Paper-15 : MANAGEMENT ACCOUNTING–ENTERPRISE PERFORMANCE MANAGEMENT

Q. 1. (a) Expand the following abbreviations :

   (i) **CRP**

   (ii) **DBR**

   (iii) **DRP**

   (iv) **PLCM**

   (v) **SQC**

   (vi) **EFQM**

   (vii) **DMAIC**

   (viii) **JUSE**

Q. 1. (b) Define the following terms :

   (i) **V in VAT Analysis**

   (ii) **McKinsey's 7s Framework**

   (iii) **Bench Marking**

   (iv) **Contribution Approach**

   (v) **Talent Drain**

Q. 1. (c) State if each of the following statements is True or False.

   (i) **Value Analysis process is a less important tool than Function Analysis System Technique**

   (ii) **The term value has four different meanings-exchange value,cost value,use value, wealth value**

   (iii) **Internal Quality costs consists of Preventive Costs,Appraisal Costs and Failure Cost**

   (iv) **The phrases – right first time or zero defects-were promoted by the Japanese quality expert Kaoru Ishikawa.**

   (v) **The Balance Score Card(BSC) puts more stress on financial parameters than on non financial parameters since its objective is the growth of the organization.**

   (vi) **Theory Y style of management is a highly autocratic style.**

   (vii) **The matrix organization structure is suitable for large projects.**

   (viii) **The key factors of Theory of Constraints are contribution and profit.**

   (ix) **Life Costing is a technique to establish the total cost of ownership.**

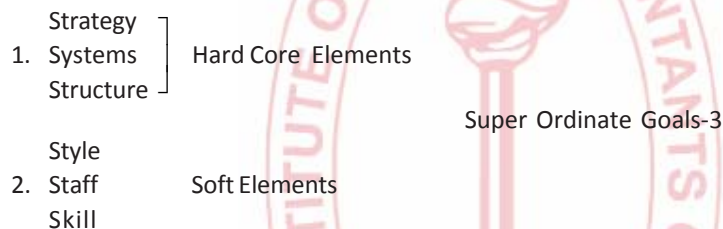   (x) **One of the goals JIT seeks to achieve is batch sizes of one.**

Answer 1. (a)
 (i) Capacity Requirement Planning
 (ii) Drum Buffer Rope
 (iii) Distribution Requirement Planning
 (iv) Product Life Cycle Management
 (v) Statistical Quality Control
 (vi) European Foundation for Quality Control
 (vii) Define, Measure, Analyze, Improve, Control
 (viii) Japanese Union of Scientists and Engineers

Answer 1. (b)
 (i) A logical structure starts with one or few raw materials and the product expands into a number of different products as it flows through its routings.
 (ii) **McKinsey's 7s Framework**

    Strategy
 1. Systems   Hard Core Elements
    Structure

                              Super Ordinate Goals-3

    Style
 2. Staff   Soft Elements
    Skill

 (iii) Benchmarking is a prosess of continuously comparing and measuring an organizations business process against business leader anywhere in the wotld to gain information that will help the organization take action to improve performance.
 (iv) Contribution Approach is a method of preparing income statement that separates Variable cost from Fixed Cost to emphasize cost behaviour patternfor the purpose of planning and control.
 (v) Talent Drain is the second potential problem in succession planning. Because upper management must identify a small group of managers to receive training and development for promotion, those managers who are not assigned to development activities may feel overlooked leave the organizations. This turnover may reduce the number of talented managers of lower and middle levels of the organization.

Answer 1. (c)
 (i) True
 (ii) False
 (iii) True
 (iv) False
 (v) False
 (vi) False
 (vii) False
 (viii) False
 (ix) True
 (x) True

Q. 2. K Ltd manufactures two types of machinery equipments M & N and applies /absorbs overheads on the basis of direct labor hours. The budgeted overheads and direct labour hours for the month of April 2010 are Rs 12,42,500 and 20,000 hours respectively. The information about Companies products is as follows :

Particulars	Equipment M	Equipment N
Budgeted Production Volume	2500 units	3125 units
Direct Material Cost	Rs 300 pu	Rs 450 pu
Direct Labour Cost		
M (3 hours @ Rs 150ph)	Rs 450	
N (4 hours @ Rs 150 ph)		Rs 600

K Ltds overheads of Rs 12,42,500 can be identified with three major activities :

Order processing (Rs 2,10,000) machine processing (Rs 875,000) and product inspection (Rs 157500). These activities are driven by number of orders processed, machine hours worked, and inspection hours respectively.

The data relevant to these activities is as follows :

	Orders Processed	Machine hours worked	Inspection hours
M	350	23,000	4,000
N	250	27,000	11,000
Total	600	50,000	15,000

Required :

(i) Assuming use of direct labour hours to absorb/apply overheads to production,compute the unit manufacturing cost of the equipments M & N,if the budgeted manufacturing volume is attained.

(ii) Assuming of Activity Based Costing,compute the unit manufacturing costc of the equipments M& N, If the budgeted manufacturing volume is achieved.

(iii) K Ltd SELLING PRICE ARE BASED ON COST.By using direct labour hours as an application base, calculate the amount of cost distortion (under costed or over costed) for each equipment.

(iv) Discuss how activity based costing might benefit K ltd.

Answer 2.

(i) Computation of unit manufacturing cost using direct labour hours to absorb overheads to production.

Direct Labour Hour Rate = Rs 12, 42,500/20,000 D.L.H

= Rs 62,125 D.L.H

Particulars	M	N
Direct Material per unit	300.00	450.00
Direct Labour	450.00	600.00
	750.00	1050.00
Add: Overheads (3 hrs × Rs 62.125; 4hrs × Rs 62.125)	186.38	248.50
Total Cost per unit	936.38	1298.50

(ii) Computation of unit manufacturing cost using ABC

Segregation of Budgeted Overheads

(a) Order Processing

M = [(Rs 210000 × 350)/100]/ 2500 units = Rs 49 pu

N = [(Rs 210000 × 250)/600]/ 3125 units = Rs 28pu

(b) Product Processing

M = [(Rs 875000 × 23000)/ 50000)]/ 2500 units = Rs 161 pu

N = [(Rs 875000 × 27000)/ 50000)]/ 3125 units = Rs 151.20 pu

(c) Product Inspection

M = [(Rs 157500 × 4000)/15000)]/ 2500 units = Rs 16.80 pu

N = [(Rs 157500 × 11000)/15000)]/ 3125 units = Rs 36.96 pu

Particulars		M		N
Direct Material per unit		300.00		450.00
Direct Labour		450.00		600.00
		750.00		1050.00
Add : Budgeted overheads pu				
Order Processing	49.00		28.00	
Machine Processing	161.00		151.20	
Product Inspection	16.80	226.80	36.96	216.16
Total Cost pu		976.80		1266.16

(iii) Statement Showing difference in cost pu

Particulars	M	N
Total Cost p.u		
(a) Under Activity Based Costing Metod	976.80	1266.16
(b) Under direct labour hour method	936.38	1298.50
Over Stated/Under Stated	(40.42)	32.34

(iii) The absorption of overheads under activity based costing helps in ascertainment in production cost incurred,since the apportionment of overheads relates the activities that bring out the production. There will be least cost distortion if ABC method is usedinstead of blanket absorption rate ie. direct labour hour rate of overhead absorption.

Q. 3. B Ltd manufactures two types of bags-L & T Both bags are produced on the same equipment and use similar processes..The following budgeted data has been obtained for the year ended 31st December 2009.

Product	L	T
Production Quantity	25,000	2,500
Number of Purchase Orders	400	200
Number of Set ups	150	100

Resources required per unit	L	T
Direct Material (Rs)	25	62.5
Direct Labour (hours)	10	10
Machine Time (hours)	5	5

Budgeted Production overheads for the year have been analyzed as follows :

	Rs
Volume Related Overheads	2,75,000
Purchase Related Overheads	3,00,000
Set up Related Overheads	5,25,000

The budgeted wage rate is Rs 20/- per hour.

The cos present system is to absorb overheads by product units using rates per labour hour.

However, the company is considering implementing a system of activity based costing.An activity baseinvestigation revealed that the cost drivers for the overhead costs are as follows :

Volume Related Overhead	Machine Hours
Purchase Related Overhead	No of Purchase Orders
Set up related Overheads	No of Set ups

Calculate the unit cost for each type of bag using

  (i) The current absorption Costing method

  (ii) The proposed activity based costing approach

Compare your results and briefly comment on your findings.

Answer 3.

Product	L	T	Total
Production Quantity	25,000	2,500	
Direct Labour hours required	250,000	25,000	Rs 275000
Total Production Overhead			Rs 11,00,000
Overhead absorption rate per labour hour			Rs 4.00
Machine hours required	125,000	12,500	1,37,500
Total Puchase Order	400	200	600
Total Set ups	150	100	250
Cost per cost driver			
Volume Related Overheads			Rs 2,75,000
Machine hours required			1,37,500
Volume related overheads/machine hour			Rs 2.00
Purchase related overhead			Rs 3,00,000
Total Purchase orders			600
Purchase related overheads/order			Rs 500
Set ups related overheads			Rs 5,25,000
Total Set ups			250
Set up related overheads per set up			Rs 2100

(a) (i) Unit cost using existing overhead absorption rate

Product	L Rs	T Rs
D. Material	25.00	62.50
D. Labour Cost	200.00	200.00
Overheads (10 lab hrs × Rs 4)	40.00	40.00
Total cost per unit	**265.00**	**302.50**

(a) (ii) Unit costs using ABC

Product	L Rs	T Rs
D. Material	25.00	62.50
D. Labour Cost	200.00	200.00
Overheads :		
Volume Related		
(Rs 2 per machine hour)	10.00	10.00
Purchase Related		
(Rs 500 × 400 orders/25000)	8.00	40.00 (Rs 500 × 200/2500)
Set up related		
(Rs 2100 × 150 set ups/25000)	12.60	84.00 (Rs 2100 × 100/2500)
	255.60	**396.50**

(b) Cost pu traditional method   Rs 265.00   Rs 302.50

     Cost pu ABC   Rs 255.60   Rs 396.50

     Difference   9.40   − 94.00

     % change   3.55%   31.07%

The ABC approach attributes the cost of resources to each product which those resources on a more appropriate basis than the traditional absorption costing method. The price of the T should be reviewed in the light of the new unit cost.

Q. 4. (a) A co manufactures three products. The budgeted quantity,selling prices and unit cost are as under :

Particulars	A	B	C
Raw Materials @ Rs20 per Kg	80	40	20
Direct Wages@ Rs 5 per hour	5	15	10
Variable Overheads	10	30	20
Fixed Overhead	9	22	18
Budgeted Production In inits	6400	3200	2400
Selling Price per unit	140	120	90

(i) Present a statement of budgeted profit

(ii) Set optimal product Mix and determine the profot ,if the supply of Raw material is restricted to 18,400 kgs

(b) What is matrix organization structure? What are its advantages and disadvantages?

Answer 4. (a)

(i) Calculation of Contribution per unit and Total Fixed Cost

		Products		
		A **6400**	**B** **3200**	**C** **2400**
Selling Price p u	(a)	140	120	90
Variaable Cost p.u :				
Raw Material		80	40	20
Direct Wages		5	15	10
Variable Overheads		10	30	20
Total Variable Cost pu	(b)	95	85	50
Contribution p u	(a)-(b)	45	35	40
Raw material p u		4	2	1
Contribution per kg of raw material		11.25	17.50	40
Ranking		III	II	I
Fixed Overheads pu		9	22	18
Total Fixed Overhead		57,600	70,400	43,200

Total Fixed Overhead = Rs 1,71,200

Statement of Budgeted Profit

Particulars	Products			
	A	**B**	**C**	**Total**
No of Units	6,400	3,200	2,400	
Contribution pu (Rs)	45	35	40	
Total Contribution	2,88,000	1,12000	96,000	4,96,000
Less : Fixed Cost				171,200
Profit				**3,24,800**

(ii)   **Statement of Optimum Pruduct Mix and Prifitability**

Particulars	Units	Raw Material Kgs	Contribution Rs	Total Contribution
Product C	2400	2400	40	96,000
Product B	3200	6400	35	1,12,000
Product A	2400	9600	45	1,08,000
Total Contribution				3,16,000
Less : Fixed Cost				1,71,200
Profit				**1,44,800**

Answer 4. (b)

Matrix Organisation Structure combines the coordination and control of the decentralized structure with the technical excellence economies of scale of the functional structures to reap the benefits of both. While managing complex programs as in large high-technology programs, complex products and services and multinational business, organization face several coordination problems. A matrix avoids such problems as the total responsibility for achieving the goals and objective of the program lies with Program Manager but must share resources from the various functional heads. The functional managers assigned to the projects are administratively reporting to the Project Manager but functionally to the Function Head.

The distinguishing feature of the matrix structure is thus the dual dimensions of management embodied in it. The outputs produced by the organization may be identified in the rows of the matrix while functional inputs utilized by each project may be identified in the columns of the matrix. The total outputs of the functions are found in the last column of the matrix. Though the Project Manager assumes full responsibility for delivery of a product which meets performance specifications he does not have direct authority over the functional organization that actually performs the work. The functional personnel thus operate under the knowledge-based authority of the function and the resource-based authority of the Project Manager. This may create a friction in the course of the work but it is up to the Project Manager to use it as a creative friction to further the goals of the program.

The matrix organization structure is suitable for projects which are not large enough to warrant a fully decentralized set-up, with all functional managers under each project. Decentralization may result in loss of scale economics, by way of duplication of functional services for several projects. The matrix structure is suitable for projects of short duration.

Advantages :

(a) Ensures better coordination and control of the decentralized structure along with achieving technical excellence and economies of scale of the functional organization,

(b) Fosters creativity and multiple sources of diversity,

(c) Broader middle-management exposure to strategic issues of the business,

(d) Acts as a good training ground for future leaders.

Disadvantages :

(a) Dual accountability as explained above, which may create confusion,

(b) Necessitates tremendous horizontal and vertical coordination,

(c) Difference in orientation between Program and Functional personnel. The functional person may aim for high technical performance not warranted by project requirement,

(d) Diffuse responsibility - as responsibility is distributed between program and functional personnel becomes difficult to administer system of accountability, leading to potential conflict,

(e) Program personnel may have a sense of insecurity as soon as a project is completed and this may lower their morale.

(f) The design of the reward structure for program and functional personnel is a ticklish issue which should be worked out in a fair and transparent manner to satisfy all.

Q. 5. (a) What is the structure of the quality circle?

   (b) What is EFQM?

   (c) A mobile manufacturer S ltd is planning to introduce a new mobile phone. The potential market over the next year is 1,00,000 units. S Ltd has the capacity to produce 4,00,000 units and could sell 1,00,000, units at a price of Rs 50/-. Demand would double for each Rs 5 fall in the selling price. The Co. has an 80% EXPERIENCE CURVE for similar products. The cost of the first batch of phones was Rs 1,00,000. A minimum margin of 25% is required?

   What is S Ltd's TARGET COST?

Answer 5. (a)

A Quality Circle has an appropriate organisational structure for its effective and efficient performance. It varies from industry to industry, organisation to organisation. But it is useful to have a basic framework as a model. The structure of a Quality Circle consists of the following elements.

(i) **A steering committee :** This is at the top of the structure. It is headed by a senior executive and includes representatives from the top management personnel and human resources development people. It establishes policy, plans and directs the program and meets usually once in a month.

(ii) **Co-ordinator :** He may be a Personnel or Administrative officer who co-ordinates and supervises the work of the facilitators and administers the programme.

(iii) **Facilitator :** He may be a senior supervisory officer. He co-ordinates the works of several quality circles through the Circle leaders.

(iv) **Circle leader :** Leaders may be from lowest level workers or Supervisors. A Circle leader organises and conducts Circle activities.

(v) **Circle members :** They may be staff workers. Without circle members the porgramme cannot exist. They are the lifeblood of quality circles. They should attend all meetings as far as possible, offer suggestions and ideas, participate actively in group process, takes training seriously with a receptive attitude. The roles of Steering Committee, Co-0rdinator, Facilitator, Circle leader and Circle members are well defined.

Answer 5. (b)

EFQM a non-profit membership foundation, is the primary source for organizations in Europe looking to excel in their market and in their business. Founded in 1989 by the CEOs of prominent European businesses, EFQM is now the hub of excellent, globally minded organizations of all sizes and sectors, and both private and public. Specifi cally designed to help organizations achieve excellence in their business initiatives, the EFQM organization works to capture the best practices of globally-minded organizations and to turn this knowledge into practical resources for the business community. EFQM is a vibrant network of organizations that share the same ambitions to drive excellence through the organization and aspire to reach excellence. The EFQM Excellence Model is a framework for organizational management systems, promoted by the European Foundation for Quality Management (EFQM) and designed for helping organizations in their drive towards being more competitive.

Regardless of sector, size, structure or maturity, to be successful, organizations need to establish an appropriate management system. The EFQM Excellence Model is a practical tool to help organizations do this by measuring where they are on the path to excellence; helping them understand the gaps; and then stimulating solutions.

Answer 5. (c)

Target Cost = Selling Price at capacity – 25% profit margin

The price demand figures are projected as

Price	Demand
Rs	Units
50	1,00,000
45	2,00,000
40	4,00,000

Target Cost Per UNIT – Rs 40 – (25% of Rs 40) = Rs 30/-

Q. 6. **Tithi (p) Ltd. has the following activities and associated cost behaviours :**

Activities	Cost Behaviour
Labour	Rs. 10 per direct labour hour
Set-up	Variable : Rs. 100 per set-up
	Step-fixed-Rs. 30,000 per step, step = 10 set-ups
Receiving	Step-fixed: Rs. 40,000 per step, step = 2,000 hours

Activities with step cost behaviour are being fully utilized by existing products. Thus, any new product demands will increase resource spending on these activities.

Two designs are being considered for a new product-Design I and II. The following information is provided about each design (1,000 units of the product will be produced) :

Cost Driver	Design I	Design II
Direct Labour hours	3,000	2,000
Number of set-up	10	20
Receiving hours	2,000	4,000

The company has recently developed a cost equation for manufacturing costs using direct labour hours as the driver.

The equation has R^2 =0.60 and is given below :

$$Y= Rs. 1, 50,000 + \$20X$$

Required :

(a) **Compute the cost of each design (based on the direct labour cost equation) if the design engineering is told that only direct labour hours drive manufacturing costs. Which design would be chosen based on this unit-based cost assumption?**

(b) **Now compute the cost of each design using all driver and activity information. Which design will now be chosen? Are there any other implications associated with the use of the more complete activity information set?**

(c) **Consider the following statement: "strategic cost analysis should exploit internal linkages." What does this mean? Explain, using the results of requirements (a) and (b).**

(d) **What other information would be useful to have concerning the two designs? Explain.**

Answer 6.

(a) **Cost based on direct labour hours as per developed cost equation.**

Design I : Rs. 20 × 3,000 = Rs. 60,000

Design II: Rs. 20 × 2,000 = Rs. 40,000

The unit-based analysis would lead to the selection of Design II.

(b) **Cost based on all revelant cost drivers.**

Basis

Design I :

Labour (Rs. 10 × 3,000)	30,000	
Setups [(10 × Rs. 100) + (1 × Rs. 30, 000)]	31,000	Setup 10, step 1
Receiving (1 × Rs. 40, 000)	40,000	Step 1
Total	Rs. 1,01,000	

Design II :

Labour(Rs. 10 × 2,000)	Rs. 20,000	
Setups [(20 × Rs. 100) + (2 × Rs. 30, 000)]	62,000	Setup 20 in 2 steps
Receiving (2 × Rs. 40, 000)	80,000	Step 2
Total	Rs. 162, 000	

Design I has the lower total cost. Notice also the difference in expected total manufacturing costs. However, the cost equation based on direct labour hours as the only cost driver gives the value of R^2 as 0.6. It means 40% of the variation in costs is unexplained, which is quite significant. The direct labour driver approach produces a much lower cost for both designs. This difference in costs between a and b above could produce significant differences in pricing strategies.

(c) Exploiting internal linkages means taking advantage of the relationships among the activities that exist within a firm's segment of the value chain. To do this, we must know what the activities are and how they are related. Activity costs and drivers are an essential part of this analysis. Using only unit-based drivers for design decisions, as in Requirement 1, ignores the effect that different designs have on non-unit-based activities. The results of Requirement (b) illustrated a significant difference between two designs – relative to the unit-based analysis. The traditional cost system simply is not rich enough to supply the information needed for a thorough analysis of linkages.

d) Linkages also extend to the rest of the firm's internal value chain activities. Thus,it would be useful to know how design choices affect and are affected by logistical activities. Furthermore, external linkages would also help. For example, it would be interesting to know how post-purchase activities and costs are affected by the two designs. Information on T test will help to comment on the significance of Fixed cost.

Q. 7. What is bench trending and how does it differ from Bench Marking? Name the different types of Bench Trending. List the basic steps in any of the types of Bench Trending?

Answer 7.

Bench Trending: Continuous monitoring of specific process performance with a select group of benchmarking partners.

Benchmarking is a systematic and continuous measurement process of comparing through measuring an organization busibess processes against business leaders (role models) anywhere in the world,to gain information that will help organization take action to improve its performance. The continuous process of enlisting the best practices in the world for the processes ,goals and objectives leading to world class levels of achievement.

Bench Marking is the process of comparing the cost ,time or quality of what one organization does against what another organization does..The result is often a business case fir making changes in order to make improvements.

Benchmarking is a powerful management tool because it overcomes paradigm blindness. Benchmarking opens organization to new methods ,ideas and tools to improve their effectiveness. It helps crack through resistance to change by demonstrating other methods of solving problems than the one can currently employed, and demonstrating that they work ,because they are being used by others.

1. Identify your problem areas
2. Identify other industries that have similar processes.
3. Identify organizations that are leaders in these areas.
4. Survey companies for measures and practices.
5. Visit the 'best practice' companies to identify leading edge practices.
6. Implement new and improved business practices.

Different Types of Bench Trending :

There are basically two types of bench trending

- Strategic Bench Trending
- Operations/Process Bench Trending

The Basic Steps in Strategic Bench trending :

- Define the market by determining its size, customer preferences, competitors and relative business position of the company within the market.
- Assess the shifting of direction of the industry, technological shifts, customer changes and potential threats from outside sources.
- By evaluating the trends in the industry ,determine the strongest current and potential competitors.
- Data on performance on competitors is gathered and the current and future performance of the unit is compared with that of its competitor.
- A performance baseline for the business units is then established and the relative performance is estimated.
- A set of initiatives which form the basis of an improvement plan are then identified to maintain the strngths while reducing projected gaps.

Q. 8. (i) Briefly describe the operation of an MRP System.

(ii) How MRP II differs from MRP I?

Answer 8. (i)

Material Requirement Planning (MRP) is a push through system that manufactures finished goods for inventory on the basis of demand forecasts.

MRP uses —

- Demand forecasts for the final products
- A bill of materials outlining the materials, components, finished products, and product inventories to predetermine the necessary outputs at each stage of production.

Taking into account the lead time required to purchase materials and manufactures components and finished products ,a master production schedules specifies the quantity and timing of each item to be produced.

The EOQ Model can be used within the MRP Systems.

Answer 8. (ii)

After the introduction in the 1960s, MRP was later extended to the management of all manufacturing resources.In particular it focuses on machine capacity planning and labour scheduling as well as material requirement planning. This extended system is known as manufacturing resource planning or MRP II.

Q. 9. (a) Write a note on Sensitivity Analysis applied to a capital project.

Name the four main variables in a capital project on which sensitivity analysis is done.

(b) What is margin of Safety? How can it be improved?

Answer 9. (a)

Sensitivity Analysis as applied to a capital project :

Sensitivity analysis is the study of how the variation in the output of a mathematical model can be apportioned,qualitatively and quantitatively to different sources of variationon the input of a model.

Sensitivity Analysis enables investigation into how projected performance will vary along with changes in the key assumptions on which capital project projections are based.

SA applied to a capital project will show the margin of error in the various parameters of a project,which can be allowed ,before the project ceases to be profitable.A project will be particularly sensitive to a variable if only a small change will result in a reversal of the investment decision,whereas it will be insensitive if a large change will not affect the decision.

The four main variables in a capital project on which sensitive analysis is done are :

 I. Initial Investment
 ii. Discounting Rate
 iii. Cash Flow
 iv. Life of the project.

Answer 9. (b)

The margin of safety refers to sales in excess of the break-even volume. It represents the difference between sales at a given activity level and sales at break-even point. It is important that there should be a reasonable margin of safety to run the operations of the company in profitable position. A low margin of safety usually indicates high fixed overheads so that profits are not made until there is a high level of activity to absorb the fixed costs. A margin of safety provides strength and stability to a concern.

The margin of safety is an important measure, especially in times of receding sales, to know the real position to operate without incurring losses and to take steps to increase the margin of safety to improve the profitability.

Margin of safety is calculated by using the following formulae : Margin of safety = (Actual Sales) – (Break even Sales)

The higher the margin of safety, the better profitability of the product/product line. The margin of safety can be improved by adopting any of the following steps :

- Keeping the break-even point at lowest level and try to maintain actual sales at highest level.
- Increase in sales volume
- Increase in selling price
- Change in product mix increasing contribution
- Lowering fixed cost
- Discontinuance of unprofitable products in sales mix.

Q. 10.(a) What is life Cycle Costing? Explain the stages in product life cycle?

  (b) What is Intranet? What are its advantages?

Answer 10. (a)

Life cycle costing is a technique which takes account of the total cost of owning a physical asset, or making a product, during its economic life. It includes the costs associated with acquiring, using, caring for and disposing of physical assets, 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.

Stages in Product Life Cycle :

There are five distinct stages in the life cycle of a product as follows :

Introduction stage – Research and engineering skill leads to product development. The product is put on the market and its awareness and acceptance are minimal. Promotional costs will be high, sales revenue low and profits probably negative. The skill that is exhibited in testing and launching the product will rank high in this phase as critical factor in securing success and initial market acceptance. Sales of new products usually rise slowly at first.

Growth Stage – In the growth stage product penetration into the market and sales will increase because of the cumulative effects of introductory promotion, distribution. Since costs will be lower than in the earlier stage, the product will start to make a profit contribution. Following the consumer acceptance in the launch stage it now becomes vital or secure wholesaler / retailer support. But to sustain growth, consumer satisfaction must be ensured at this stage. If the product is successful, growth usually accelerates at some point, often catching the innovator by surprise.

Maturity Stage – This stage begins after sales cease to rise exponentially. The causes of the declining percentage growth rate the market saturation – eventually most potential customers have tried the product and sales settle at a rate governed by population growth and the replacement rate of satisfied buyers. In addition there were no new distribution channels to fill. This is usually the longest stage in the cycle, and most existing products are in this stage. The period over which sales are maintained depends upon the firm's ability to stretch the cycle by means of market segmentation and finding new uses for it.

Saturation stage – As the market becomes saturated, pressure is exerted for a new product and sales along with profit begin to fall. Intensified marketing effort may prolong the period of maturity, but only by increasing costs disproportionately.

Declining Stage – Eventually most products and brands enter a period of declining sales. This may be caused by the following factors :

- Technical advances leading to product substitution
- Fashion and changing tastes
- Exogenous cost factors will reduce profitability until it reaches zero at which point the product's life is commercially complete.

Answer 10. (b)

An Intranet is a private computer network that uses Internet protocols and network connectivity to securely share part of an organization's information or operations with its employees. Sometimes the term refers only to the most visible service, the internal website. Briefly, an intranet can be understood as "a private version of an Internet," or as a version of the Internet confined to an organization. Through such devices and systems off-site employees can access company information, computing resources and internal communications.

Advantages of Intranets :

1. **Workforce productivity** – Intranets can help users to locate and view information faster and use applications relevant to their roles and responsibilities. Users can access data held in any database the organization wants to make available, anytime and - subject to security provisions - from anywhere within the company workstations.

2. **Time** – With intranets, organizations can make more information available to employees on a "pull" basis (i.e.: employees can link to relevant information at a time which suits them) rather than being deluged indiscriminately by emails.

3. **Communication** – Intranets can serve as powerful tools for communication within an organization, vertically and horizontally. From a communications standpoint, intranets are useful to communicate strategic initiatives that have a global reach throughout the organization. The type of information that can easily be conveyed is the purpose of the initiative and what the initiative is aiming to achieve, who is driving the initiative, results achieved to date, and who to speak to for more information. By providing this information on the intranet, staff have the opportunity to keep up-to-date with the strategic focus of the organization.

4. **Knowledge Management** – Web publishing allows 'cumbersome' corporate knowledge to be maintained and easily accessed throughout the company using hypermedia and Web technologies. Examples include: employee manuals, benefits documents, company policies, business standards,

news feeds, and even training, can be accessed using common Internet standards (Acrobat files, Flash files, CGI applications). Because each business unit can update the online copy of a document, the most recent version is always available to employees using the intranet.

5. **Business operations and management** – Intranets are also being used as a platform for developing and deploying applications to support business operations and decisions across the internetworked enterprise.

6. **Cost-effective** – Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms.

7. **Promote common corporate culture** – Every user is viewing the same information within the Intranet.

8. **Enhance Collaboration** – With information easily accessible by all authorised users, teamwork is enabled.

Q. 11. **D ltd specializes in the manufacture of Computers. It is planning to introduce a new computer specially designed for children. Development of the new computer is to begin shortly and D ltd is in the process of preparing a product life cycle budget. It expects the new product to have a life cycle of 3 years and estimates the following costs :**

	Year 1	Year 2	Year 3
Units manufactured & Sold	50,000	200,000	150,000
Computers per batch	400	500	500
Price per computer	Rs 45	Rs 40	Rs 35
R & D Cost	Rs 9,00,000	Rs 1,00,000	—
Production Cost :			
Variable Cost per unit	Rs 16	Rs 15	Rs 15
Variable Cost PER BATCH	Rs 700	Rs 600	Rs 600
Fixed Cost	Rs 6,00,000	Rs 6,00,000	Rs 6,00,000
Marketing Cost :			
Variable Cost PER UNIT	Rs 3.60	Rs 3.20	Rs 2.80
Fixed Cost	Rs 4,00,000	Rs 3,00,000	Rs 3,00,000
Distribution Cost :			
Units produced per batch	200	160	120
Variable Cost per unit	Rs 1	Rs 1	Rs 1
Variable Cost PER BATCH	Rs 120	Rs 120	Rs100
Fixed Cost	Rs 2,40,000	Rs 2,40,000	Rs 2,40,000
Customer service Cost PER UNIT	Rs 2	Rs 1.50	Rs 1.50

(a) **Calculate the budgeted life cycle operating profit for the new product.**

(b) **Explain how an organization would benefit from a product life cycle costing exercise.**

Answer 11.

(a) **Life Cycle Operating Profit**

	Year 1 Rs '000	Year 2 Rs '000	Year 3 Rs '000	Total Rs '000
Sales	2,250	8,000	5,250	15,500
R & D Design	(900)	(100)		(1,000)
Production Cost				
Variable cost per unit	(800)	(3000)	(2,250)	(6,050)
Variable cost per batch	(87.5)	(240)	(180)	(507.5)
Fixed Cost	(600)	(600)	(600)	(1800)
Marketing Cost				
Variable Cost per unit	(180)	(640)	(420)	(1240)
Fixed Cost	(400)	(300)	(300)	(1000)
Distribution Cost				
Variable cost per unit	(50)	(200)	(150)	(400)
Variable cost per batch	(30)	(150)	(125)	(305)
Fixed Cost	(240)	(240)	(240)	(720)
Customer Service				
Costs per unit	(100)	(300)	(225)	(625)
Operating Profit	(1137.5)	2230	760	1852.5

(b) A Life Cycle Costing exercise enables an organization to appraise the profitability over the whole life of the product rather than a period of time. Thus, products that are loss making initially but profitable in the longer term will be accepted.

Q. 12. **AB FOODS have observed from a market survey that they can sell a special type of packed snack at a price of Rs 50 per pack during festive season only.**

However, for this purpose they will have to make a fresh investment of Rs 1,50,000 in equipment. The variable cost of production would be Rs25 pu. The variable cost of production would come down to Rs 20 if the investment is made for Rs 3, 00,000. The likely sales to be achieved are as under :

Volume	Probability
5000	0.30
10000	0.50
15000	0.20

There will be no residual value of investments at the end of the festive season. Should the company go ahead and invest?

Answer 12.

Expected Volume of Sales = .30 × 5000+0.50 × 10000+0.20 × 15000=9500 units

Expected Revenue = 9500 × Rs 50 = Rs 4,75,000

	Option I Rs	Option II Rs
Cost of Investment	1,50,000	3,00,000
Variable Cost @Rs25/20	2,37,500	1,90,000
Total Revenue	4,75,000	4,75,000
Net Gain/Loss	78,500	(15,000)

The company can go ahead andinvest Rs 1,50,000.

Q. 13. (a) The operating results of a department provide the following information for a particular week :

Average output per week	**48,000 units**
Saleable value of output	**Rs. 60, 000**
Contribution on above	**Rs. 24, 000**

The management is contemplating to bring about more mechanization in the department at a capital cost of Rs.16, 000 which will result in reduction in number of workmen from the present strength of 160 nos. to 120 nos. However, due to mechanical help, the output of individual workmen will increase by 60%. The existing piece rate is Re.0.10 per article and as an incentive; the management propose to increase the existing piece rate by 5% for every 10% increase in the individual output achieved. There will be a reduction in sale price by 4% to sell the increased production.

You are required to calculate extra weekly contribution resulting due to proposed changes.

(b) In what circumstances is a company justified in selling its products at a price below variable cost?

Answer 13. (a)
Working :

		Rs.
(i)	Sales per week	60,000
	Contribution	24,000
	Variable cost	36,000
	Less : wages (0.10 × 48000 pc)	4,800
	Variable cost excluding wages 31,200 i.e. 31,200/48,000=Re 0.65 per pc	
(ii)	Future expected production units/employee	
	Production per employee = 48,000/160 =	300
	Add : increase by 60%	180
		480
	Total future production from 120 workmen = 57,600.	
(iii)	expected selling price	Rs.
	Present price	Rs. 60,000/48,000 = 1.25
	Less reduction by 4%	= 0.05
	Revised price	1.20

(iv)	Revised piece rate wages		Rs.
	Present rate		0.10
	Incentive		0.03
	(5% × 60% =3%)		0.13
(v)	Forecast of profitability		Rs.
	Sales (57600 units × Re 1.20)		69,120
	Less : Variable cost	Rs.	
	Wages @ Re 0.13	7,488	
	Other overheads (excluding wages @ Re 0.65)	37,440	
			44,928
	Contribution		24,192
	Present contribution		24,000
	Increase in contribution	Rs.	192

Answer 13. (b)

A company is justified in selling its product below the variable cost in the following circumstances :

  (i) Where the product is of perishable nature

 (ii) Where heavy stocks have been accumulated.

(iii) where it is decided to use the product as loss leader i.e. to boost the sales of other products

 (iv) where the product is intended to be popularized by an introductory/temporary offer

  (v) where it is intended to be an entry barrier to the would-be competitor

 (vi) Where it is to serve some social purpose.

Q. 14. Fill in the blank spaces(1 to 4) in the table below to show how standard costing and target costing differ

Stage in Product Life Cycle	Standard Costing Approach	Target Costing Approach
Product Concept Stage	No Action	(1)
Design Stage	(2)	Keep costs to a minimum
Production Stage	Costs are Controlled Using Variance Analysis	(3)
Reminder of Life	(4)	Target cost reduced, perhaps monthly

Answer 14.

Blanks Filled up :

  (1) Set the selling Price and required profit and determine the resulting target cost.

  (2) Set standard cost and a resulting standard price.

  (3) Constant Cost Reduction through target costing.

  (4) Standards usually revised annually.

Q. 15. Hudco Ltd. Requires its various operating divisions to meet the company's target return of 15% on investment, as specified by the board. Besides the ROI of 15% the board also requires an annual positive cash flow. The Steady Division has achieved the 15% target for many years. Steady's assets are mainly plant and equipment (its property rented), plus net current assets. The average age of its assets has increased by 10 months per year over the last four years. A recent benchmarking exercise has shown that Steady's productivity is below that of its competitors, although its financial performance appears very good. The divisional operations director has recently presented a proposal for a major investment in new plant and machinery. He argued that without substantial investment Steady would not be able to compete on either quantity or delivery time. The divisional sales director agreed that these factors had become the two most important features in winning new orders. The budgeted financial figures for 2004 are shown here :

	Steady Division- 2004 (Rs Cr)
Sales	168.60
Operation profit before depreciation	22.20
Depreciation	3.00
Operating profit	19.20
Interest payable	1.80
Divisional net profit before tax	17.40
Plant and equipment	60.00
Net current assets	36.00
Total divisional assets	96.00

The proposal for new investment would lead to a net increase in plant and equipment of Rs. 36 crore and a reduction in net current assets of Rs. 12 crore. Steady expects that the new assets would lead to an increase in operating profit before depreciation of Rs 8.4 crore and a net increase in depreciation of Rs. 4.8 crore. Hudco charges 12% on all funds used by divisions.

You are required to —

(a) Calculate the return on investment for Steady Divisions for 2004, with and without the new investment proposal. Briefly comment on the expected performance of Steady Division for each option.

(b) Calculate the Residual Income (RI) for Steady Division for 2004, with or without the new investment proposal. Briefly comment on whether using RI would improve the measurement of Steady's performance.

(c) Outline the major features of Economic Value Added (EVA) and briefly discuss whether its use could improve divisional performance measurement for Hudco.

Answer 15.

(a)

Hudco Ltd. - Steady Division
Return on Investment (ROI)

	Without investment Rs. (Cr.)		With investment Rs. (Cr.)
PBIT	19.20	(+ 8.4 - 4.8)	22.80
Total Assets	96.00	(36.00 – 12.00)	120.00
ROI	20%		19%

Comments :

Steady's return is more than the company's target. However, the information of poor productivity and aged assets makes a discerning accountant wonder if the apparent better result were the products of low asset values rather than production efficiency.

With new additional investment the ROI is reduced. This might discourage the steady manjagement to undertake the proposed investment, though this will mean steady remains a weakling in respect of productivity, quality of goods and service in its market.

This measure, ROI, obstructs a clear vision of the merit of a project at times.

(b) **Residual Income (RI)**

	Without investment Rs. (Cr.)		With investment Rs. (Cr.)
PBIT	19.20		22.80
Imputed interest charge			
@ 12% (on 96.00)	(11.52)	(on 120.00)	(14.40)
RI	7.68		8.40

Comments :

As in ROI, RI also shows better results as the imputed interest on older assets gets smaller.

However, the RI measure here will encourage new investment. As against the current return, a target return is decided with a view to long term objective of the corporate management. Sometimes the target rate of return is used as the imputed interest charge; a positive RI in this case will indicate a project that earns in excess of the target ROI. Performance measures must be designed to reward decisions that are optimum for the company as a whole.

(c) Economic Value Added (EVA)

EVA, as a measure, follows the same principle as RI. Value addition by a project is measured by EVA. However, this measure looks at the impact on economic value of the business by the project. This requires a procedure which may deviate from the conventional accounting principles. For example, fully written off goodwill, research and development may be reinstated at their economic values

with corresponding adjustments to the reported profit. The use of all the assets to generate economic benefits is thus highlighted. The emphasis on measuring value creating in the EVA should encourage managers to make decisions that are compatible with the objectives of the business as a whole.

Indeed, assets are often measured on a current cost basis within the EVA, which will eliminate the misleading benefit that appears to be gained from holding assets for longer than their economic value warrants. Divisional bonus schemes may be based on EVA for motivation of managers, which will attain corporate goal congruence at the same time.

Q. 16. **XYZ Ltd.having idle capacity received an offer to sell 2000 units of one of its product to a new customer in a geographic region not normally serviced by the company. The offering price is Rs.10 per unit. The product normally sells for Rs.14. The activity based accounting system provides the following information :**

	Cost Driver	Unused Capacity	Quantity Demanded*	Activity Rate (Rs)**	
				Fixed	Variable
Direct Materials	Units	0	2,000	—	3.00
Direct Labour	Direct Labour hours	0	400	—	7.00
Set-ups	Set-up hours	0	25	50.00	8.00
Machining	Machine hours	6,000	4,000	4.00	1.00

* This represents the amount of resources demanded by the special order being considered.

** Fixed activity rate is the price that must be paid per unit of activity capacity. The variable activity rate is the price per unit of resources for resources acquired as needed.

Although the fixed activity rate for set-ups is Rs.25 per hour, any expansion of this resource must be acquired in blocks. The unit of purchase for set-ups is 100 hours of set-up servicing. Thus, any expansion of set-up activity must be done 100 hours at a time. The price per hour is the fixed activity rate.

Required :

(a) **Compute the change in income for XYZ Ltd. if the order accepted. Comment on whether the order should be accepted or not (in particular, discuss the strategic issues).**

(b) **Suppose that the set-up activity had 50 hours of unused capacity. How does this affect the analysis?**

Answer 16. (a)

Order to be accepted or not.

The relevant costs are those that change if the order is accepted. These costs would consist of the variable activity costs (resources acquired as needed) plus any cost of acquiring additional activity capacity (resources acquired in advance of usage). The income will change by the following amount :

Revenue (Rs.10 × 2,000 units)		Rs. 20,000
Less : Increase in resource spending		
Direct materials (Rs. 3 × 2000 units)	Rs. 6,000	
Direct labour (Rs. 7 × 400 Direct labour hours)	2,800	
Setups (Rs. 50 × 100 hours) + (Rs. 8 × 25 hours)	5,200	
Machining (Rs. 1 × 4,000 machine hours)	4,000	18,000
Income change		Rs. 2,000

Special orders need to be examined carefully before acceptance. The order offers an increase in income of Rs. 20,000, but it does require expansion of the setup activity capacity – perhaps a recurring annual commitment of Rs. 5,000 for the future, unless there is some certainty that such special orders will be forthcoming in future years as well.

The special order may be accepted, as the company is suffering from idle capacity. Other strategic factors need to be considered. These include —

- Will this order affect any regular sales?
- Is the company looking for a permanent solution to its idle-capacity or are special orders becoming a habit-a response pattern that may eventually prove disastrous?
- Will acceptance adversely affect the company's normal distribution channels?
- Will it be an opportunity for the company to explore the new market for its other products?
- Can this be taken as the company's penetration pricing policy for the new market?
- Any reaction from competitors in the new market?

Answer 16. (b)

The special order needs only 25 setup hours, whereas the company has 50 hours of excess setup capacity. In this case there will be no need for expansion of capacity with attendant increase in fixed costs. So, the total incomes will increase by Rs. 7,000 if the order is accepted.

Q. 17. The operating result of Sona Ltd. For the previous year was as under :

	Sales Mix	
Product	% of Mix	P. V. ratio
A	40	20
B	10	6
C	30	12
D	20	10
	100	

Total sales value of the products was Rs. 80 lakhs.

Total fixed overhead amounted to Rs. 10 lakhs. The Raw material content, which is entirely imported, is 50% of the respective variable cost of the item.

The forecast of the year just started are as under :

(i) The raw material cost will go up by 10%.

(ii) The raw material availability will be restricted to Rs. 35 lakhs from the imported source.

(iii) **The maximum potential sales of any of the four products in the current year is 40% of the total sale value of the previous year.**

(iv) **In the sale price of the products there will be an uniform 5% increase.**

You are required to :

(a) **Prepare statement of probability for the previous year.**

(b) **Set a product mix with maximize profit for the current year and prepare a statement showing forecast profitability for the current year.**

Answer 17.

Profitability (previous year)

Product	Sales Mix	Sales value	PV Ratio	Contribution	Raw Material at 50% of (1-p/v)%	Contribution as % of RM	Rank
(1)	(2) %	(3) Rs.	(4) %	(5) Rs.	(6) Rs.	(7)	(8)
A	40	32,00,000	20	640,000	1,280,000	50.00	1
B	10	800,000	6	48,000	376,000	12.76	4
C	30	2,400,000	12	288,000	1,056,000	27.27	2
D	20	1,600,000	10	160,000	720,000	22.22	3
	100	8,000,000		1,136,000			
Less : Fixed Expenses				1,000,000			
				136,000			

Product mix at previous year's cost and prices to maximize profit.

Product	Sales %	Sales value	Variable cost	Raw material with 10% income
(9)	(10)	(11) Rs.	(12) Rs.	(13)
A	40% (max)	3,200,000	2,560,000	1,408,000
B	—	—	—	—
C	40% (max)	3,200,000	2,816,000	1,548,800
D	20% (Restricted)	1,600,000	1,440,000	792,000
		8,000,000		3,748,800

* at relative (1-p/v ratio)

Taking Raw material as key factor (availability Rs.35 lakhs) optimum product mix.

Product	Sales	Value (Rs.) at	Raw material previous year prices	Increase in sales prices by 5%
(14)	(15)	(16)	(17) Rs.	(18) Rs.
A	40%	3,200,000	1,408,000	3,360,000
B	—	—	—	—
C	40%	3,200,000	1,548,800	3,360,000
D	Balance	1,097,374	(bal) 543,200	1,152,243
			3,500,000	7,872,243

Profitability (current year)

Product (19)	Sales (20) Rs.	Raw material (21) Rs.	Variable cost (22) Rs.	Total variable cost (23) Rs.	Contribution (24) Rs.
A	3,360,000	1,408,000	1,280,000	2,688,000	672,000
B	—	—	—	—	—
C	3,360,000	1,548,800	1,408,000	2,956,800	403,200
D	1,152,243	543,200	493,819	1,037,018	115,225
Total:	7,872,243	3,500,000	3,181,819	6,681,818	1,190,425
Less:	Fixed expenses				1,000,000
	Profit :				**1,90,425**

Q. 18. As a cost auditor of a company manufacturing electric lamps, you collect the following information.

		2009-10	2008-09
Production of Fluorescent lamps	**(in million pieces)**	**120**	**115**
Glass Tubes used	**(in million pieces)**	**140**	**126**
Cost per Glass Tube	**(in Rupees)**	**2.67**	**2.54**

The glass tubes are manufactured by the company. You note that wastages of glass tubes, due to breakage and other causes cannot be entirely avoided by the company, particularly in such a mass production. The usage figures relating to glass tubes include wastages and one finished lamp requires only one glass tube. Wasted glass tubes are added to raw materials fed into furnace and is used for subsequent glass tube production and is known as 'cullet'. Credit for such cullet is given to the cost of lamps at the standard rate of Rs. 2.75 per kg. Each glass tube is assumed to have a standard weight of 250 gms., for purposes of this calculation. The standard rate and standard weight is same in both the years.

As you are aware, para 6 of the Annexure to the Cost Audit Report requires the cost auditor to comment on the material usage.

With the above available information prepare your analysis and comments under that para in your report of that cost audit.

Answer 18.

Analysis :

		2009-10	2008-09
Usage for 100 lamps	(Tubes/production cost per tube)	116.67	109.57
Imput cost	(Usage × cost per tube)	311.51	278.31
Cullet qty. in kg.	(Usage – 100) × 0.25	4.17	2.39
Credit for cullet	(Qty. × Rs. 2.75)	11.47	6.57
Net Material cost	(Input cost – Cullet Credit)	300.04	271.74
Cost per tube	(Data given)	2.67	2.54
Material Cost Variance	(300.04 – 271.74)	29.30	

If the usage for both year had been the same, the higher cost of production of glass tubes would have resulted in an increase of (0.13/2.54) × 271.74 or 13.91.

Therefore usage variance, as compared to the earlier year has been responsible for cost increase of 29.30 - 13.91 or Rs. 15.39.

Comments : The increase in cost of manufacture of glass tubes is about 5%. This may not be unreasonable considering that fuel costs are quite significant in manufacture of glass tubes, as it involves melting of materials for glass.

The usage of glass tubes is higher than the previous year by more than 6% as it has gone up from about 109.6 to 116.7. It therefore seems worthwhile to monitor such variations more closely to identify the major reasons for such increase to enable corrective action.

Q. 19. Indo Gulf Fertilizers Ltd. supports the concept of the terotechnology or life cycle costing for new investment decisions covering its engineering activities.

The company is to replace a number of its machines and the Production Manager is to run between the "X" machine, a more expensive machine with a life of 12 years, and the "W" machine with an estimated life of 6 years. If the "W" machine chosen it is likely that it would be replaced at the end of 6 years by another "W" machine. The pattern of maintenance and running costs differs between the two types of machine and relevant data are shown below :

(Rs.)

Particulars	X	W
Purchase price	19,000	13,000
Trade-in-value	3,000	3,000
Annual repair costs	2,000	2,600
Overhead costs (in 8th & 4th year respectively)	4,000	2,000
Estimated financing costs averaged over machine life (p.a.)	10%	10%

You are required to recommend, with supporting figures, which machine to purchase, stating any assumptions made.

Answer 19.

Machine X – Life 12 years

	Year	Cost (Rs.) factor	Discountcost (Rs.)	Discounted
Purchase price	0	19,000	1 .00	19,000
Overhead cost	8	4,000	0.47	1,880
Trade-in-value	12	(3,000)	0.32	(960)
Annual repair cost	1-12	2,000	6.81	13,620
				33,540

Annualized equivalent =   Rs. 33,540/ 6.81 =   Rs. 4,925

Machine W – Life 6 years

	Year	Cost (Rs.)	Discount factor	Discounted cost (Rs.)
Purchase price	0	13,000	1 .00	13,000
Overhead cost	4	2,000	0.68	1,360
Trade-in-value	6	(3,000)	0.56	(1,680)
Annual repair cost	1-6	2,600	4.36	11,336
				24,016

Annualised equivalent = Rs. 24,016/ 4.36 = Rs. 5,508.

Recommendation – Purchase Machine "X"

Assumptions :

(a) Same performance, capacity and speed

(b) No inflation

(c) 12 year-estimates are as accurate as 6-years estimates

(d) Cash flow at the year end.

Q. 20. (a) A factory engaged in manufacturing plastic buckets is working at 40% capacity and produces 10,000 buckets per month. The present cost break-up for one bucket is as under :

Materials	**Rs. 20**
Labour	**Rs. 6**
Overheads	**Rs. 10 (60% fixd)**

The selling price is Rs. 40 per bucket. If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity, the selling price falls by 5% accompanied by a similar fall in the price of materials.

You are required to prepare a statement showing the profits at 50% and 90% capacities and also determine the break-even points at each of these production levels.

(b) What is target costing and what are the stages to the methodology?

Answer 20. (a)

Capacity level	40% Present	50%	90%
Production and sales (units)	10,000	12,500	22,500
Selling price (Rs.)	40.00	38.80	38.00
Sales (a)	4,00,000	4,85,000	8,55,000
Variable cost			
Materials @ Rs. 20 for 40% & 50%, @19 for 90%	2,00,000	2,50,000	4,27,500
Labour @ Rs. 6	60,000	75,000	1,35,000
Variable overheads (Rs. 10 ×40/100)	40,000	50,000	90,000
Total (b)	3,00,000	3,75,000	6,52,500
Contribution (a) – (b)	1,00,000	1,10,000	2,02,500
Less : Fixed overheads @ (Rs. 10 ×60/100 ×10,000 units)	60,000	60,000	60,000
Profit	40,000	50,000	1,42,500
Contribution per unit	10.00	8.80	9.00
Break even point (units) =	6,000	6,818	6,677

Answer 20. (b)

Target costing is defined 'as a cost management tool for reducing the overall cost of a product over its entire life cycle with the help of the production, engineering, R&D.'

The target cost is the estimated cost of a product that enables a company to remain and compete in the market in the long run. The idea of target costing, originally promoted in Japan, is about going upstream to achieve cost reduction. Target costing is not really a method of costing, but it is a technique used in cost management. The intent of target costing is to reduce cost, where reduction is aimed at the entire life cycle

of any product. Target costing can also help in achieving certain broader objectives, such as, identifying and delivering various customer requirements in a product through effective management of different processes.

A firm's business plan and product market strategies provide the framework and basic guidelines for applying the target costing methodology. Specific steps involved in target costing may be summarized as follows :

- Determine customer wants precisely.
- Translate them into desired product performance feature.
- Estimate the proportion of value added by each feature and component.
- Choose a product design assures a targeted profit, and cost targets for each component in total.
- Choose manufacturing design that assure targeted costs.
- Choose suppliers that assure buying at targeted costs.
- After each cost review, conduct value engineering to reduce target costs.
- Monitor initial production to be sure that all product performance, cost, profit, targets are met.

Q. 21. (a) "Purpose of sensitivity analysis is to identify the critical variable in the project analysis" — Discuss !

(b) Vishal Ltd., has estimated the following sales and profit of a new product which it may decide to launch on to the market.

	Rs.	Rs.
Sales (4,000 × Rs. 4)		**16,000**
Variable Cost-materials	8,000	
Variable Cost-labour	4,000	12,000
		4,000
Incremental Fixed Costs		3,200
Profit		800

Make a Sensitivity Analysis based on the above data.

Answer 21. (a)

Sensitivity analysis is a term used to describe any technique whereby decision options are tested for their vulnerability to changes in any "variable" such as expected sales volume, selling price, material costs, labour costs etc. It is used to analyse the risk in short-term decision opportunities.

The useful approaches to sensitivity analysis are :

(i) The best possible / worst possible approach,

(ii) To estimate by how much costs and revenue would need to differ their estimated values before the decisions would change,

To estimate whether a decision would change if estimated costs are x% higher than the estimated, or estimated revenues are y% lower than the estimated.

Answer 21. (b)

A Sensitivity analysis can be made as follows :

(i) If increment fixed costs are more than 25% above the estimate, the project will make a loss,

(ii) If unit costs of material are more than 10% (i.e. over Rs. 8,800) the project will make a loss,

Similarly, if labour costs increase by more than 20% above the estimate, the project will make a loss,

   (iv) If selling price is reduced by more than 5%, the project will make a loss,

   (v) If sales are reduced more than 20% of estimated sales of 4,000 units, the project will make a loss.

Out of the above, the selling price is most sensitive as for the slight reduction by just more than 5% will make a project loss. Hence, this area requires more attention (in the form of market research, etc.)

Q. 22. **X ltd.is considering the purchase of a new computer controlled packing machine to replace the two machines which are currently used to pack product y. The new machine would result in reduced labour costs because of more automated nature of the process and in addition, would permit production levels to be increased by creating greater capacity at the packing stage. With an anticipated rise in the demand for product y, it has been estimated that the new machine will lead to increase profits in each of the next three years. Due to uncertainty in demand, however, the annual cash flows (including savings) resulting from purchase of the new machine cannot be fixed with certainty and have therefore been estimated probabilistically as follows :**

Annual Cash Flows (Rs. '000)

Year 1	Prob.	Year 2	Prob.	Year 3	Prob.
10	0.3	10	0.1	10	0.3
15	0.4	20	0.2	20	0.5
20	0.3	30	0.4	30	0.2
		40	0.3		

Because of the overall uncertainty in the sales of product y, it has been decided that only 3 years cash flows will be considered in deciding whether to purchase the new machine. After allowing for the scrap value of the existing machines, the net cost of the new machine will be Rs.42,000. ignore tax.

Required **:**

   (i) **On the basis of the average cash flow for each year, calculate the net present value of the new machine, given company's cost of capital is 15% and the present value of Re.1 at 15% discount rate are as follows :**

Year	1	2	3	4	5
P.V	0.8696	0.7561	0.6575	0.5718	0.4972

Answer 22.

   (i) **Expected cash flow.**

   Year 1 Expected cash flow = 10*0.3+15*0.4+20*0.3 =   15(000)

   Year 2 Expected cash flow = 10*0.1+20*0.2+30*0.4+40*0.3 =   29(000)

   Year 3 Expected cash flow = 10*0.3+20*0.5+30*0.2 =   19(000)

   Present cash flow = 15*0.8696+29*0.7561+19*0.6575 = 47.4634 (Rs.000)

   The NPV of the new machine =Rs. (47463-42000) = Rs. 5463.

Q. 23. **A company has developed a special purpose Electronic Device Ltd. and once introduced in the market, the same expected to have a life cycle of 3 years from the time of its introduction in the market before the device becomes obsolete due to technological advancement of other competitive products.**

You have been asked by the company to prepare a product life cycle budget.

	Year 1	Year 2	Year 3
No of units to be manufactured and sold	50,000	2,00,000	1,50,000
Price per device (Rs)	500	400	350
R & D and Design Cost	9,00,000	1,00,000	nil
Production Cost			
Variable Cost per unit (Rs)	200	150	150
Fixed Cost (Rs)	70,00,000	70,00,000	70,00,000
Marketing Cost			
Variable Cost per unit (Rs)	100	70	60
Fixed Cost (Rs)	30,00,000	25,00,000	25,00,000
Distribution Cost			
Variable Cost per unit (Rs)	50	50	50
Fixed Cost (Rs)	10,00,000	10,00,000	10,00,000

Prepare the budget life cycle operating profit.

It has been further indicated that if a discount of 10% is given to customers, the units to be sold per year will increase by 5%.Would you recommend introduction of such discount?

(b) **Explain the concept of Learning Curve and State how relevant is the same in managing cost.**

Answer 23. (a)

Preparation of Budgeted Life Cycle Operating Profit

Rs in lacs

	Year I	Year II	Year III	Life Cycle
Sales Revenue	250.00	800.00	525.00	1575.00
R & D, Design Cost	9.00	1.00		10.00
Production Cost				
Variable Cost	100.00	300.00	225.00	625.00
Fixed Cost	70.00	70.00	70.00	210.00
Marketing Cost				
Variable Cost	50.00	140.00	90.00	280.00
Fixed Cost	30.00	25.00	25.00	80.00

Distribution Cost

Variable Cost	25.00	100.00	75.00	200.00
Fixed Cost	10.00	10.00	10.00	30.00
Operating Profit	**(44.00)**	**154.00**	**30.00**	**140.00**

Operating Result if discount given

Revised Sales Revenue   Rs. (in lacs)

Year I	(50,000×105%) × 450 =	236.25
Year II	(2,10,000×105%) × 360 =	756.00
Year III	1,05,000×105%) × 315 =	496.12
		1488.37

Budgeted Life Cycle Operating Profit 15% increase in sales & 10% discount to customers)

Rs in lacs

	Year I	Year II	Year III	Life Cycle
Sales Revenue	236.25	756.00	496.12	1488.37
R & D, Design Cost	9.00	1.00		10.00
Production Cost				
Variable Cost	105.00	315.00	236.25	656.25
Fixed Cost	70.00	70.00	70.00	210.00
Marketing Cost				
Variable Cost	52.50	147.00	94.50	294.00
Fixed Cost	30.00	25.00	25.00	80.00
Distribution Cost				
Variable Cost	26.25	105.00	78.75	210.00
Fixed Cost	10.00	10.00	10.00	30.00
Operating Profit	**(66.50)**	**83.00**	**(18.38)**	**(1.88)**

The second alternative is not acceptable, as that would result in overall loss during the life cycle.

Answer 23. (b)

The first time when any operation is carried out it takes little bit of extra time and the time taken goes on decreasing during the subsequent operations as the workmen become more and more familiar to the operations.This process of decline in time taken will continue for some time and the labour cost p.u comes down. This is the concept of working out the learning curve.

The Learning Curve is relevant in managing cost due to the following reasons.

  (i) It is useful in analysis of cost volume profit analysis.
 (ii) It is useful in preparing budgeting, price fixation and profit planning.
(iii) It is useful in negotiating price with a customer based on volume of offtake.
 (iv) It is useful in performance evaluation.

Q. 24. (i) What is lean manufacturing? Briefly describe the lean/JIT system.

(ii) Explain how adoption of JIT affects profitability of an organization.

Answer 24. (a)

Just in time (JIT) philosophy was first developed in Japan. Toyota introduced it in 50's and later, other companies in Japan have adopted it.

The overriding feature of JIT is that materials or parts are generated in the exact quantity required and just at the time they are needed. A classic JIT system consists of a series of manufacturing units each delivering to one another in successive stages of production. The amount delivered by each unit to the next unit is exactly what the needs for the next production period (usually one day). There are no safety margins in the form of buffer stock, live storage or work-in-progress. JIT is a sophisticated approach in eliminating wastage in the process of manufacturing in different stages, say, from the production design stage to the stage of delivery of finished product. JIT is sometimes regarded as an inventory control technique or a purchasing method. It aims at eliminating all activities which do not add 'value' to the product.

JIT seeks to achieve the following goals :

- Elimination of non value added activities
- Zero inventory
- Zero defects
- Batch size of one
- Zero Breakdown
- A 100% on time delivery service

Schonberger defines JIT as being 'to produce and deliver finished goods just in time to be sold, sub assemblies just in time to be assembled into finished goods, fabricated parts just in time to go into sub assemblies and purchased materials just in time to be transformed into fabricated parts'.

Answer 24. (b)

The introduction of a JIT system can be expected to affect profit as follows :

- There will be a reduction in inventory holding costs since inventories of raw materials and finished goods will be eliminated.
- There will probably be an increase in the price paid for raw materials to compensate the supplier for the additional flexibility that they are required to offer.
- There may be cost increase as a result of peaks and troughs of demand which cause fluctuating production levels and results in high labour costs through overtime.
- More management time may be spent on planning the resource utilization rather than on making strategic decisions to improve the profitability.

Q. 25. (a) Your Company has estimated the unit variable cost of a product to be Rs.10 and the selling price is Rs.15 per unit. Budgeted sales for the year are 20,000 units.

Estimated fixed costs are as follows :

Fixed cost per annum	probability
Rs. 50,000	0.1
60,000	0.3
70,000	0.3
80,000	0.2
90,000	0.1

What is the probability that the company will equal or exceed its target profit of Rs.25, 000 for the year?

(b) (Sensitivity to changes in the levels of plant value, running costs and saving of a project) x ltd. Is considering a project with the following cash flows :

Year	purchase of plant	running cost	savings
0	Rs. (7,000)		
1		Rs. 2,000	Rs. 6,000
2		Rs. 2,500	7,000

The cost of capital is 8%. Measure the sensitivity of the project to changes in the levels of Plant Value. Running Costs and Savings (Considering each factor at a time) such that Net Present Value becomes zero. Which factor is more sensitive to affect the acceptability of the project. The present value factors at 8% are as follows:

Year	Factor
0	1,00
1	0.93
2	0.86

Answer 25. (a)

Budgeted sales for the year	20,000 units
Budgeted contribution per unit	Rs.15 - Rs.10=Rs.5
Budgeted total contribution =20,000 × Rs.5	Rs.1, 00,000
Target profit	25,000
Maximum fixed cost to meet the target	75,000

The probability of fixed cost of Rs.75,000 will be = 0.1 + 0.3 + 0.3 = 0.7

Answer 25. (b)

Present value of cash flows :

Year	Discount factor at 8%	PV of Plan cost	PV of Running cost	PV of Savings	NPV
0	1.00	(Rs,7000)	–	–	(Rs.7,000)
1	0.93		(Rs.1,860)	Rs.5,580	3,720
2	0.86		(2,150)	6,020	3,870
		(Rs.7,000)	(4,010)	11,600	NPV 590

The project has positive NPV and therefore may be accepted. The changes in cash flows which would need to occur before the project just breaks-even (NPV = 0)

Sensitivity Analysis (Variation of PV of Rs.590)

(1) The plant cost would need to increase by viz.(Rs.590 / 7,000) × 100 = 8.4%

(2) The running cost would need to increase by (590 / 4,010) × 100 = 14.7%

(3) Savings will fall short by: (590 / 11,600) × 100 = 5.1%

Savings is therefore more sensitive to affect the accountability of the project.

Q. 26. P, Q, R and S are the four types of products that appear in the price list of a company with a note that a particular item or items may not be available on demand. The demand for the products is more than what the company can supply and non-supply of any of them will have no effect on the demand for the rest.

For the calendar year 2010, the company has made the following tentative budget that will use up all the available supplies of materials and labour in that year.

A linear programming was made by the company's accountant who stated that the opportunity costs or the shadow price came to Rs.2.50 per labour hour and Rs.16.25 per kg. of material. He also suggested the product-mix which has since been forgotten. The accountant has left the company. the company now asks you as their Management Consultant to give your opinion about the budgeted programme.

Data from the tentative budget for 1998 :

Product	P	Q	R	S
Production/sales units	1000	1200	1600	800
Selling price per unit (Rs.)	100	130	120	150
Variable cost per unit (Rs.)	60	80	50	70
Labour hours per unit	3	4	2	5
Material usage per unit (kg.)	2	3	4	5

(a) Determine the optimal sales mix for the company.

(b) What difference the sales mix in (a) will make from that in the tentative budget in respect of contribution?

Answer 26.

(a) The total labour hours available :

= (1,000 × 3) + (1,200 × 4) + (1,600 × 2) + (800 × 5) = 15,000 hours.

The total available material :

= (1,000 × 2) + (1,200 × 3) + (1,600 × 4) + (800 × 5) = 16,000 kg.

Table comparing opportunity cost with contribution

Product	Labour	Material	Opportunity cost* Labour @ Rs. 2.50	Material @ Rs. 16.25	Total	Contribution (S.P. – V.C.)	Difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)	8 = (7) – (6)
P	3	2	Rs.7.50	Rs. 32.50	Rs. 40.00	Rs. 40.00	Rs. 0.00
Q	4	3	10.00	48.75	50.00	50.00	(-) 8.75
R	2	4	5.00	65.00	70.00	70.00	0.00
S	5	5	12.50	93.75	80.00	80.00	(-) 13.75

* The opportunity cost has been arrived at by multiplying the quality of resources used by its shadow price. Now in case of Q and S opportunity cost is more than the contribution so it can be omitted (or not produced), because benefit forgon is more than the contribution.

For evaluation of R and S, following equation can be formed :

3 P + 2 R = 15,000	…. (i)	(for labour constraint)	
2 P + 4 R = 16,000	…. (ii)	(for material constraint)	

From (i) and (ii), we get

P = 3,500 units;

and   R = 2,250 units

Therefore, optimal sales mix is :

P = 3,500 units and R = 2,250 units

It will give contribution of:

(3500 × Rs.40) + (2250 × Rs.70) = Rs.2, 97,500

(b) The tentative budget will make all the four products and it will give a contribution of :

P - 1,000 units × Rs.40 = Rs. 40,000

Q - 1,200 units × Rs.50 =   60,000

R – 1,600 units × Rs.70 =   1,12,000

S -   800 units × Rs.80 =   64,000

Total contribution   2,76,000

It is clear that budget based on shadow prices of constrained resources (labour and material) will give an extra contribution of Rs.21,500 *i.e.,* (Rs. 2,97,500 – Rs. 2,76,000).

Note : The shadow prices of constrained resources represent the opportunity cost, *i.e.,* benefits forgone, if the production is undertaken. Therefore, the products, where the opportunity cost in more than the contribution will not be produced.

Q. 27. (a) Write a note on Total Quality Management.

(b) Differentiate between Quality Planning, Quality Control & Quality Improvement.

Answer 27. (a)

Quality is considered a by-product of the manufacturing system, i.e. each individual process has some variation that will lead to the production of some defective units. If the resulting defective rate is too high, compared to the established quality standards, quality inspectors will identify and send them back for rework. The approach is expensive and does not guarantee the desired quality, because quality maintenance and ensuring it self can not be inspected into a product. This approach assigns the responsibility for quality to quality control managers.

A more unlighted approach to quality emphasizes building quality into the product by studying and improving activities that affect quality, from marketing through design to manufacturing. This new approach is referred to as Total Quality Management (TQM).

It is an active approach encompassing a company-wide operating philosophy and system for continious improvement of quality. It demands co-operation from everyone in the company, from the top management down to workers.

The principles of TQM are as follows :

  (i) Customer focus,
 (ii) Managerial Leadership,
(iii) Belief in continious improvement.
 (iv) The current thinking on TQM is moving from Quality of product and service to Quality of people to embrace also Quality of environment. ISO 14000 standard supports this.

Answer 27. (b)

Difference between Quality Planning, Quality Control & Quality Improvement :

Quality Planning	Quality Control	Quality Improvement
Determine who are the Customers	Choose control subjects what to control?	Establish the infrastructure needed to secure annual quality improvement
Determine the neds ofthe Customers	Choose units of measurements- Evaluate Measurements	Identify the specific needs for improvement- the improvement projects
Develop product features that respond to the customer's needs.	Establish standards of performance	For each project establish a project team with clear responsibility forbringing the project to a successful conclusion
Develop processes that areable to product feature	Measure actual performance	Provide the resources, motivation and training needed by the teams to :
Transfer the resulting plans to the operating forces.	Interpret the difference (actual versus standard)	Diagnose the causes
	Take action on difference	Stimulate establishment of a remedy
		Establish controls to hold the gains

Q. 28. Write Short Notes on :

    (a) **Value Analysis**

    (b) **Supply Chain Management**

    (c) **Decision Tree**

    (d) **Theory of Constraint**

    (e) **Balance Score Card**

    (f) **Value Chain Management**

Answer 28. (a)

Value Analysis defines a basic function as anything that makes the products work or sell. A function that is defined as basic control change. Secondary functions, also called supporting functions, described the manner in which basic functions were implemented. Secondary function could be modified or eliminated to reduce product cost. The term value has four different meanings : Cost Value, use value, esteem value and exchange value. The first step in the value analysis process is to define the problem and its scope. Once this is done, the functions of the product and its items are derived. These functions are basic and secondary functions. A cost function matrix or value analysis matrix is prepared. Improvement Opportunities are then brainstormed, analysed and selected.

Answer 28. (b)

Supply Chain Management- Supply Chain Management encompasses the planning and management of all activities involved in sourcing , procurement,conversion and logistics management activities. Supply Chain Management integrates supply and demand management within and across companies.

Five basic components of supply Chain Management are :

- Plan-Develop a strategy for managing all resources that go towards meeting customer demand.
- Source-Choose the supplier
- Make-Schedule activities for Production.
- Deliver- Coordinate receipt of order to delivery
- Return-Receive Defectives and excess

Answer 28. (c)

Decision Tree-Decision Tree is a tool which helps to choose between several courses of action. It provides a highly effective structure within which options can be laid out and the possible outcomes of choosing those options can be investigated. It also helps to form a balanced picture of the risks and rewards associated with each possible course of action.

Answer 28. (d)

Theory of Constraint :

It describes methods to maximize operating income when faced with some bottleneck and some non-bottleneck operations. It defines three measuremnts :

(a) Throughput contribution, equal to sales revenue minus direct materials cost.

(b) Investments (inventory), equal to the sum of materials cost of direct materials inventory, W.I.P inventory and finished good inventory; R & D costs and costs of equipment and buildings.

(c) Operating costs, equal to all operating costs (other than direct materials) incurred to earn throughput contribution. Operating costs include salaries and wages, rent, utilities and depreciation.

Increasing throughput and/or decreasing inventory or operating expenses should lead to the accomplishment of the firm's goal; to make money now and in future as well. Anything that prevents a firm from reaching this goal is labeled as a constraint (in the form of capacity, material, the market (demand), behaviour or even management policy).

Theory of Constraint thinking regards all progress toward the goal of making money as relating directly to management attention toward the constraint(s).

The five focusing steps are a tool developed to help systems deal with constraints: Step (i) Identify the system's constraints,

Step (ii) Decide how to exploit the system's constraints,

Step (iii) Subordinate everything else to the decisions made in step (ii), Step (iv) Elevate the system's constraints,

Step (v) If a constraint is broken in step (iv), go back to step (i), but do not allow inertia to cause a new constraints

Answer 28. (e)

Balanced Score Card :

Balanced Score Card is a performance management and strategy development methodology that helps executives translate on organization's mission statement and overall business strategy into specific, qualifiable goals and monitors the organization's performance in terms of these goals. Balanced Score Card also aligns budgets to strategy and helps in developing an enterprise performance management system.

It is a set of financial and non-financial measures relating to company's critical success factors. As a management tool it helps companies to assess overall performance, improve operational processes and enable management to develop better plans for improvements. It offer managers a balanced view of their organization upon which they can base real change.

Balanced Score Card has the following four perspectives:

(a) *Customer perspective* :

To achieve the company's vision and strategy how should the company appear its customer?

(b) *Internal busines performance* :

To satisfy the company's sharehloders and customers and what business processes must the company excel?

(c) *Learning and growth perspective* :

To achieve the vision; how will the company sustain its ability to change and imrpove?

(d) *Financial perspective* :

To succeed financially how should the company appear to the company's share holders?

Answer 28. (f)

Value Chain Management :

Value chain management (VCM) is a solution for smoothening the interaction between all partners of an enterprise, suppliers, dealers, bankers etc. VCM goes beyond supply chain management to bring synergy between business partner by way of providing business and knowledge information in the effective manner to help achieve business targets. There are three kinds of partners among whom a company try to build synergy.

• One is the normal supply chain management partners – suppliers, suppliers to suppliers, dealers, customers etc.

• The second important partner category is the transporter who transports raw material and finished goods. The transporters play an important role in value chain.

• The third important category of partners are service providers and banks

Q. 29. Write Short Notes on :

   (i) Zero Defects and Right First Time-Philip Crosby

  (ii) Enterprise Risk Management

 (iii) Aggregate Planning

  (iv) ERP

   (v) Management Control System

  (vi) Quality Function Deployment

Answer 29. (i)

'Zero Defects' & "Right First Time" — Philip Crosby :

Philip Crosby prompted the phrases, "Zero Defects" does not mean mistakes never happen, rather than there is no allowable number of errors built into a product or process and that it is to be got right first time. He believes that management should take prime responsibility for quality and worker only follow their managers' example.

His four absolute quality management criteria are :

 (i) Quality is conformance to requirements,

 (ii) Quality prevention is preferable to quality inspection,

(iii) Zero defects is the quality performance standard,

 (iv) Quality is measured in monetary terms—the price of non-conformance.

Steps to quality improvement :

  (i) Committed to quality,

  (ii) Creation of quality improvement teams representing all the departments,

 (iii) Measure processes to determine current and potential quality issues,

 (iv) Calculate cost of (poor) quality,

  (v) Raise quality awareness of all employees,

 (vi) Take action to correct quality issues,

(vii) Monitor progress of quality improvement,

(viii) Train supervisors in quality improvement,

 (ix) Hold "Zero Defects" days,

  (x) Encourage employees to create their own quality improvement goals,

 (xi) Encourage employee communication with management about obstacles to quality,

(xii) Recognize participants' effort,

(xiii) Create quality councils,

(xiv) Do it all over again — quality improvement does not end.

Answer 29. (ii)

Enterprise Risk Management :

As the field of risk management expanded to include managing financial, environmental, and technological risks, the role of risk managers grew to encompass an organization-wide approach known as enterprise risk management (ERM). This approach seeks to implement risk awareness and prevention programs throughout a company, thus creating a corporate culture, able to handle the risks associated with a rapidly changing business environment.

Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel. It is being applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.

The underlying premise of enterprise risk management is that every entity exists to provide value for its stakeholders. All entities face uncertainty, and the challenge for management is to determine how much uncertainty to accept as it strives to grow stakeholder value. Uncertainty presents both risk and opportunity, with the potential to erode or enhance value. Enterprise risk management enables management to effectively deal with uncertainty and associated risk and opportunity, enhancing the capacity to build value.

Value is maximized when management sets strategy and objectives to strike an optimal balance between growth and return goals and related risks, and efficiently and effectively deploys resources in pursuit of the entity's objectives.

Answer 29. (iii)

Aggregate planning is an operational activity that does an aggregate plan for the production process, in advance of 2 to 18 months, to give an idea to management as to what quantity of materials and other resources are to be procured and when, so that the total cost of operations of the organization is kept to the minimum over that period.

The quantity of outsourcing, subcontracting of items, overtime of labour, numbers to be hired and fired in each period and the amount of inventory to be held in stock and to be backlogged for each period are decided. All of these activities are done within the framework of the company ethics, policies, and long term commitment to the society, community and the country of operation.

Aggregate planning has certain prerequired inputs which are inevitable. They include :

- Information about the resources and the facilities available.
- Demand forecast for the period for which the planning has to be done.
- Cost of various alternatives and resources. This includes cost of holding inventory, ordering cost, cost of production through various production alternatives like subcontracting, backordering and overtime.
- Organizational policies regarding the usage of above alternatives.

"Aggregate Planning is concerned with matching supply and demand of output over the medium time range, up to approximately 12 months into the future. Term aggregate implies that the planning is done for a single overall measure of output or, at the most, a few aggregated product categories. The aim of aggregate planning is to set overall output levels in the near to medium future in the face of fluctuating or uncertain demands.

The following procedure is generally adopted in the process of aggregate planning —

- Determine Demand for each period
- Determine Capacity for each period
- Identify company,departmental and union policy
- Determine Unit cost of production
- Develop alternative Plans
- If satisfactory plans emerge, select the one that best satisfies the objective.

Answer 29. (iv)

ERP – Enterprise resource planning (ERP) refers to a computer information system that integrates all the business activities and processes throughout an entire organization. ERP systems incorporate many of the features available in other types of manufacturing programs, such as project management, supplier management, product data management, and scheduling. The objective of ERP is to provide seamless, real-time information to all employees throughout the enterprise. Companies commonly use ERP systems to communicate the progress of orders and projects throughout the supply chain, and to track the costs and availability of value-added services.

ERP systems offer companies the potential to streamline operations, eliminate overlap and bottle-necks, and save money and resources. But ERP systems are very expensive and time-consuming to implement, and surveys have shown that not all companies achieve the desired benefits. According to the online business resource Darwin Executive Guides, it is "a tall order, building a single software program that serves the needs of people in fi nance as well as it does the people in human resources and the warehouse... To do ERP right, the ways you do business will need to change and the ways people do their jobs will need to change too. And that kind of change doesn't come without pain."

Answer 29. (v)

Management Control System – Joseph Maciariello & Calvin Kirby have defined M.C.S. as follows MCS is a set of inter-related communication structures that facilitates the processing of information for the purpose of assisting managers in coordinating the parts and attaining the purpose of an organization on a continuous basis.

They view "the entire organization as a control system. 'Control' is seen as a characteristic of a control system; it occurs when the organization is attaining its purpose. Purpose and attainment of purpose are central to the work of control system."

Purposes of MCS, according to them are :

1. Coordination of parts of organization

2. Steering those parts to achieve organizational goals.
3. Bring along unity out of the diverse activities of an organization.

Answer 29. (vi)

Quality Function Deployment – Quality Function Deployment (QFD) is a structured approach to defining customer needs or requirements and translating them into specific plans to produce products to meet those needs. The "voice of the customer" is the term to describe these stated and unstated customer needs or requirements. The voice of the customer is captured in a variety of ways : direct discussion or interviews, surveys, focus groups, customer specifications, observation, warranty data, field reports, etc. This understanding of the customer needs is then summarized in a product planning matrix or "house of quality". These matrices are used to translate higher level "what's" or needs into lower level "how's" — product requirements or technical characteristics to satisfy these needs.

While the Quality Function Deployment matrices are a good communication tool at each step in the process, the matrices are the means and not the end. The real value is in the process of communicating and decision-making with QFD. QFD is oriented toward involving a team of people representing the various functional departments that have involvement in product development: Marketing, Design Engineering, Quality Assurance, Manufacturing/Manufacturing Engineering, Test Engineering, Finance, Product Support, etc.

The active involvement of these departments can lead to balanced consideration of the requirements or "what's" at each stage of this translation process and provide a mechanism to communicate hidden knowledge - knowledge that is known by one individual or department but may not otherwise be communicated through the organization. The structure of this methodology helps development personnel understand essential requirements, internal capabilities, and constraints and design the product so that everything is in place to achieve the desired outcome - a satisfied customer. Quality Function Deployment helps development personnel maintain a correct focus on true requirements and minimizes misinterpreting customer needs. As a result, QFD is an effective communications and a quality planning tool.

Q. 30. Write Short Notes on :
   (a) Distribution Requirement Planning
   (b) KAIZEN Costing
   (c) Five S Concept
   (d) Six Sigma
   (e) PDCA

Answer 30. (a)

Systematic process for determining which goods, in what quantity, at which location, and when are required in meeting anticipated demand. This inventory related information is then entered into a manufacturing requirements planning (MRP-I) system as gross requirements for estimating input flows and production schedules.

A supply channel is composed of three structures. At one end of the channel is the manufacturer. The manufacturer focuses on the development and production of products and originates the distribution process. The terminal point in the channel is the retailer who sells goods and services directly to the customer for their personal, non-business use. In between the two lies a process called distribution.

Distribution involves a number of activities centered around a physical flow of goods and information. At one time the term distribution applied only to the outbound side of supply chain management, but it now includes both in bound and outbound. Management of the inbound flow involves these elements :

- Material planning and control
- Purchasing

- Receiving
- Physical management of materials via warehousing and storage
- Materials handling

Management of the outbound flow involves these elements :

- Order processing
- Warehousing and storage
- Finished goods management
- Material handling and packaging
- Shipping
- Transportation

Distribution channels are formed to solve three critical distribution problems: functional performance, reduced complexity, and specialization.

Answer 30. (b)

Kaizen Costing :

Kaizen costing is a modification of standard costing which is essential to realize the planned cost reductions in continuous time. Kaizen costing is a Japanese contribution to cost accounting. Kaizen costing is continuous improvement applied to cost reduction in the manufacturing stage of a product's life. Like that of standard costing programme, the aim of Kaizen costing is to remove inefficiencies from production processes.

Kaizen costing tracks the cost reduction plans on a monthly basis. The Kaizen costing targets are expressed in the physical resources terms. If the head of a group fails to achieve the Kaizen costing target by 1 percent, review by senior will start. Resource consumption is so tightly controlled in many Japanese firms. Thus the planned cost reductions are planned and monitored through Kaizen cost targets in terms of physical resources.

While implementing the concept of Kaizen, following few rules are to be remembered :

- List down your own problems.
- Grade your problems as to minor, difficult and major.
- Select the smallest minor problem and start with it. After tackling this, move on to next graded problem and so on.
- Know and always remember, improvement is a part of daily routine.
- Never accept status quo.
- Never reject any idea before trying it.
- Share the experiments with colleagues.
- Eliminate already tried but failed experiments, while sharing the problems with your colleagues.
- Never hide problems, always highlight them.

Answer 30. (c)

Five S Concept — Five 'S' are derived from the first letters of the words.

SEIRI — means Organization or sorting

SEITON — means straighten or prepare correctly

SEISO — means Cleanup or Cleanliness

SEIKETSU — means Standardization

SHITSUKE — means Discipline

Advantages of 5S :

By thoroughly enforcing 5S in each work area.

1. Operations can be performed without error, proceeding in a well-regulated fashion, resulting in fewer defective items thereby increasing the overall quality of product.
2. Operations can be performed safely and comfortably, reducing the chances of accidents.
3. Machinery and equipment can be carefully maintained, reducing the number of breakdowns.
4. Operations can be performed efficiently, eliminating waste thereby incrasing the efficiency and productivity.

Answer 30. (d)

Six Sigma — Six Sigma is a rigorous and a systematic methodology that utilizes information (management by facts) and statistical analysis to measure and improve a company's operational performance, practices and systems by identifying and preventing 'defects' in manufacturing and service-related processes in order to anticipate and exceed expectations of all stakeholders to accomplish effectiveness.

Six Sigma is a business management strategy originally developed by Motorola, USA in 1981. As of 2010 it enjoys widespread application in many sectors of industry, although its application is not without controversy.

Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Black Belts", "Green Belts", etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified targets. These targets can be financial (cost reduction or profit increase) or whatever is critical to the customer of that process (cycle time, safety, delivery, etc.).

The term *six sigma* originated from terminology associated with manufacturing, specifically terms associated with statistical modelling of manufacturing processes. The maturity of a manufacturing process can be described by a *sigma* rating indicating its yield, or the percentage of defect-free products it creates. A six-sigma process is one in which 99.99966% of the products manufactured are free of defects, compared to a one-sigma process in which only 31% are free of defects. Motorola set a goal of "six sigmas" for all of its manufacturing operations and this goal became a byword for the management and engineering practices used to achieve it.

Answer 30. (e)

PDCA-PDCA — ("Plan-Do-Check-Act") is an iterative four-step problem-solving process typically used in quality control. PDCA was made popular by Dr. W. Edwards Father of modern quality control; however it was always referred to by him as the "Shewhart cycle." Later in Deming's career, he modified PDCA to "Plan, Do, Study, Act" (PDSA) so as to better describe his recommendations.

The concept of PDCA comes out of the Scientific Method. The scientific method can be written as "hypothesis" - "experiment" - "evaluation" or Plan, Do, and Check. Shewhart described manufacture under "control" - under statistical control - as a three step process of specification, production, and inspection. The also specifically related this to the Scientific Method of hypothesis, experiment and evaluation. Shewhart, says that the statistician "must help to change the demand [for goods] by showing... how to close up the tolerance range and to improve the quality of goods." Clearly, Shewhart intended the analyst to take action based on the conclusions of the evaluation. PDCA has an inherent circular paradigm, it assumes that everything starts with Planning. Plan has a limited range of meaning. Shewart intended that experiments and quality control should be planned to deliver results in accordance with the specifications, which is good advice. However, Planning was not intended to cover aspects such as creativity, innovation, invention. In these aspects particularly when based upon imagination, it is often impossible or counterproductive to plan. Hence, PDCA is inapplicable in these situations.