prices can be made during the year.
10. When transfer prices are based on market price, long-term competitive/ normal prices must be considered.
11. Transfer pricing and arbitration ground rules can be reviewed once in four years or earlier if there is a major change in business conditions.

Fox, Kennedy and Sugden suggest that ideally a transfer price should be:

A. Simple to calculate.
B. Robust (not requiring frequent adjustment);
C. Fair (hence motivating to both parties);
D. Profit maximizing (for the company as a whole)

Q.421 Outline the limitations of negotiated method of transfer pricing.

Answer: Limitations of negotiated method of transfer pricing are as follows:

1. A system of negotiated prices develops business like attitude amongst divisions of a company. This attitude may tempt the managers to purchase their requirements from outside sources, even by, ignoring the overall Interest of the company.
2. Agreed transfer price between divisions of a company, will depend on the negotiating skills and bargaining power of the managers involved and the final outcome may not be close to optimal level.
3. Conflict between divisions of a company may arise while negotiating about transfer price and the resolution of such conflicts may require sufficient management time.
4. Measurement of divisional profitability may depend on the negotiating skills of the managers who have unequal bargaining power.
5. Deciding about negotiated transfer price between the divisions of a company, is tjme-consuming exercise for the managers involved.

Q.422 What should be the basis of transfer price, if unit variable cost and unit selling price are constant?

Answer: If unit variable cost and unit selling price are constant then the main problem that would arise while fixing the transfer price of a product would be as follows:

There is an optimum level of output for a firm as a whole. This is so because there is a certain level of output beyond which Its net revenue will not rise, The Ideal transfer price under these circumstances will be that which will motivate these managers to produce at this level of output.

Essentially it means that some divisions in a business house might have to produce its output at a level less than its full capacity and in all such cases a transfer price may be imposed centrally.

Q.423 How will you resolve Transfer Pricing conflicts between division and company as a whole?

Answer:

1. **Objectives and conflicts:-**

The criteria for fixing transfer prices are (a) Goal congruence in decision-making, (b) Management Efforts (c) Segment Performance Evaluation, and (d) Sub-unit autonomy and motivation value. However no, single transfer price can serve all of these criteria. They often conflict and managers are forced to make trade-offs.

Some situations of conflicts between objectives are:

- **Goal Congruence v/s. Performance Evaluation:** The transfer price that leads to the short-run optimal economic decision is relevant cost. If the transferring division has excess capacity, this cost will be equal to variable cost only (since opportunity costs are Nil). The transferring division will not recover any of its fixed costs when transfers are made at variable costs and will therefore report a loss.
- **Goal Congruence v/s„ Divisional Autonomy:** In case of failure of a division to achieve the objective of goal congruence the management of the company may dictate their 'transfer price', if a transfer price is imposed on the manager of the supplying division, the concept of divisional autonomy and decentralization is undermined.
- **Performance Evaluation v/s. Profitability:** A transfer price that may be satisfactory for evaluating divisional performance may overhead divisions to make sub-optimal decisions when viewed from the overall company perspective.

2. **Conflicts between Divisions and Company as a whole: -** If divisional managers are given "absolute free hand" in decision making on transfer prices, there is a possibility that divisional goals may be pursued, ignoring overall company interests. This may force the top management to interface in decision making. However interference of top management and "dictating a transfer price" on the divisions is usually the main basis of conflicts between a division and the company as a whole.

3. **Proposals for resolving transfer pricing conflicts: -** To resolve the transfer pricing conflicts the followings transfer-pricing methods can be suggested:

1. Dual-rate transfer pricing system.
2. Two-part transfer pricing system.

Q.424 Write a note on pricing by service sector.

Answer: PRICING BY SERVICE SECTOR

1. The service sector follows a different approach for pricing their service. Although a service has no physical existence it must be priced and billed to customers.
2. Most service organizations use a form consisting of time and material pricing to arrive at the price of a service.
3. Service companies such as appliance repair shops, automobile repair business calculate their prices by using two computations one for labour and other for materials and parts.
4. A mark up percentage is used to add the cost of overhead to the direct cost of labour, materials and parts. If materials and parts are not part of service being performed, then only direct labour costs are used as basis for determining price.
5. For professionals such as accountant and consultants direct labour costs and apportioned overhead and indirect costs are considered for pricing.

Q.425. Explain four P's of quality improvement principles.

The Four P's quality improvement principles are as below:

1. People: It will quickly become apparent that some individuals are not ideally suited to the participatory process. Lack of enthusiasm will be apparent from a generally negative approach and a tendency to have prearranged meeting which coincide with the meetings of TQM teams.

2. Process: The rhetoric and inflexibility of a strict Deming approach will often have a demotivating effect on group activity.

3. Problem: Experience suggests that the least successful groups are those approaching problems that are deemed to be too large provide meaningful solutions within a finite time period.

4. Preparation: A training in the workings of Deming- like processes is an inadequate preparation for the efficient implementation of a quality improvement process.

Q.426. "Cost can be managed only at the point of commitment and not at the point of incidence. Therefore, it is necessary to manage cost drivers to manage cost." Explain the statement with reference to structural and executional cost drivers.

A firm commits costs at the time of designing the product and deciding the method of production. It also commits cost at the time of deciding the delivery channel (e.g. delivery through dealers or own retail stores). Costs are incurred at the time of actual production and delivery. Therefore, no significant cost reduction can be achieved at the time when the costs are incurred. Therefore, it is said that costs can be managed at the point of commitment. Cost drivers are factors that drive consumption of resources. Therefore, management of cost drivers is essential to manage costs. Structural cost drivers are those which can be managed by effecting structural changes. Examples of structural cost drivers are scale of operation, scope of operation (i.e. degree of vertical integration), complexity, technology and experience or learning. Thus, structural cost drivers arise from the business model adopted by the company. Executional cost drivers can be managed by executive decisions, examples of executional cost drivers are capacity utilization, plant layout efficiency, product configuration and linkages with suppliers and customers. It is obvious that cost drivers can be managed only at the point of structural and operating decisions, which commit resources to various activities.

Q.427. What is the fundamental difference between Activity Based Costing System (ABC) and Traditional Costing System? Why more and more organisations in both the manufacturing and non-manufacturing industries are adopting ABC?

In the traditional system of assigning manufacturing overheads, overheads are first allocated and apportioned to cost centres (production and support service cost centres) and then absorbed to cost objects (e.g. products). Under ABC, overheads are first assigned to activities or activity pools (group of activities) and then they are assigned to cost objects. Thus, ABC is a refinement over the traditional costing system. Usually cost centres include a series of different activities. If different products create different demands on those activities, the traditional costing system fails to determine the product cost accurately. In that situation, it becomes necessary to use different rates for different activities or activity pools.

The following are the reasons for adoption of ABC by manufacturing and non-manufacturing industries:

(i) Fierce competitive pressure has resulted in shrinking profit margin. ABC helps to estimate cost of individual product or service more accurately. This helps to formulate appropriate marketing / corporate strategy.

(ii) There is product and customer proliferation. Demand on resources by products / customers differ among product / customers. Therefore, product / customer profitability can be measured reasonably accurately, only if consumption of resources can be traced to each individual product / customer.

(iii) New production techniques have resulted in the increase of the proportion of support service costs in the total cost of delivering value to customers. ABC improves the accuracy of accounting for support service costs.

(iv) The costs associated with bad decisions have increased substantially.

(v) Reduction in the cost of data processing has reduced the cost of tracking resources consumption to large number of activities of customers and not individual customers.

Q.428. Classify the following items under the three measures used in the theory of constraints:

		Solution
(i)	Research and Development Cost	Investment
(ii)	Rent/Utilities	Operating Costs
(iii)	Raw materials used for production	Contribution
(iv)	Depreciation	Operating Costs
(v)	Labour Cost	Operating Costs
(vi)	Stock of raw materials	Investment
(vii)	Sales	Contribution
(viii)	Cost of equipments and buildings	Investment

The 3 key measures are:

Contribution, Operating Costs, Investments

Q.429. Explain briefly the concepts of Opportunity costs and Relevant costs.

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.

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

E.g. Direct labour under alternative I – ` 10/ hour
Direct labour under alternative II – ` 20/hour
Then, direct labour is relevant cost.

Q.430. Why is meant by incremental Revenue?

Incremental Revenue: It is the additional revenue that arises 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 of in the nature of activity.

Q.431.Distinguish between "Marginal cost" and "Differential Cost".

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.

Q.433. What are the applications of incremental cost techniques in making managerial decisions?

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. This technique is applicable to situations where fixed costs alter.

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:

(i) Introduction of a new product
(ii) Discontinuing a product, suspending or closing down a segment of the business
(iii) Whether to process a product further or not
(iv) Acceptance of an additional order form a special customer at lower than existing price.
(v) Opening of new sales territory and branch.
(vi) Optimizing investment plan out of multiple alternatives.
(vii) Make or buy decisions.
(viii) Submitting tenders.
(ix) Lease or buy decisions.
(x) Equipment replacement decisions.

Q.434. Comment on the use of opportunity cost for the purpose of decision-making

Decision making: Opportunity costs apply to the use of scarce resources, where resources are not secure; 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.

Q.435. Explain with one example each that sunk cost is irrelevant in making decisions, but irrelevant costs are not sunk costs.

Sunk cost is a historical cost incurred in the past. In other words it is a cost of a resource already acquired. Future decisions in respect of this resource will not be affected by it. For example, book value of machinery. Hence sunk costs are irrelevant in decision making.
Irrelevant costs are not necessary sunk costs. For example, when a comparison of two alternative production methods using the same material quantity is made, then direct material cost is not affected by the decision but this material cost is not sunk cost.

Q.436. "Sunk cost is irrelevant in decision-making, but irrelevant costs are not sunk costs". Explain with example.

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.

Q.437. Explain the concept of relevancy of cost by citing three examples each of relevant costs and non-relevant costs.

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 are:

(1) All variable costs are relevant costs.
(2) Fixed costs which vary with the decision are relevant costs.
(3) Incremental costs are relevant costs.

Examples of non-relevant costs are:

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

Q.438. What are the applications of incremental /differential costs?

Applications of Incremental/Differential Cost:

1. Whether to process a product further or not.
2. Dropping or adding a product line.
3. Optimizing investment plan.
4. accepting an additional order from a special customer at lower than existing price.
5. Make or buy decision.
6. Opening a new sales territory or branch.
7. Optimizing investment plan out of multiple alternatives.
8. Submitting tenders.
9. Lease or buy decisions.
10. Equipment replacement decisions.

Q.439. "Use of absorption costing method for the valuation of finished goods inventory provides incentive for over-production." Elucidate the statement.

When absorption costing method is used, production fixed overheads are charged to products and are included in product costs. Consequently, the closing stocks are valued on total cost (including fixed overheads) basis. The net effect is that the charge of fixed overheads to P/L account gets reduced, if the closing stock is greater than the opening stock. This situation has the effect of inflating the profit for the period.

Where stock levels are likely to fluctuate significantly, profits may be distorted if calculated on absorption costing basis. If marginal costing is used, since the fixed costs are charged off to P/L account as period cost, such a situation will not arise. The impact of using absorption costing on profits can be summarized as under:

- When sales are equal to production, profits will be the same under absorption costing and marginal costing.
- If production is higher than sales, the absorption costing will post higher profits that marginal costing.
- If sales are in excess of production, absorption costing will show lower profits than marginal costing.

Since profit calculation in absorption costing can produce strange result, the managers may deliberately alter the stock levels to influence the profits if absorption costing is used. Hence, it is true to say that if absorption costing method is used managers have the incentive to over produce to show better result.

Q.440. What is Pareto Analysis? Name some applications.

Vilfredo Pareto, an Italian economist, observed that about 70 – 80% of value was represented by 30 – 20% of volume. This observation was found to exist in many business solutions.

Analyzing and focusing on the 80% value relating to 20% volume helps business in the following areas.

(i) Pricing of a product (in a multi-product company)
(ii) Customer profitability.
(iii) Stock control.
(iv) Activity Based Costing (20% cost drivers are responsible for 80% of total cost)
(v) Quality Control.

Q.441. State the general guidelines to be used in adopting a pricing policy in a manufacturing organization.

The general guidelines to be used in adopting a pricing policy are as under:

(i) The pricing policy should encourage optimum utilization of resources.
(ii) The pricing policy should work towards a better balance between demand and supply.
(iii) The pricing policy should promote exports.
(iv) The pricing policy should serve as an incentive to the manufacturers to maximize production by adopting improved technology.
(v) The pricing policy should avoid adverse effects on the rest of the economy.

Q.442. Enumerate the uses of Pareto Analysis.

Pareto analysis is useful to:

(i) Prioritize problems, goals and objectives.
(ii) Identify the root causes.
(iii) Select and define the key quality improvement programs, key employee relations improvement programs etc.
(iv) Verify the operating procedures and manufacturing processes.
(v) Allocate physical, financial and human resources effectively.
(vi) Maximize research and product development time.

Q.443. Briefly explain skimming pricing and penetration pricing policies.

Skimming prices: Policy of highly pricing a product at the entry level into the market and reducing it later.

For example: Electronic goods, mobile phone, Flat, TVs, etc.

It is used when market is price insensitive, demand inelastic or to recover high promotional costs.

Penetration Pricing: Policy of entering the market with a low price, then establishing the product and then increasing the price.

This is also used by companies with established markets, when products are in any stage of their life cycle, to avoid competition. This is also known as "stay-out pricing".

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For example, entry of a new model small segment car into the market.

Q.444. What are the disadvantages of Cost Plus Pricing?

Disadvantages of cost plus pricing:

(i) If ignores demand, facts to take into account buyers' needs and willingness to pay.

(ii) Fails to reflect competition adequately.

(iii) Assumes correct cost estimation, whereas in multi-product firm, costs may be arbitrarily allocated.

(iv) In many decision, incremental costs are more relevant than full cost. This is ignored.

(v) Fixed Overheads depends on volume if volume is more cost is less, and vice-versa. Increase decrease in sales volume depends on price. Thus it is a vicious circle — cost plus markup is a price based on sales volume & sales volume is based on price.

Q.445. "Overhead variances should be viewed as interdependent rather than independent'. Explain.

The operations of a firm are so inter linked that the level of performance in one area of operation will affect the performance in other areas. Improvements in one area may lead to improvements in other areas. A sub-standard performance in one area may be compensated by a favourable performance in another area. Because of such interdependency among activities in the firm, the managers should not jump to conclusions merely based on the label of variances namely favourable or unfavourable. They should remember that there is a room for trade off amongst variances. Hence, variances need to be viewed as `attention directors' rather than problem solvers. Thus, a better picture will be captured when overhead variance are not viewed in isolation but in an integrated manner.

Q.446. Under the single plan, record the journal entries giving appropriate narration, with indication of amounts of debits or credits alongside the entries, for the following transactions using the respective control A/c.

(i) Material price variance (on purchase of materials)

(ii) Material usage variance (on consumption)

(iii) Labour rate variance.

(i) Dr. Material Control A/c

Dr. or Cr. Material Price Variance A/c

Cr. Creditors A/c

(Being price variance during purchase of materials)

(ii) Dr. WIP Control A/c

Dr. or Cr. Material Usage Variance A/c

Cr. Material Control A/c

(Being recording of usage variance at Standard cost of excess/under utilized quantity)

(iii) Dr. Wages Control A/c

Dr. or Cr. Labour Rate Variance A/c

Cr. Cash

(Being entry to record wages at standard rate)

Q.447. How are cost variances disposed off in a standard costing system? Explain.

There is no unanimity of opinion among Cost Accountants regarding the disposition of variances. The following are commonly used methods for their disposition.

1. Transfer all variances to Profit and Loss Account. Under this method, stock of work-in-progress, finished stock and cost of sales are maintained at standard cost and variances arising are transferred to profit and loss account.

2. Distributing variances on pro-rata basis over the cost of sales, work-in-progress and finished goods stocks by using suitable basis.

3. Write off quantity variance to profit and loss account and spread price variance over to cost of sales, work in progress and finished goods. The reason behind apportioning variance to inventories and cost of sales is that they represent costs although they are derived as variances.

Q.448. "Calculation of variances in standard costing is not an end in itself, but a means to an end." Discuss.

The crux of standard costing lies in variance analysis. Standard costing is the technique whereby standard costs are predetermined and subsequently compared with the recorded actual costs. It is a technique of cost ascertainment and cost control. It establishes predetermined estimates of the cost of products and services based on management's standards of efficient operation. It thus lays emphasis on "what the cost should be". These should be costs are when compared with the actual costs. The difference between standard cost and actual cost of actual output is defined as the variance.

The variance in other words in the difference between the actual performance and the standard performance. The calculations of variances are simple. A variance may be favourable or unfavourable. If the actual cost is less than the standard cost, the variance is favourable but if the actual cost is more than the standard cost, the variance will be unfavourable. They are easily expressible and do not provide detailed analysis to enable management of exercise control over them. It is not enough to know the figures of these variances from month to month. We infact are required to trace their origin and causes of occurrence for taking necessary remedial steps to reduce / eliminate them.
A detailed probe into the variance particularly the controllable variances help the management

to ascertain:

(i) The amount of variance
(ii) The factors or causes of their occurrence
(iii) The responsibility to be laid on executives and departments and
(iv) Corrective actions which should be taken to obviate or reduce the variances.

Mere calculation and analysis of variances is of no use. The success of variance analysis depends upon how quickly and effectively the corrective actions can be taken on the analysed variances. In fact variance gives information. The manager needs to act on the information provided for taking corrective action. Information is the means and action taken on it is the end. In other words, the calculation of variances in standard costing is not an end in itself, but a means to an end.

Q.449. Describe three distinct groups of variances that arise in standard costing.

The three distinct groups of variances that arise in standard costing are:

(i) Variances of efficiency. These are the variance, which arise due to efficiency or inefficiency in use of material, labour etc.

(ii) Variances of prices and rates: These are the variances, which arise due to changes in procurement price and standard price.

(iii) Variances due to volume: These represent the effect of difference between actual activity and standard level of activity. These can be summarized as under:

Element of cost	*Variance of Efficiency*	*Variance of Price*	*Variance of volume*
Material	Usage, Mixture, Yield	Price	Revision
Labour	Efficiency, idle time	Rate of pay	--
- Variable	Efficiency	Expenditure	Revision
- Fixed	Efficiency	Expenditure	Revision
			Capacity
			Calendar

Q.450. Discuss with examples, the basic costing methods to assign costs to services.

(i) **Job Costing method**: The cost of a particular service is obtained by assigning costs to a distinct identifiable service.
e.g. Job Costing method is used in service sectors - like Accounting Firm, Advertisement campaign.

(ii) **Process Costing method:** Cost of a service is obtained by assigning costs to masses of similar unit and then computing cost / unit on an average basis.
e.g. Retail banking, postal livery, credit card etc.

(iii) **Hybrid method:** Combination of both (i) & (ii) above.

Q.451. Explain the main characteristics of Service sector costing.

Main characteristics of service sector are as below:

(a) **Activities are labour intensive:** The activities of service sector generally are labour intensive. The direct material cost is either small or non-existent.

(b) **Cost-unit is usually difficult to define:** The selection of cost units usually, for service sector is difficult to ascertain as compared to the selection of cost unit for manufacturing sector. The following table provides some examples of the cost units for service sector.

- Hospital — Patient per day, Room per day
- Accounting firm — Charged out client hours
- Transport — passenger km., quintal km.
- Machine maintenance — Maintenance hours provided to user department
- Computer department — Computer time provided to user department.

(c) **Product costs in service sector:** Costs are classified as product or period costs in manufacturing sector for various reasons.

Q.452. Give an appropriate cost unit for each of the following service sectors:

(i) Hotel
(ii) School
(iii) Hospital
(iv) Accounting firm
(v) Transport
(vi) Staff Canteen
(vii) Machine maintenance
(viii) Computer Department

Service Sector		Cost Unit
(i)	Hotel	Bednights available or occupied
(ii)	School	Student hours or no. of full time students
(iii)	Hospital	Patient-day / Room-day
(iv)	Accounting firm	Client hours
(v)	Transport	Passenger-Kms, or Quintal km or tonne-km
(vi)	Staff Canteen	No. of meals provided or no. of staff
(vii)	Machine maintenance	Maintenance hours to user departments
(viii)	Computer Department	Computer time to user departments.

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Q.453. "Customer profile is important in charging cost." Explain this statement in the light of customer costing in service sector.

Customer costing in the service sector: The customer costing is a new approach to management. The central theme of this approach is customer satisfaction. In some service industries, such as public relations, the specific output of industry may be difficult to identify and even more difficult to quantify. Further there are multiple customers, identifying support activities i.e. common costs with particular customer may be more problematic. In such cases it is important to cost customer. An ABC analysis of customers profitability provides valuable information to help management in pricing customer .Consider a banking sector. A banks activity for customer will include the following types of activities. These are:

i. Stopping a cheque
ii. Withdrawal of cash
iii. Updation of pass book
iv. Issue of duplicate pass book
v. Returning a cheque because of insufficient funds
vi. Clearing of a customer cheque.

Different customers or categories of customers use different amount of these activities and so customer profiles can be built up and customer can be charged according to the cost to serve them.

Customer profile is important in analyzing cost under the following categories

1. **Customer Specific costs:** These are the direct and indirect cost of providing service to customer plus customer related cost assigned to each customer.
   For example: cost of express courier service to a client who requests over-night delivery of some agreement.

2. **Customer – line categories:** These are the costs which are broken into broad categories of customers and not individual customers.

Q.454. "Hard Rock Coconut" is an exclusive resort located in a famous Island of Pacific Ocean that vows to isolate its guests from the hustle and bustle of everyday life. Its leading principle is "all contemporary amenity wrapped in old-world charisma". Each of the resort's 18 villas has a separate theme like Castle, Majestic, Ambassador, Royal Chateau, Coconut, Lemon, Balinese etc and guests often ask for a specific villa when they make reservations. Villas are Ideal for families or friends travelling together and these villas feature luxurious accommodation spanning two floors. Since it is located within a 300-acre estate on white sand beach, the resort offers its guests a wide variety of outdoor activities such as horseback riding, hiking, diving, snorkelling, sailing, golf and so on. Guests could also while away the day relaxing in the pool and availing themselves of the resort's world-famous spa "Hard Coco Spa". The dining room, which only has three tables for the public, is acceptable proud of its 4-star rating.

You are required to develop a balanced scorecard for "Hard Rock Coconut". It is sufficient to give two measures in each of the four perspectives.

The following is a possible scorecard for "Hard Rock Coconut"

Financial Perspective	Economic Value Added Revenue per villa
Customer Perspective	% repeat customers Number of customer complaints
Internal Business	Service rating of spa Staff hours per guest % cost spent for maintenance Travel guide rank for restaurant
Innovation and Learning	Employee retention Number of new services offered

Q.455. Global Multinational Ltd. (GML) has two Divisions 'Dx' and 'Dz' with full profit responsibility. The Division 'Dx' produces Component 'X' which it sells to `outside' customers only. The Division Dz' produces a product called the `Z' which incorporates Component 'X' in its design. 'Dz' Division is currently purchasing required units of Component 'X' per year from an outside supplier at market price.

New CEO for Indian Operations has explored that 'Dx' Division has enough capacity to meet entire requirements of Division 'Dz' and accordingly he requires internal transfer between the divisions at marginal cost from the overall company's perspective.

Manager of Division 'Dx' claims that transfer at marginal cost are unsuitable for performance evaluation since they don't provide an incentive to the division to transfer goods internally. He stressed that transfer price should be 'Cost plus a Mark-Up'.

New CEO worries that transfer price suggested by the manager of Division `Dx' will not induce managers of both Divisions to make optimum decisions. You are requested to help him out of the problem.

To overcome the optimum decision making and performance evaluation conflicts that can occur with marginal cost-based transfer pricing following s has been proposed:

Dual Rate Transfer Pricing System

"With a `Dual Rate Transfer Pricing System' the 'Receiving Division' is charged with marginal cost of the intermediate product and 'Supplying Division' is credited with full cost per unit plus a profit margin".

Accordingly Division 'Dx' should be allowed to record the transactions at full cost per unit plus a profit margin. On the other hand Division Dz' may be charged only marginal cost. Any inter divisional profits can be eliminated by accounting adjustment.

Impact:

- Division 'Dx' will earn a profit on inter Division transfers.
- Division 'Dz' can chose the output level at which the marginal cost of the product 'X' is equal to the net marginal revenue of the product 'Z'.

Two Part Transfer Pricing System:

The 'Two Part Transfer Pricing System' involves transfers being made at the marginal cost per unit of output of the supplying Division plus a lump-sum fixed fee charged by the supplying Division to the receiving Division for the use of the capacity allocated to the intermediate product."

Accordingly Division `Dx' can transfer its products to Division 'Dz' at marginal cost per unit and a lump-sum fixed fee.

- 'Two Part Transfer Pricing System' will inspire the Division 'Dz' to choose the optimal output level.
- This pricing system also enable the Division 'Dx' to obtain a profit on inter Division transfer.

Q.456. "Target costing is less useful in situations where the majority of costs are not locked in during the design phase" – Explain with example.

Target costing is most useful in situations where the majority of product costs are locked in during the product design phase. This is the case for most manufactured products, but only for few services. In the services area, such as consulting, the bulk of all activities can be reconfigured for cost reduction during the "production" phase, which is when services are being provided directly to the customer. In the services environment the "design team" is still present but is more commonly concerned with streamlining the activities conducted by the employees providing the service, which can continue to be enhanced at any time, not just when the initial services process is being laid out. For example, Design team can lay out the floor plan of a fast-food restaurant, with the objective of creating an arrangement that allows employees to cover the shortest possible distances while preparing food and serving customers; this is similar to the design of a new product. However, unlike a product design, this layout can be readily altered at any time if the design team can arrive at a better layout, so that the restaurant staff can continue to experience high levels of productivity improvement even after the initial design and layout of the facility. In this situation costs are not locked in during the design phase, so there is less need for target costing.

Q.457. X Ltd. wants to enter in the market with a new product 'Gamma'. You are required to help management of X Ltd. in deciding pricing strategy if

- Demand of the 'Gamma' is elastic,
- Good possibility of substantial savings on large scale production and
- There is threat of competition.

While preparing to enter the market with anew product, X Ltd. has to adopt a skimming or penetration pricing strategy.

Skimming Pricing: It is a policy of high prices during the early period of a product's existence. This can be synchronised with high promotional expenditure and in the later years the prices can be gradually reduced.

Penetration Pricing: Penetrating pricing, means a pricing suitable for penetrating mass market as quickly as possible through lower price offers. The company may not earn profit by resorting to this policy during the initial stage. Later on, the price may be increased as and when the demand picks up.

X Ltd. should follow **'Penetration Pricing'** as –

(a) Demand of product 'Gamma' can be increase by lowering the price as it has elastic demand.

(b) There is also scope of substantial savings on large scale production and increase in demand is sustained by the adoption of low pricing policy.

(c) The prices fixed at a low level act as an entry barrier to the prospective competitors.

Q.458. Write a short note on Six Sigma

Six Sigma: Continuous improvement can be brought into the organisational culture by introducing continuously changing planned targets. One such target can be six-sigma accuracy. The sigma accuracy means the process is 99.999998% accurate. That is the process will/can produce only 0.002 defects per million. This is the structural meaning of six-sigma. In quality practice, six-sigma means 3.4 parts per million.

Six sigma is the statistical measure used to ensure quality of products and services. The six sigma academy has developed a break through strategy consisting of measure, analyze, improve and control, that allows companies to make exceptional bottom-line improvements.

In addition to the material and labour savings, which flow directly to the bottom line, a company engaged in six sigma can expect to see:

- Improved customer satisfaction
- Reduction cycle time
- Increased productivity
- Reduction in total defect
- Improved process flow

Six Sigma Capability Chart

Sigma	Parts per million
Six sigma	3.4 defects per million
Five sigma	233 defects per million
Four sigma	6,120 defects per million
Three sigma	66,807 defects per million
Two sigma	3,08,537 defects per million
One sigma	6,90,000 defects per million

Q.459. Explain briefly the Cost Accountant's role in a. Target Costing Environment.

The role of a Cost Accountant in a Target Costing Team consists of the following activities–

1. **Cost Estimation:** To provide other members of the design team a running series of cost estimates based on initial designs sketch, activity-based costing reviews of production processes, and "best guess" costing information from suppliers based on estimated production volumes.

2. **Permissible Cost Ranges:** To provide estimates within a high-low range cost, since preliminary data may be vague. But, the estimated cost range should be modified as more information becomes available.

3. **Capital Budgeting Analysis:** To cater to capital budgeting requests generated by the Design Team, based on types of equipment needed for the anticipated product design, product revenues and costs, rates of return, etc. and to answer questions regarding uncertainties and risk analysis.

4. **Cost Principles Explanation:** To work with the Design Team to help it understand the nature of various costs (such as cost allocations based on an Activity-Based Costing system), as well as the cost-benefit trade-offs of using different design or cost operations in the new product.

5. **Review of Cost Reduction Targets:** To track the gap between the Current Cost and the Target Cost (Le. the Design Team's goal), providing an itemization of where cost savings have already been achieved, and where there has not been a sufficient degree of progress.

6. **Final Review and Feedback:** To compare a products Actual Cost to the Target Cost after the design is completed, and for as long as the Company sells the product. This is necessary since Management must know immediately if costs are increasing beyond budgeted levels and why these increases are occurring.

Note: Since the role of the Cost Accountant in a Target Costing Team is very significant, he should have the following qualifications - (only illustrative and not exhaustive)

- Good Knowledge of Company's products as well as their features and components.
- Knowledge of how to create an Activity Based Costing system to evaluate related production costs, or at least interpret such costing data developed by someone else.
- Skills to work well in a team environment, proactively assisting other members of the team in constantly evaluating the costs of new design concepts.
- Good analytical and presentation skills, since the ongoing costing results must be continually presented not only to other members of the team and to top management.

Q.460. What do you mean by Kaizen Costing?

1. **Meaning**: Kaizen Costing refers to the ongoing continuous improvement program that focusses on the reduction of waste in the production process, thereby further lowering costs below the initial targets specified during the design phase. It is a Japanese term for a number of cost reduction steps that can be used, subsequent to issuing a new product design to the factory floor.

2. **Need:** The need for continuous cost reduction, i.e. Kaizen Costing, is brought out as below -
   (a) At the time of implementation of Cost Reduction Methods, there may be further chances of waste reduction, cost and time reduction and product improvement, which were not visualized or identified in earlier review.
   (b) There are always opportunities to control costs, after the Design Phase on a new product is completed, though these opportunities are fewer than during the Design Phase.
   (c) The Firm can obtain further unplanned cost reductions at the implementation stage, on account of workers' feedback and newer shop floor techniques.

3. **Kaizen Costing Process:** Activities in Kaizen Costing include elimination of waste in production, assembly, and distribution processes, as well as the elimination of unnecessary work steps in any of these areas. Thus, Kaizen Costing is intended to, repeat many of the Value Engineering steps, continuously and constantly refining the process, ther

4. **Savings from Kaizen Costing:** Cost reductions resulting from Kaizen Costing are much smaller than those achieved with Value Engineering. But, these are significant, since competitive pressures are likely to force down the price of a product over time, and any possible cost savings allow a Company to still attain its targeted profit margins.

5. **Multiple Versions of Products, i.e. Continuous Kaizen Costing:** Multiple improved versions of products can be introduced to meet the challenge of gradually reducing costs and prices. The market price of products continues to drop over time, which forces a Company to use both Target Costing and Kaizen Costing to reduce costs and retain its profit margin.

However, prices eventually drop to the point where margins are reduced, which forces the Firm to develop a new product with lower initial costs, and for which Kaizen Costing can again be used to further reduce costs. This pattern may be repeated many times as the Firm forces its costs down through successive generations of products.

The exact timing of a switch to a new product is easy to determine well in advance since the returns from Kaizen Costing follow a trend line of gradually shrinking savings. Since prices also follow a predictable downward track, plotting these two trend lines into the future reveals when a new product version must be ready for production.

Q.461. Classify the following items under appropriate categories of equably costs viz. Prevention Costs, appraisal Cost, Internal Failure Costs and External Failure costs:

	Particulars of Items	**Solution**
(i)	Rework	Internal Failure
(ii)	Disposal of Scrap	Internal Failure
(iii)	Warranty Repairs	External Failure
(iv)	Revenue Loss	External Failure
(v)	Repair to manufacturing equipments.	Internal Failure
(vi)	Discount on defective sale	External Failure
(vii)	Raw material inspection	Prevention cost
(viii)	Finished product inspection	Appraisal Cost
(ix)	Establishment of quality circles	Prevention cost
(x)	Packaging inspection	Appraisal Cost

Q.462. Write short notes on Participative Budgeting.

1. Participative Budgeting is a budgeting system in which all Budget Committee Members are given the opportunity to apply their own budgets in practice.

2. Inter-relationship between different functional budgets (viz. Sales, Production, Purchase, etc.) means that one budget cannot be completed without reference to several others. Hence, there is an immense need for co-ordination among all Department Heads, by having a Budget Committee.

3. Participative Budgeting (using Budget Committees) is also called "bottom-up budgeting". It is different from imposed or "top-down budgets" where the ultimate budget holder does not have any say / participation in the budgeting process.

4. Advantages of Participative Budgeting include -
   (a) improved quality of forecasts to use as the basis for the budget,
   (b) higher levels of motivation for the participating Managers,
   (c) better results since the applicant and executor of the Budget are the same person.

Q.463. Outline the relationship between Standard Costing and Budgetary Costing.

Distinction between Standard Costing and Budgetary Control

Particulars	Standard Costing	Budgetary Control
1. Meaning	Standards Costs are pre-determined. costs representing what the costs should be, at the level of efficient conditions of production and operation.	Budgets are financial and/or quantitative statements, prepared and approved prior to a defined period of time, of the policy to be pursued during that period for achieving that objective.
2. Coverage	They are generally restricted to Costs.	They include estimates of income, costs and employment of capital
3. Basis	These are determined by the collection of technical data related to production and applying costs to each element of production.	These are determined based on management's plans of what should be done to achieve a certain objective and how to actually achieve it.
4. Effect of temporary conditions	If, in a particular year, Costs are likely to be high due to certain factors, Standard Costs are not changed unless the factors are permanent changes nature. Effect of short-run temporary changes will not be reflected in Standard Costs.	Budgeted Costs are estimated keeping in view actual conditions and attainable targets of a period under review, in view of the conditions that are likely to be prevalent in that year. The effect of short-term changes in cost structure, etc, will be fully reflected in Budgeted Costs.
5. Permanence	Standard Costs are usually semi-permanent in nature, and may not be changed unless and until there are changes in the basic price structure or in the methods of operations.	They are estimated usually for one year and take into account the practical problems of operations and are kept at a level, which the Firm hopes to achieve in the year for which the budget is being prepared.

Q.464. Compare between Traditional Budgeting and Zero-Based Budgeting.

	Traditional Budgeting	Zero-Based Budgeting
1.	It is accounting-oriented, with stress laid on the previous years' level of expenditure.	It is decision-oriented, in a rational manner, for allocation of resources for both old and new programmes & activities.
2.	Here, reference is made to the past period levels of Revenues and Costs, and then adjustments are made to recognize factors like inflation trends, market demand situations, etc.	Here, a decision unit is broken into understandable Decision Packages, which are ranked according to importance, enabling Top Management to focus their attention on top priority Decision Packages.
3.	It is a routine and direct approach, treating each Division / Decision Unit equally.	It is an analytical approach, and immediately highlights the Decision Packages enjoying priority over others.
4.	It is for Top Management to decide why a particular amount should be spent on a particular decision unit.	Here, Manager of each Division should completely justify why there should be a budget allocation for his Division.
5.	It is comparatively rigid, and not dearly responsive to environmental changes.	This is very flexible and responsive to environmental changes.
6.	Managers may deliberately inflate their Budget Cost Request, so that they may still get the required amount, after cost "cuts" from Top Management.	Managers cannot have an adhoc approach for Cost Budgets. Top Management accords its approval only to a carefully devised, result-oriented Decision Package.

Q.465. What is DPP and Category of Indirect Cost for DPP.

Direct Product Profitability, it is a new way of spreading overheads in retail organisations, which is used in the grocery trade in particular. DPP has become much more sophisticated and is now very similar to activity based costing.

Categorisation of Indirect Costs for DPP:

i. Overhead cost
ii. Volume related cost
iii. Product batch cost
iv. Inventory financing cost.

Q.466. What is meant by Learning Effect or Learning Curve Effect?

1. Learning is the process during which a person acquires the skill to do a job.
2. When a worker takes up a job for the first time, he is new to the job and his performance is not to his best. Hence he takes considerable time to complete it.
3. However, when the same job is repeated, he is able to improve his performance because of the skill acquired by doing the same job or a similar job earlier.
4. This phenomenon is called **Learning Effect**. It applied only to labour-oriented operations.

Q.467. What do you mean by Learning Curve?

1. Learning Curve is a geometrical progression, which reveals the steadily decreasing costs for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated.
2. The amount of decrease will be less and becomes lesser with the production of each successive units.
3. The slope of the Decision Curve is expressed as a percentage.
4. Learning Curve is also known as Experience Curve, Improvement Curve and Progress Curve.

Q.468. What are the distinctive features of Learning Curve Theory in a Manufacturing Environment?

1. In manufacturing a product, when the quantity produced doubles the absolute amount of cost increase will be successively smaller. However, the rate of decrease will remain fixed. This is the essence of the Learning Curve Theory.
2. Reduction in cost when output increases is due to the following special features of the manufacturing environment–
   (a) Better tooling methods are developed and used,
   (b) More productive equipments are designed and used to make the product.
   (c) Design bugs are detected and corrected,
   (d) Engineering Changes decrease over time.
   (e) Earlier teething problems are overcome. Management strives for better planning and control.
   (f) Rejections and rework tend to diminish over time.

   The reasons for such a reduction is that each unit will entail – (a) Less Labour, (b) Less Material, (c) More units produced from same equipment, and (Costs of fewer delays and less loss of time.

Q.469. List a few industrial /manufacturing applications or used of the Learning Curve. Mention some important applications of Learning Curve in Cost and Management Accounting.

1. **CVP Analysis:** Learning Curve helps to analyse CVP relationship during familiarization phase of product or process and thus it is very useful for cost estimates. Learning Curve also assists in forecasting.
2. **Budgeting and Profit Planning:** Learning Curve provides scientific ideas and sophistication for budgeting and profit planning. The Budget Team selects the costs that reflect Learning Effect, and incorporates it while developing budgets or when planning projects.
3. **Pricing Decisions:** Cost data adjusted for Learning Effect helps in proper pricing decisions.
4. **Product Design:** It helps Design Engineers in decision making based upon expected (predictable from past experience) rates of improvement.
5. **Contract Negotiations:** It helps the Government to negotiate Contracts. The Government receives full advantage of the decreasing unit cost in establishing the Contract Price.
6. **Setting Standards:** The Learning Curve provides the base to set standards for the Learning Phase.

Q.470. Explain Float and Types of Float.

Float: Float is the flexibility available in any activity which can be absorbed either by delaying that activity or by enlarging its duration.

There is no difference between Float and Slack. FLOAT refers to an activity and SLACK refers to an event.

1. **Total Float:** The total float of an activity represents the amount of time by which an activity can be delayed without delaying the project completion date.
   Total float=EF – LF
   Or = Es – Ls
2. **Free Float:** Free float is that portion of the total float within an activity can be manipulated without affecting the float of subsequent activities.
   Free float = Total float - Head slack
3. **Independence Float:** This is the amount of time an activities are completed as late as possible and all succeeding activities are completed as late as possible and all succeeding activities started as early as possible.
   Independence float = Free float - Tail slack
4. **Interfering Float:** Interfering float is that part of the total float which causes a reduction in the float of the successor activities.
   Interfering float = LF – Es

Q.471 Write short notes on Resource Smoothing / Leveling.

Resource refers to Materials, Men, Machinery, Money, Methods, etc. used in the activities of a Project. Different activities require different quantum of resources. The resource requirement on any day in a Project may not be uniform, e.g. 20 men required on the first day, 7 men required on the fourth day, etc:

Resource Smoothing is a network technique used for smoothening peak resource requirement during different periods / activities of the Project Network.

3. In Resource Smoothing, the Total Project Duration is maintained at the expected level, i.e. Normal Duration.
4. The resources .required for completing different activities of a Project are smoothened (averaged) by utilizing floats available on Non-Critical Activities.
5. Non-Critical Activities having floats are re-scheduled or shifted, so that a uniform demand on resources is achieved.
6. The Activity with the Maximum Total Float is generally considered first for re-scheduling / postponing.
7. The Critical Path. Activities should not be re-scheduled since Total Float = Zero and Project Duration will be extended in such a case.

Q.472. Distinguish Between PERT and CPM

Particulars	CPM	PERT
Event/Activity	CPM is activity oriented. Results of various calculations are considered in terms of activities.	PERT is event oriented.
Uncertainty	It is a determined model. It does not consider uncertainties involved in project completion.	It is probabilistic mode. It uses 3 estimates of activity time t_{or}, t_m, t_p, keeping time uncertainty in view.
Emphasis	It places dual emphasis on time and cost, and evaluates the trade-off between project cost and project time.	It is primarily concerned with time.
Nature of Projects	It is used for projects of repetitive nature, where one has prior experience of handling similar projects.	It generally used for new projects where time required for various activities are not pre-determined.

Q.473. A Project Manager has to manage various Projects. For each Project given below, you are required to advise him whether to use PERT or CPU and briefly state the reason:

Question	PERT/CPM	Reason
1. Project K is yet to begin. The Manager has recently successfully handled similar projects. He is able to break down the project into smaller modules and knows when he may comfortably finish each module.	CPM	Project is of repetitive nature and Manager has prior experience of handling similar projects.
2. Project L has been sanctioned some fixed amount. Though the Manager is familiar about what time it will take, he expects pressure towards the end to finish the project slightly earlier, by deploying additional resources to the Company.	CPM	As the Project might have to be completed earlier than expected, the Project Manager may concentrate on the Critical Path Activities first.
3. Project M is new to the Manager. He has never handled such a Project. He can break up the project into smaller modules, but even then, he is not sure of their exact times.	PERT	New Project where time required for various activities are not predetermined.
4. Project N has a limitation on the skilled workforce available. But the Manager knows from earlier experience, the slack on each event in the project. He is confident of handling the bottleneck of labour.	CPM	Project Manager can utilize large floats available on non-critical activities of the project, and cut down the demand on the resources.
5. Project O is a research project, bound to produce immense benefit to the Company in future.	PERT	New Research Project where time required for various activities are not pre-determined.

Q.474. Write short notes on Project Crashing.

1. Project Crashing is a Network Technique, with a focus on reducing the. Project Duration to the Optimum Level.
2. Reduction in Project Duration may involve extra costs. Hence, Project Crashing seeks to determine the Optimum Duration for the Project, i.e. time that corresponds to the Minimum Costs.
3. The following terms are associated with Project Crashing:
   (a) Normal Time: It is the normal time required to complete an activity at Normal Cost.

Q.475 Explain the meaning of a Linear Programming Problem.

1. **Meaning**: A Linear Programming Problem (LPP) is a mathematical model dealing with the use or allocation of certain scarce resources (i.e. Key Factor like Raw Materials, Labour Hours, Machine Time, Capital Availability, etc.) in the best possible manner in order to maximize profit or minimize cost.

2. **Conditions**: LPP consists of a particular class of programming problems, which meet the following conditions:-

(a) **Objective:** There must be a defined Objective, i.e. either Maximization of Profit (or Revenue or Income), or Minimization of Cost (or Time). The Objective Function is denoted by "Z". The Objective Function should be defined by use of a linear function involving the decision variables.

(b) **Variables:** There must be Decision Variables, e.g. products, time, processes, etc. which the decision-maker may use at different levels. These must be non-negative. These Decision Variables may be denoted by alphabets like a, b, c, etc. or x_1, x_2, x_3, etc.

(c) **Constraints:** There should be limitations / restrictions relating to the use of certain resources. These constraints are denoted by in equations having '≤' or '≥' sign. In some cases, the conditions can be stated using '=' sign also.

Q.476 List the areas of LPP Application:

1. Industrial Applications - Production Planning, Product-Mix, Blending, Trim Applications, etc.
2. Product Distribution - Transportation Applications.
3. Marketing Applications - Advertising Mix Problems.
4. Financial Applications - Investment Portfolio.
5. Administrative Applications - Personnel Assignment, Balancing Production, Inventories and Work-force.
6. Agriculture Applications.
7. Operational Scheduling Applications - Right Scheduling Applications.

Q.477. What are the disadvantages of LPP?

1. **Existence of Non-Linear Equations:** The primary requirement of Linear programming is that the objective function and constraint function should be linear. Practically, Linear Relationships do not exist in all cases.

2. **Interaction between Variables:** Linear Programming fails in a situation where non-linearity in the equations emerge due to joint interactions between some of the activities, e.g. total measure of effectiveness or total usage of some resource.

3. **Fractional Values:** In LPP, fractional values are permitted for the Decision Variables. However, many decision problems require the solution for Decision Variable to be in non-fractional values. Rounding-off the values obtained by LP techniques may not result in an optimal solution in such cases.

4. **Knowledge of Co-efficient:** It may not be possible to state all co-efficients in the Objective Function and Constraints with certainty. Also, Variables in most cases are random variables with an individual probability distribution for the values.

Q.478. Write short notes on Slack Variables.

A Variable added to the LHS of every '5' inequality is called as a Slack Variable. The purpose of introducing the Slack Variable is to convert the inequality constraint into an equality.

Stack Variable is an idle or unused resource represented by a Constraint.

Since it represents an unused resource, a Slack Variable has to be positive (i.e. non-negative).

Contribution or Profit per unit of a Slack Variable is zero, since profits are not made on unused resources. Hence, the Co-efficient of a Slack Variable in the Objective Function is always Zero.

The co-efficient of a Slack Variable in the Constraint will be "One". It is taken as the Basic Variable in the Initial Simplex Table.

Q.479. Write short notes on Surplus Variables.

A Variable subtracted from the LHS of every '≥' inequality is called as a Surplus Variable. The purpose of introducing the Surplus Variable is to convert the inequality constraint into equality.
Surplus Variable is the excess amount of resources utilized over and above the given level.

Since it represents a resource (excess utilized), a Surplus Variable has to be positive (i.e. non-negative).

Contribution or Profit per unit of a Surplus Variable is zero, since profits are not made on excess utilization of resources. Hence the Co-efficient of a Surplus Variable in the Objective Function is always Zero.

The co-efficient of a Surplus Variable in the constraint will be "Negative One" (–1). It cannot be taken as the Basic Variable in the Initial Simplex Table, since it does not form an Unit Matrix.

Q.480. Discuss the application of the learning curve.

Application of Learning curve: Learning curve helps to analyze cost-volume profit relationships during familiarization phase of product or process to arrive at cost estimates.

It helps in budgeting and profit planning.

It helps in pricing and consequent decision making – e.g. acceptance of an order, negotiations in establishing contract prices etc. with the advantage of the knowledge of decreasing unit cost.

It helps in setting standards in the learning phase.

Q.481. What are the distinctive features of learning curve theory in manufacturing environment? Explain the learning curve ratio.

As the production quantity of a given item is doubled, the cost of the item decreases at a fixed rate. This phenomenon is the basic premise on which the theory of learning curve has been formulated. As the quantity produced doubles, the absolute amount of cost increase will be successively smaller but the rate of decrease will remain fixed. It occurs due to the following distinctive features of manufacturing environment:

(i) Better tooling methods are developed and used.
(ii) More productive equipments are designed and used to make the product.
(iii) Design bugs are detected and corrected.
(iv) Engineering changes decrease over time.
(v) Earlier teething problems are overcome.
(vi) Rejections and rework tend to diminish over time.

In the initial stage of a new product or a new process, the learning effect pattern is so regular that the rate of decline established at the outset can be used to predict labour cost well in advance. The effect of experience on cost is summarized in the learning curve ratio or improvement ratio.

$$\text{Learning curve ratio} - \frac{\text{Average labour cost of first 2N units}}{\text{Average labour cost of first N units}}$$

For example, if the average labour cost for the first 500 units is ` 25 and the average labour cost for the first 1,000 units is ` 20, the learning curve ratio is (` 20/25) or 80%. Since the average cost per unit of 1,000 units is ` 20, the average cost per unit of first 2,000 unit is likely to be 80% of ` 20 or ` 16.

Q.482. The following information is provided by a firm. The factory manager wants to use appropriate average learning rate on activities, so that he may forecast costs and prices for certain levels of activity.

(i) A set of very experienced people feed data into the computer for processing inventory records in the factory. The manager wishes to apply 80% learning rate on data entry and calculation of inventory.

(ii) A new type of machinery is to be installed in the factory. This is patented process and the output may take a year for full fledged production. The factory manager wants to use a learning rate on the workers at the new machine.

(iii) An operation uses contract labour. The contractor shifts people among various jobs once in two days. The labour force performs one task in 3 days. The manager wants to apply an average learning rate for these workers.

You are required to advise to the manager with reasons on the applicability of the learning curve theory on the above information.

The learning curve does not apply to very experienced people for the same job, since time taken can never tend to become zero or reduce very considerably after a certain range of output. This is the limitation of the learning curve.

(i) Data entry is a manual job so learning rate theory may be applied. Calculation of inventory is a computerized job. Learning rate applies only to manual labour.

(ii) Learning rate should not be applied to a new process which the firm has never tried before.

(iii) The workers are shifted even before completion of one unit of work. Hence learning rate will not apply.

Q.483. How would you use the Monte Carlo Simulation method in inventory control?

The Monte Carlo Simulation:

It is the earliest mathematical Model of real situations in inventory control: Steps involved in carrying out Monte Carlo simulation are:

- Define the problem and select the measure of effectiveness of the problem that might be inventory shortages per period.
- Identify the variables which influence the measure of effectiveness significantly for example, number of units in inventory.
- Determine the proper cumulative probability distribution of each variable selected with the probability on vertical axis and the values of variables on horizontal axis.
- Get a set of random numbers.
- Consider each random number as a decimal value of the cumulative probability distribution with the decimal enter the cumulative distribution plot from the vertical axis. Project this point horizontally, until it intersects cumulative probability distribution curve. Then project the point of intersection down into the vertical axis.
- Then record the value generated into the formula derived from the chosen measure of effectiveness. Solve and record the value. This value is the measure of effectiveness for that simulated value. Repeat above steps until sample is large enough for the satisfaction of the decision maker.

Q.484. State major reasons for using simulation technique to solve a problem.

Reasons:

(i) It is not possible to develop a mathematical model and solutions with out some basic assumptions.

(ii) It may be too costly to actually observe a system.

(iii) Sufficient time may not be available to allow the system to operate for a very long time.

(iv) Actual operation and observation of a real system may be too disruptive.

Q.485. What are the steps involved in carrying out Monte Carlo simulation model?

Steps involved in Monte Carlo simulation are:

(i) To select the measure of effectiveness of the problem, that is, what element is used to measure success in improving the system modeled. This is the element one wants to maximize or minimize.

(ii) Identifying the variables which influence the measure of effectiveness significantly.

(iii) Determining the proper cumulative probability distribution.

(iv) To get a set of random numbers.

(v) Consideration of each random number as a decimal value of the cumulative probability distribution. With the decimal, enter the cumulative distribution plot from the vertical axis, Project this point horizontally, until it intersects cumulative probability distribution curve.

(vi) Recording the value generated in step(v) into the formula derived from the chose measures of effectiveness. Solve and record the value.

(vii) Repeating steps (V) and (VI) until sample is large enough for the satisfaction of the decision maker.

Q.486. What are the steps in Monte Carlo Simulation

The steps involved in carrying out Monte Carlo Simulation are:

(i) Select the measure of effectiveness of the problem.

(ii) Identify the variables which influence the measure of effectiveness significantly.

(iii) Determine the proper cumulative probability distribution of each variable selected under step (ii) Plot these, with the probability on the vertical axis and the values of variables on horizontal axis.

(iv) Get a set of random numbers.

(v) Consider each random number as a decimal value of the cumulative probability distribution. With the decimal, enter the cumulative distribution plot from the vertical axis. Project this point horizontally, until it intersects cumulative probability distribution curve. Then, project the point of intersection down into the vertical axis.

(vi) Record the value (or values if several variables are being simulated) generated in step (v) into the formula derived from the chosen measure of effectiveness. Solve and record the value. This value is the measure of effectiveness for that simulated value.

(vii) Repeat steps (v) and (vi) until sample is large enough for the satisfaction of the decision maker.

Q.487. What do you mean by a dummy activity? Why is it used in networking?

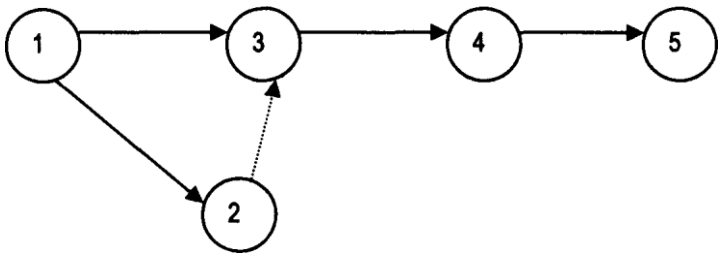
Dummy activity is a hypothetical activity which consumes no resource or time. It is represented by dotted lines and is inserted in the network to clarify an activity pattern under the following situations.

(i) To make activities with common starting and finishing events distinguishable.

(ii) To identify and maintain the proper precedence relationship between activities that are not connected by events.

(iii) To bring all "loose ends" to a single initial and single terminal event.

e.g.



Dummy (2) — (3) is used to convey that can start only after events numbered (2) and (3) are over:

Q.488. Explain the following in the context of a network:

(i) Critical path

(ii) Dummy activity.

(i) Critical Path:

Critical Path is a chain of activities that begin with the starting event and ends with ending event of a particular protect. It is that path that runs through a network with the maximum length of time or It indicates the maximum possible lime required for completion of a project. Critical path indicates the minimum time that will be required to complete a project. It is determined after identifying critical events. Critical path goes through critical events.

(ii) Dummy Activities:

Dummy Activity is that activity which does not consume time or resources. It is used when two or more activities have same initial and terminal events. As a result of using dummy activities, other activities can be identified by unique end events.
These are usually shown by arrows with dashed lines.

Q.489. What are the Steps in PERT/CPM Model?

Steps in PERT/CPM Model:

PERT/CPM model building consists of following five steps:

1. Analyse and break down the project in terms of specific activities and/or events.
2. Determine the interdependence and sequence of specific activities and prepare a net-work.
3. Assign estimates of time, cost of both to all the activities of the network.
4. Identify the longest or critical path through the network.
5. Monitor, evaluate and control the progress of the project by replanning, rescheduling and reassignment of resources.

Q.490. What are the Steps for solving the Assignment Problem?

Steps for solving the Assignment Problem
Assignment problem can be solved by applying the following steps:

Step 1: Subtract the minimum element of each row from all the elements in that row. From each column of the matrix so obtained, subtract its minimum element. The resulting matrix is the starting matrix for the following procedure.

Step 2: Draw the minimum number of horizontal and vertical lines that cover all the zeros. If this number of lines is *n*, order of the matrix, optimal assignment can be made by skipping steps 3 and 4 and proceeding with step 5. If, however, this number is less than *n*, go to the next step.
Step 3: Here, we try to increase the number of zeros in the matrix. We select the smallest element out of these which do not lie on any line. Subtract this element from all such (uncovered) elements and add it to the elements which are placed at the intersections of the horizontal and vertical lines. Do not alter the elements through which only one line passes.

Step 4: Repeat steps 1, 2 and 3 until we get the minimum number of lines equal to *n*.

Step 5: (A) Starting with first row, estimate all rows of matrix in step 2 or 4 in turn until a row containing exactly one zero is found. Surround this zero by, indication of an assignment there. Draw a vertical line through the column containing this zero. This eliminates any confusion of making any further assignments in that column. Process all the rows in this way.

(B) Apply the same treatment to columns also. Starting with the first column, examine all columns until a column containing exactly one zero is found. Mark and draw a horizontal line through the row containing this marked zero. Repeat steps 5A and B, until one of the following situation arises:

(i) No unmarked ( ) or uncovered (by a line) zero is left.

(ii) There may be more than one unmarked zero in one column or row. In this case, put around one of the unmarked zero arbitrarily and pass 2 lines in the cells of the remaining zeros in its row and column. Repeat the process until no unmarked zero is left in the matrix.

Q.491. How do you know whether an alternative solution exists for a transportation problem?

The Δi_j matrix = $\Delta i_j = Ci_j - (u_i + v_j)$

Where c_i is the cost matrix and $(u_i + v_j)$ is the cell evaluation matrix for allocated cell.

The Δi_j matrix has one or more 'Zero' elements, indicating that, if that cell is brought into the solution, the optional cost will not change though the allocation changes.

Thus, a 'Zero' element in the Δi_j matrix reveals the possibility of an alternative solution.

Q.492. Explain the term Degeneracy Concept in transportation problem. How can this be solved?

A transportation problem's solution has m+n-1 basic variables, (where m, n are the number of rows and columns) which means that the number of occupied cells in such a solution is one"less than the number of rows and number of columns.

When the number of occupied cells in a solution is less than m+n-1, the solution is called a degenerate solution.

Such a situation is handled by introducing an infinitesimally small allocation 'e' in the least cost and independent cell.

If the number of occupied cells < m+n-1 by one, then only one 'e' needs to be introduced. If the number of occupied cells is less by more than one, to the extent of shortage, 'e's will have to be introduced till the condition that no. of occupied cells = m+n-1. For e.g. if no. of occupied cells in a solution is 7 and we have m+n-1 = 9, then, we have to introduce two quantities of 'e', say ei and e2 in 2 of the least cost independent cells.

Degeneracy occurs because in any particular allocation (earlier than the last allocation), the row and column totals get simultaneously fulfilled. (In the last allocation, it is always that row and column get fulfilled). Then, we have a degeneracy by one number, i.e. no. of occupied cells +1= m+n-1. We need to put one 'a'. In the subsequent allocation, if again row and column totals get fulfilled simultaneously, again there will be a shortage of occupied cells and another 'e' will be required.

Due to this concept, an assignment problem, solved by transportation technique taking demand quantity = supply quantity = 1 in every now and column will require an 'e' for each allocation other than the last one. For e.g. in a 5 x 5 assignment problem, there are 4 allocations other than the last one, therefore, 4 'e's will be required.i.e. m + n -1 will be 5+5-1, =9, whereas, the no. of occupied cells will be 5.To resolve the degeneracy, we will need 4 'e's.

The 'e' has to be placed in the least cost independent cell, for arriving at the optimal solution as early as possible. If, by mistake, we place 'e' in the second least cost but independent cell, after the u;, vi step, the 'e' will be shifted to the least cost independent cell, thereby necessitating one more iteration. This is similar to the simplex table. If we bring in a wrong variable by mistake, it will go out in the next iteration. The only thing is that the solution will be reached later.

Q.493. Will the initial solution for a minimization problem obtained by Vogel's Approximation Method and the Least Cost Method be the same? Why?

The initial solution need not be the same under both methods.
Vogel's Approximation Method uses the differences between the minimum and the next minimum costs for each row and column.

This is the penalty or opportunity cost of not utilising the next best alterative. The highest penalty is given the 1st preference. This need not be the lowest cost.

For example if a row has minimum cost as 3, and the next minimum as 2, penalty is 1; whereas if another row has minimum 4 and next minimum 6, penalty is 2, and this row is given preference. But least cost given preference to the lowest cost cell, irrespective of the next cost.

Vogel's Approximation Method will to result in a more optimal solution than least cost.

They will be the same only when the maximum penalty and the minimum cost coincide.

Q.494 What do you mean by Degeneracy in transportation problem? How this can be solved?

In a transportation problem, if the no of occupied cells is less than m+n+1, such a solution, in transportation problem is called as degeneracy. Degeneracy can occur two ways:

i) The initial basic solution can turn out to be a degenerate solution. Or
ii) an improved solution can turn out to be a degenerate solution.

This can be solved by introducing an infinitesimally small allocation e (epsilon) to least cost empty cell, so that the total number of allocated cells is equal to m+n+1 independent cells.

Q.495. State the methods in which initial feasible solution can be arrived at in a transportation problem

The methods by which initial feasible solution can be arrived at in a transportation model are as under:

(i) North West Corner Method.

(ii) Least Cost Method

(iii) Vogel's Approximation Method (VAM)

Q.496. What are the steps in Vogel's Approximation Method (VAM)

VAM entails the following steps:

Step 1: For each row of the transportation table identify the smallest and next smallest costs. Find the difference between the two costs and display it to the right of that row as "Difference" (Diff.) Likewise, find such a difference for each column and display it below that column. In case two cells contain the same least cost then the difference will taken as zero.

Step 2: From amongst these row and column difference, select the one with the largest difference. Allocate the maximum possible to the least cost cell in the selected column or row. If there occurs a tie amongst the largest difference, the choice may be made for a row or column which has least cost. In case there is a tie in cost cell also, choice may be made for a row or column by which may be made for a row or column by which maximum requirement is exhausted. Match the column or row containing this cell whose totals have been exhausted so that this column or row is ignored in further consideration.

Step 3: Recompute the column and row differences for the reduced transportation table and go to step 2. Repeat the procedure until all the column and row totals are exhausted.

Q.497. What are Algorithm involved under North-West Corner Rule

Steps:

1. Before allocation ensure that the total on demand & supply of availability and requirement are equal. If not then make same equal.

2. The first allocation is made in cell occupying the upper left hand corner of the matrix.
   The assignment is made in such a way that either the resource availability is exhausted or the demand at the first destination is satisfied.

3.(a). If the resource availability of the row one is exhausted first, we move down the second row and first column to make another allocation which either exhausts the resource availability of row two or satisfies the remaining destination demand of column one.

(b). If the first allocation completely satisfies the destination demand of column one, we move to column two in row one, and make a second allocation which either exhausts the remaining resource availability of row one or satisfies the destination requirement under column two.

Q.498. Write short notes on the characteristics of the dual problem.

Characteristics of the dual problem:

1. For any linear programming model called primal model, there exists a companion model called the dual model.
2. The number of constraints in the primal model equals the number of variables in the dual model.
3. The number of variables in the primal problem equals the number of constraints in the dual model.
4. If the primal model is a maximization problem then the dual model will be of the form less than or equal to, "≤" while the restrictions in the dual problem will be of the form-greater than or equal to, "≥".
5. The solution of the prima; model yields the solution of the dual model. Also, an optimal simplex table for the dual model yields the optimal solution to the primal model. Further, the objective functions of the two optimal tables will have identical values.
6. Dual of the prima's dual problem is the primal problem itself.
7. Feasible solutions to a primal and dual problem are both optimal if the complementary slackness conditions hold, that is, (value of a primal variable) x (value of the corresponding dual surplus variable) = 0 or (value of a primal slack variable) x (value of the corresponding dual variable) = 0.

   If this relationship does not hold, than either the, primal solution or the dual solution or both are no optimal.
8. If the primal problem has no optimal solution because of infeasibility, then the dual problem will have no optimal solution because of unboundedness.
9. If the primal has no optimal solution because of unboundedness, then the dual will have no optimal solution because of infeasibility.

Q.499. What are the practical applications of Linear programming?

Linear programming can be used to find optional solutions under constraints.

In production:

- pdt. mix under capacity constraints to minimise costs/maximise profits along with marginal costing.

- Inventory management to minimise holding cost, warehousing / transporting from factories to warehouses etc.

Sensitivity Analysis: By providing a range of feasible solutions to decide on discounts on selling price, decisions to make or buy.

Blending: Optional blending of raw materials under supply constraints.

Finance: Portfolio management, interest/receivables management.

Advertisement mix: In advertising campaign – analogous to pdn. management and pdt. mix.
Assignment of personnel to jobs and resource allocation problems.

However, the validity will depend on the manager's ability to establish a proper linear relationship among variables considered.

Q.500. Explain Concept of Learning Curve?

Answer: In case of a job which is repetitive in nature and the working time is not scheduled by the speed of machinery, an individual is likely to become more confident and knowledgeable about his work as he gains more experience. As a consequence of his learning effect he can do the job in less time than when he initially commenced the first job. Ultimately when he has acquired more experience the learning process will lend to stop. The speeding up of a job with repeated performance is known as learning effect or learning curve effect. The reduction in the required labour time thus can be quantified.

Learning, curve theory was first developed in the United States aircraft industry. It has been extended to other labour-oriented industries and has been extended to no production activities such as marketing efforts. Learning curve effect is not only restricted to individual but it also applies to a group of workers. However the learning effect is not an automatic natural phenomenon. All production process win not show rate of increased efficiency and there may be cases where the differences in the learning rates will be substantial.

The quantitative average time per unit produced is normally considered to be reduced by a constant percentage every time total output of the product is doubled. The following table the working of which is based on 80% learning effect can exemplify this.

Number of Units (Cumulative)	Cumulative average time per unit in hours	Total Time	Incremental time Time for additional units.
1	100	100	--
2	80	160	60
4	64	256	96
8	51.2	409.6	1536

Thus Learning curve can be expressed as $y = a x^5$

Learning curve theory can be used:-

A. To calculate the incremental cost of making extra units of a particular products.
B. To set standards for labour,
C. To prepare realistic production budgets and to report labour cost variances.
D. To quote contact price.

Direct labour cost and time as well as variable overhead costs, which vary with direct labour hours are affected by learning curve. On the other hand material cost will not be affected. In case where absorption costing system in vogue, the fixed overhead application rate may be affected due to higher production or use of capacity. Besides the above cases where learning curve will have effect directly a management accountant should bear in some other considerations, such as: -

1. Sales promotion and advertising expenditure.
2. delivery date commitments.
3. budgeting and standard cost.
4. Cash budget,
5. Work scheduling and overtime decisions, and
6. Economics of scale.

Q.501. What are the Limitations of Learning Curve?

Answer: Which there are certain distinct advantages of incorporating; earning curve theory in practice, It suffers from certain limitations, which must be kept in view: -

1. Learning curve phenomenon is not always present Before it is assumed, there should be evidence/precedence to prove that this assumption will hold good in estimating production times and costs for new items of production.
2. One glaring shortcoming of this theory is that it assumes stable conditions at work. In daily life, it is not always practicable especially due to labour turnover.
3. Time-break between repeating production should not be too long or the workers will forget and learning process will have to begin all over again.

4. It is not always possible to get enough accurate data to decide what the learning curve is.

5. The theory also provides that constant stage follows the learning stage. At what point of time, "constant stage" precisely begins, is not easy to ascertain.

6. Normally, the trade unions will not accept gradual reduction in production time per unit. In this type of situation, management may try to establish a low standard time per unit from the onset. This will lead to adverse efficiency variances, until learning effect has taken place.

7 if there is productivity bonus incorporation of learning effect may frustrate worers in learning stage, as it may appear as a threat to the size of bonus, that they may earn.
8. Production techniques production design, etc., almost always continuously change. This may lead to a situation, where it will take a long time for a "standard" production method to emerge; to which learning effect will apply.

Q.502. What is the meaning of Linear Programming?

Answer: The method of maximizing (or minimizing) a linear function of several variables (called objective function) subject to the condition that the variables are non-negative and satisfy a set of linear equations and/or in equations (called Linear Constraints) is given the name LINEAR PROGRAMMING. The term linear implies that all the mathematical relations used in the problem are linear relations, while the term programming refers to the method of determining a particular programme or plan of action. The two together have the technical meaning stated above.

Thus linear programming is a mathematical way of planning, which involves three steps:

1. To identify the objective function as a linear function of its variables and state all the limitations on resources as linear equation and/or in equations (constraints).
2. To Use mathematical techniques to find all possible sets of values of the variables (unknowns), satisfying the constraints.
3. To Select the particular set of values of the variables obtained in (2) that lead to our objective-maximum profit, least cost, etc.

The result at step (1) above is called a Linear programming problem. The set of solutions obtained in (2) is called the set of feasible solutions and the solution finally selected in step. (3) is known as the optimum (best or optimal) solution of the Linear Programming problems.

BASIC REQUIREMENTS: -

Regardless of the way one defines linear programming certain basic requirement are necessary before this technique can be employed to optimization problems.

These are:

1. **Decision variables and their relationship.** The decision variable refers to any activity (product, project, etc) that is competing with either activity for limited resources. The relationship among these variable should be linear.

2. **Well-defined objective function.** A clearly defined objective must be stated which may be either to maximize contribution by utilizing the available resources, or it may be to produce at the lowest possible cost by using a limited amount of productive factors.

3. **Presence of constraints or restriction:** There must be limitations on resources (like production, capacity, manpower, time, machines, markets etc. that are to allocate among various competing activities.

4. **Quantitative measurement of problem element:** It is essential that each element of the problem is capable of being quantified. Numerical data must depict the problem in terms of relationship involved as well as among the elements considered. Thus, accurate means of measurement, such as rupees, acres, hours, kilogram must be brought into computation.

1. **Alternative courses of action.** There must be alternative courses of action to choose from e.g. it must be possible to make a selection between various combinations of the productive factors such as men, machines, materials, markets, etc.

2. **Non-negative restrictions.** All decision variables must assume non-negative values, as negative value of physical quantities is an impossible situation.

3. **Linearity.** The basic requirements of a linear programming problem are that both the objective and constraints must be expressed in terms of linear equations or inequalities. It is well known that if the number of machines in a plant is increased, the production in the plant also proportionately increases. Such a relationship, giving corresponding increment in one variable for every increment in the other, is called linear and can be graphically represented in the form of a straight line.

BASIC ASSUMPTIONS: -

1. **Proportionality.** We assume the proportionality exists in the objective and constraints, i.e. the measure of effectiveness profit or loss) in the objective function and amount of each resource used must be proportional to the value of each decision variable considered individually. For example if we want to double the output we simply double the required resources.

2. **Additives.** It means that sum of the resources used by different activities must be equal to the total quantity of resources used by each activity for all the resources individually and collectively. In other words interaction among the activities of the resources does not exist.

3. **Divisibility.** This assumption implies that solutions need not be in whole numbers (integers). Instead they are divisible and may take any fractional value. If a fraction of a product cannot be produced (like one-fourth of a bus), an integer-programming problem exists.

4. **Certainty.** We assume that conditions of certainty exist, i.e. the coefficients in the objective function and constraints are completely known (deterministic) and do not change during the period being studied, e.g. profit per unit of each product, amount of resources available are fixed during the planning period.

5. **Finiteness**. An optimum solution cannot be computed in the situations where there are an infinite number of alternative activities and resource restrictions.

6. **Optimality** in Linear programming problem, the maximum profit solution or the minimum cost solution always occurs at a corner point of the set of feasibte solutions.

APPLICATIONS OF LINEAR PROGRAMMING

The use of LP is made in regard to the problems of allocations, assignment transportations etc. But the most important of these is that of allocation of scare resources on which we shall concentrate. Some allocation problems are as follows: -

1. Devising of a production schedule that could satisfy future Demands (seasonal or otherwise) for the firm's product and at the same time minimize production (including inventory) costs.
2. Choice of investment from a variety of shares and debentures so as to maximize return on investment.
3. Allocation of a limited publicity budget on various heads in order to Maximize its effectiveness.
4. Selection of the product-mix to make the best use of available Resources like machine man-hours etc, with a view to maximize Profits.
5. Selecting the advertisement mix that will maximize the benefit Subject to the total advertising budget, Linear Programming can be Effectively applied.
6. Determination of the distribution system that will minimize Transportation costs from several warehouses to various markets.
7. Designing routing and assignment problems.
8. Manufacturing problems. To find the number of items of each type that should be manufactured so as to maximize the profit subject to production restrictions imposed by limitations on the use of machinery and labour.
9. Transportation problems. To find the least expensive way of transporting shipments from the warehouses to customers.
10. Diet Problems. To determine the minimum requirement of nutrients subject to availability of foods and their prices.
11. Blending Problems. To determine the optimum amount of several constituents to be used in producing a set of products while determining the optimum quantity of each product to produce.
12. Assembling Problems. To have the best combination of basic components to produce goods according to certain specifications.
13. Production problems. To decide the production schedule to satisfy demand and minimize cost in face of fluctuating rates and storage expenses.

14. Job assigning problems. To assign job to workers for maximum effectiveness and optimum results subject to restrictions of wages and other costs.
15. Trim-Loss problems. To determine the best way to obtain a variety of smaller rolls of paper from a standard width of roll that is kept in stock and at the same time, minimize wastage.

ADVANTAGES AND LIMITATIONS OF LINEAR PROGRAMMING:-

Main advantages of L.P. are as follows:

1. Linear Programming helps in attaining the optimum use of productive factors. It also indicates how a decision maker can employ his productive factors effectively by selecting and distributing these elements.
2. Linear programming technique improves the quality of decisions. Users of this technique become more objective and less subjective
3. Highlighting of bottlenecks in the production processes is one of the most significant advantages of this technique. For example, when bottlenecks occur, some production factors (say machines) cannot meet demand while other remains idle for some of the time.
4. Linear programming provides possible and practical solutions since there might be other constraints operations outside of the problems, which must be taken into account.

Linear programming suffers from certain limitations which are given below: -

1. In reality, objectives functions and constraints cannot be expresses in linear form.
2. In linear Programming problem, fractional values are permitted for the decision variables. However many decision problems require that the decision variables should be obtained in non-fractional values.
3. The co-efficient of basic variables cannot be determined with certainty however; they can be stated only with probability.
4. Where a problem consists of inflicting multiple objectives, this technique cannot provide a solution.
5. The linear programming does not take into consideration the effect of time and uncertainty.
6. Parameters appearing in the LP model are assumed to be constant but in real life situations they are frequently neither known nor constant.
7. In case of large, complex and constrained problems, computational problems are enormous.

Q.503. Write Short notes on simulation and its applications?

Answer: It is a natural and logical extension to the analytical and mathematical models inherent in OR. There are many situations, which cannot be represented mathematically due to the stochastic nature of the problem, the complexity of problem formulation or the interactions needed to adequately describe the problem under study. For many situations defying mathematical formulation, simulation is the only tool that might be used to obtain relevant answers.

According to T.H. Taylor: - "Simulation is a numerical technique for conducting experiments on a digital computer which involves certain types of mathematical and logical relationships necessary to describe the behavior and structure pf a compels real word system over extended period of time."

In other words, it is a quantitative technique that utilities a computerized mathematical model in order to represent actual decision making under conditions of uncertainty for evaluating alternative courses of actions based upon facts and assumptions.

Simulation provides a trial and error movement toward the optimal solution. The decision maker selects an alternative, experiences the effect *of* the selection and then improves the selection. In this way the selection is adjusted until it approximates the optimal solutions. The simulation thus avoids the cost of real-world experimentation when the best solution is found.

Thus, through simulation, one can study the effects of certain informational, organizational and environmental changes on the operation of a system by making alterations in the model of the system and by observing the effects of these alterations on the system's behavior. A detailed observation of the system may lead to a better understanding of the system and to suggestions for improving it, which otherwise would be unobtainable. Simulation can serve as a" Preservice test" to try out new policies and decision rules for operating a system, before running the risk of experimenting on the real system. When new elements are introduced into a system, simulation can be used to anticipate bottlenecks and other problems that may arise in the behavior of the system.

Applications of Simulation: -

Simulation has innumerable applications. For example it can be used for learning about the operating characteristics of a new airplane by simulating flight conditions in a wind tunnel, on electronic or hydraulic analog models of production processes or economic systems, or on mathematical models of such real-life systems as inventory control, production scheduling network analysis and so on. It can also be used for planning military strategy, traffic control management games and role playing, medical diagnosis, hospital emergency facilities, gambling and analysis, location analysis for example determining optional location for plants and ware houses evaluation of industrial and commercial policies.

Q.504. What are the steps in Simulation?

Answer: Steps in the simulation process:

(1) Define the problem and system you intend to simulate.
(2) Formulate the model you intend to use.
(3) Test the model, compare with behavior of the actual problem environment.
(4) Identify and collect data to test the model.
(5) Run the simulation
(6) Analyse the results of the simulation and, if desired change the solution you are evaluating.
(7) Rerun the simulation to tests the new solution.

Validate the simulation i.e. increase the chances of valid inferences

Q.505. Advantages of SIMULATION.

Answer: Advantages of simulation are enumerated below:

1. SIMULATION techniques allow experiments with a model of the system rather than the actual operating system. Sometimes experimenting with the actual system itself could prove to be too costly and, in many cases too disruptive. For example if you are comparing two ways of providing food service in a hospital , the confusion that would result from operating two different systems long enough to get valid observations might be too great. Similarly the operation of a large computer center under a number of different operating alternatives might be too expensive to be feasible.

2. The non-technical manager can comprehend simulation more easily than a complex mathematical model. Simulation does not require simplifications and assumptions to the extent required in analytical solutions. A simulation model is easier to explain to management personnel since it is a secretion of the behavior of some system or process.

3. Sometimes there is not sufficient time to allow the actual system to operate extensively. For example if we were studying long-term trends in world population. We simply could not wait the required number of years to see results. Simulation allows the manager to incorporate time into an analysis. In a computer simulation of business operation the manager can compress the result of several years or periods into a few minutes of running time.

4. Simulation allows a user to analyse these large complex problems for which analytical results are no: available. For example in an inventory problem if the distribution for demand and lead time for an item follow a standard distribution, such as the poison distribution, then a mathematical or analytical solution can be found. However when mathematically convenient distributions are not applicable to the problem, an analytical analysis of the problem may be impossible. A simulation model is a useful solution procedure for such problems.

Q.506. Define a project can briefly explain the four common implications which characterised a project and state the five steps of the working methodology of critical path analysis.

Answer: A Project can be defined as a set of activities or jobs that are performed in a certain sequence determined logically or technologically and it has to be completed within one(i) specified time, (ii) a specified

Cost and (iii) meeting the performance standards. Examples of a project from fairly diverse filled could be cited. Some of them are given below:

1:- Introducing a new product in the market.

2:- Construction of a new bridge over a river of construction of a 25 - storied building.

3:- Executing a large and complex order on jobbing production,

4:- Sending a space craft to the mars.

All these projects are characterised by the following set of common implications, although they pertain to widely different fields.

(1) **The large scale characteristics:** These projects are generally unusually large and complex thousand of suppliers, workers and other categories of persons are involved and their efforts have to be coordinated for completion of the project.

(2) **The non recurring characteristics:** These projects are generally of a onetime nature. Neither in the past, nor in the future they are likely to undertaken substantially in the same form.

(3) Uncertain the critical dates: During of the various activities involved in such projects are usually uncertain. Further in such type of projects many critical dates exits by which operation must be completed in order to complete the entire project on schedule.

(4) Completion dead line: The Fourth distinct feature of these projects is that there is deadline for the completion of the entire project m case of any delay in the completion of the project some penalty is levied for such delay beyond the dead line.

The, working methodology of critical path analysis (CPA) which included both CPM and PERT consists of following five steps:

1:- Analysis and breakdown the project in terms of specific activities and/or events.

2:- Determine the interdependence and sequence of specific activities and prepare a network.

3:- Assign estimates of time, cost or both to all the activities of the network.

4:- Identify the longest or critical path through the network.

5:- Monitor evaluate and control the progress of the project *by* re-planning rescheduling and reassignment of resources.

Q.507. Will the initial solution for a minimization problem obtained by Vogel's Approximation Method and the Least Cost Method be the same? Why?

The initial solution need not be the same under both methods.

Vodel's Approximation Method uses the differences between the minimum and the next minimum costs for each row and column.

This is the penalty of opportunity cost of not utilizing the next best alternative. The highest penalty is given the 1st preference. This need not be the lowest cost.

For example if a row has minimum cost as 3, and the next minimum as 2, penalty is 1; whereas if another row has minimum 4 and next minimum 6, penalty is 2, and this row is given preference. But least cost given preference to the lowest cost cell, irrespective of the next cost.

Vogel's Approximation Method will to result in a more optimal solution than least cost.

They will be the same only when the maximum penalty and the minimum cost coincide.

Q.508 In an assignment problem to assign job to men to minimize the time taken, suppose that one man does not know how to do a particular job, how will you eliminate this allocation from the solution?

In an assignment minimization problem, if one task cannot be assigned to one person, introduce a prohibitively large cost for that allocation, say M, where M has a high the value. Then, while doing the row minimum and column minimum operations, automatically this allocation will get minimized.

Q.509. State the types of errors in logical sequencing may arise while drawing a network diagram?

Generally three types of errors in logical sequencing may arise while drawing a network diagram, particularly when it is a complicated one. These are known as looping, dangling and redundancy.

(1) **Looping:** Normally in a network, the arrow points are from left to right. This convention is to be strictly adhered, as this would avoid illogical looping. Looping error is also known as Cycling error.

(2) **Dangling:** Activity which is not connected to any of the intermediate events or end event is called dangling activity. The situation represented by the following diagram is also at fault, since the activity represented by the dangling arrow 9-11 is undertaken with no result.

To overcome the problem arising due to dangling arrows, following rules may be adopted:

(i) All events, except the first and the last, must have at least one activity entering and one activity leaving them, and

(ii) All activities must start and finish with an event.

(3) **Redundancy:** When dummy activities are inserted in a network diagram unnecessarily, this type of error is called error of redundancy. It is shown in the following figure:

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