P-17 – Strategic Performance Management
Section – A

SN 1 Conceptual Framework of Performance Management

Question No.1:

Read the following caselet and answer the following:

Food Corporation of India (FCI) was established under the Food Corporation of India Act 1964 for the purpose of trading in food grains and other foodstuffs. The Act extended to the whole of India. The Corporation acts as a body corporate. The general superintendence, direction and management of the affairs and business of the Corporation vests in a board of directors, which exercises all such powers and does all such acts and things as may be exercised or performed by the Corporation under the FCI Act.

FCI performs the major functions of procurement, storage preservation, movement, transportation, distribution and sale of food grains and meets the requirements of Public Distribution System (PDS) in the country. In other words, it handles or manages the entire supply chain in food grains distribution in India. It acts as a nodal agency of the central government based on ethical business principles having regard to the interest of the producers (farmers) and consumers.

Supply chain management of food grains by FCI is actually a joint responsibility of the Central Government, the state governments and the union territories involved in the actual implementation of PDS. Functions of the centre are to procure, store and transport. The implementation and administration of PDS is the responsibility of the state government and the UT administration. They lift these commodities from central godowns mills and distribute them to consumers through the massive network of fair price shops. Monitoring, inspection and enforcement of legal provisions is also done by the state government and the UT administration.

The network of fair price shops (FPS) has been expanding over the years, adding to the supply chain. During the last decade, the number of fair price shops had increased from 3.61 lakh (1990) to 4.59 lakh (2004) as indicated in the following:

Increase in No. of Fair Price Shops

Year	No. of FPS (in lakhs)
1985	3.19
1987	3.38
1990	3.61
2004	4.59

An efficient supply chain management requires the establishment of a close link between production, procurement, transportation, storage and distribution of selected commodities. Infrastructure needs to be strengthened, particularly in the backward, remote and inaccessible areas. The system also needs to be much improved to make it cost-effective. There is need for buffer stock in such a system. But, buffer stock can be reduced by timely procurement, transportation and storage.

This would reduce the carrying costs of the goods meant for distribution. The costs can also be reduced by increasing efficiency in the distribution network.

Leakages during the movement of food grains, etc., need to be plugged. Proper and timely checks of the fair price shops, godown, etc., can also lower the cost of PDS operations and the total supply chain management. FCI has to ultimately ensure a cost-effective supply chain and, for this, appropriate modalities have to be worked out.

Required:

(a) Explain the objectives of Supply Chain Management.

(b) Describe the Importance of Supply Chain Management.

(c) Discuss the advantages and disadvantages after implementing the supply chain management by FCI.

Answer of:

(a) Objective of Supply Chain Management:

(i) Supply chain Management takes into consideration every facility that has an impact on cost and plays a role in making the product conform to customer requirements: from supplier and manufacturing facilities through warehouses and distribution centers to retailers and stores.

(ii) The supply chain management is to be efficient and cost –effective across the entire system; total system wide costs from transportation and distribution to inventories of raw materials, work – in-process and finished goods are to be minimized.

(iii) Finally, supply chain management revolves around efficient integration of suppliers, manufacturers, warehouses and stores; it encompasses the firm's activities at many levels, from the strategic level through the tactical to the operational level.

(b) In the ancient Greek fable about the tortoise and the hare, the speedy and overconfident rabbit fell asleep on the job, while the "slow and steady" turtle won the race. That may have been true in Aesop's time, but in today's demanding business environment, "slow and steady" won't get you out of the starting gate, let alone win any races. Managers these days recognize that getting products to customers faster than the competition will improve a company's competitive position. To remain competitive, companies must seek new solutions to important Supply Chain Management issues such as modal analysis, supply chain management, load planning, route planning and distribution network design. Companies must face corporate challenges that impact Supply Chain Management such as reengineering globalization and outsourcing.

Why is it so important for companies to get products to their customers quickly? Faster product availability is key to increasing sales, says R. Michael Donovan of Natick, Mass., a management consultant specializing in manufacturing and information systems. "There's a substantial profit advantage for the extra time that you are in the market and your competitor is not," he says. "If you can be there first, you are likely to get more orders and more market share." The ability to deliver a product faster also can make or break a sale. "If two alternatives [products] appear to be equal and one is immediately available and the other will be available in a week, which would you choose? Clearly, "Supply Chain Management has an important role to play in moving goods more quickly to their destination."

(c) This would reduce the carrying costs of the goods meant for distribution. The costs can also be reduced by increasing efficiency in the distribution network.

Leakages during the movement of food grains, etc., need to be plugged. Proper and timely checks of the fair price shops, godown, etc., can also lower the cost of PDS operations and the total supply chain management. FCI has to ultimately ensure a cost-effective supply chain and, for this, appropriate modalities have to be worked out.

Question no. 2

(a) Describe the Components of Performance Management.
(b) Mention the objectives of using the CRM applications.
(c) Describe the objectives of Competitive intelligence.

Answer:

(a) Components of Performance Management

(i) Performance Planning: Performance planning is the first crucial component of any performance management process which forms the basis of performance appraisals. Performance planning is jointly done by the appraise and also the reviewee in the beginning of a performance session. During this period, the employees decide upon the

targets and the key performance areas which can be performed over a year within the performance budget, which is finalized after a mutual agreement between the reporting officer and the employee.

(ii) Performance Appraisal and Reviewing: The appraisals are normally performed twice in a year in an organization in the form of mid reviews and annual reviews which is held in the end of the financial year. In this process, the appraisee first offers the self filled up ratings in the self appraisal form and also describes his/her achievements over a period of time in quantifiable terms. After the self appraisal, the final ratings are provided by the appraiser for the quantifiable and measurable achievements of the employee being appraised. The entire process of review seeks an active participation of both the employee and the appraiser for analyzing the causes of loopholes in the performance and how it can be overcome. This has been discussed in the performance feedback section.

(iii) Feedback on the Performance followed by personal counseling and performance facilitation: Feedback and counseling is given a lot of importance in the performance management process. This is the stage in which the employee acquires awareness from the appraiser about the areas of improvements and also information on whether the employee is contributing the expected levels of performance or not. The employee receives an open and a very transparent feedback and along with this the training and development needs of the employee is also identified. The appraiser adopts all the possible steps to ensure that the employee meets the expected outcomes for an organization through effective personal counseling and guidance, mentoring and representing the employee in training programmers which develop the competencies and improve the overall productivity.

(iv) Rewarding good performance: This is a very vital component as it will determine the work motivation of an employee. During this stage, an employee is publicly recognized for good performance and is rewarded. This stage is very sensitive for an employee as this may have a direct influence on the self esteem and achievement orientation. Any contributions duly recognized by an organization helps an employee in coping up with the failures successfully and satisfies the need for affection.

(v) Performance Improvement Plans: In this stage, fresh set of goals are established for an employee and new deadline is provided for accomplishing those objectives. The employee is clearly communicated about the areas in which the employee is expected to improve and a stipulated deadline is also assigned within which the employee must show this improvement. This plan is jointly developed by the appraisee and the appraiser and is mutually approved.

(b) Objectives for using CRM applications

- To support the customer services
- To increase the effectiveness of direct sales force.
- To support of business to business activities.
- To support of business to consumer activities.
- To manage the call center.
- To operate the In- bound call centre.
- To operate the Out - bound call centre.

(c) Organizations constantly seek new ways to achieve sustainable competitive advantage and to counter aggressive competition. Proactive organizations recognize the advantage to be gained from an organized competitive intelligence program. In the Japanese semiconductor industry, for example, large organizations such as Mitsubishi, Mitsui, Sumitomo and Marubeni maintain intelligence departments that rival the U.S. Central Intelligence Agency in ability and accuracy. In the U.S., competitive intelligence

programs are a popular tool among companies such as IBM Corp., Texas Instruments, Inc., Citi Corp, AT&T Inc., U.S. Sprint, McDonnell Douglas Corp., and 3M.

Organizations develop competitive intelligence programs with the following objectives in mind:

(i) To provide an early warning of opportunities and threats, such as new acquisitions or alliances and future competitive products and services;

(ii) To ensure greater management awareness of changes among competitors, making the Organization better able to adapt and respond appropriately;

(iii) To ensure that the strategic planning decisions are based on relevant and timely competitive Intelligence; and

To provide a systematic audit of the organization's competitiveness that gives the CEO an unfiltered and unbiased assessment of the firm's relative position.

Question no. 3

(a) Discuss the importance of Customer Satisfaction.

(b) Explain the advantages and benefits of Customer Relationship Management.

(c) Discuss the basic components of Supply Chain Management.

Answer:

(a) Superior customer satisfaction affects bottom line:

- Increased customer loyalty
- Greater pricing leverage
- Increased sales
- Increased usage
- Competitive advantage
- Superior operating results
- Increased financial performance
- Increased market share

(b) Competition is very sharp in current market. Companies must take care of a customer in every area of their specialization by using various communication channels. Customer expects perfect services whether he calls a help line, asks a dealer, browses a web site or personally visits a store. It is necessary to assure him in a feeling that he communicates with the same company whatever form of communication, time or place he chooses. According to Matušinská the basic advantages and benefits of CRM are these:

- Satisfied customer does not consider leaving
- Product development can be defined according to current customer needs
- A rapid increase in quality of products and services
- The ability to sell more products
- Optimization of communication costs
- Proper selection of marketing tools (communication)
- Trouble-free run of business processes
- Greater number of individual contacts with customers
- More time for customer
- Differentiation from com petition
- Real time access to information
- Fast and reliable predictions
- Communication between marketing, sales and services
- Increase in effectiveness of teamwork
- Increase in staff motivation

Advantages and benefits are almost endless. Unfortunately some negatives exist. One of them is the fact that proper implementation and running of CRM is very difficult (technology, people – employees, initial money investment etc.), another one is the safety of information that companies keep about their customers, sharing information with third party and its overall protection. The entire operating principle of CRM

(gathering information, recording calls, analyzing all clients' activities etc.) is invasion of privacy of customers.

(c) Following are basic components of Supply Chain Management:

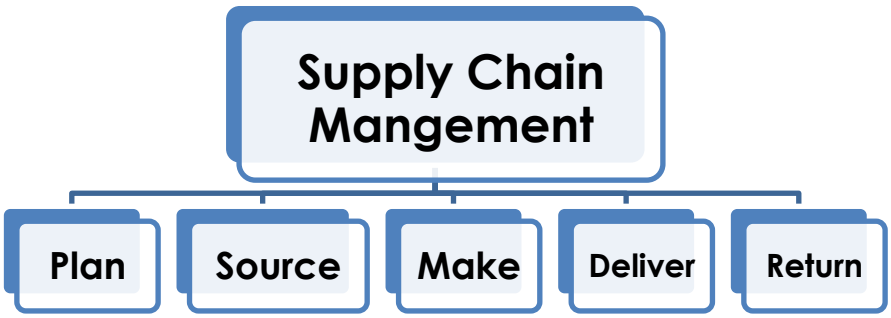
(i) **Plan** – This is the strategic portion of SCM. You need a strategy for managing all the resources that go toward meeting customer demand for your product or service. A big piece of planning is developing a set of metrics to monitor the supply chain so that it is efficient, costs less and delivers high quality and value to customers.

(ii) **Source** – Choose the suppliers that will deliver the goods and services you need to create your product. Develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships. And put together processes for managing the inventory of goods and services you receive from suppliers, including receiving shipments, verifying them, transferring them to your manufacturing facilities and authorizing supplier payments.

(iii) **Make** – This is the manufacturing step. Schedule the activities necessary for production, testing, packaging and preparation for delivery. As the most metric-intensive portion of the supply chain, measure quality levels, production output and worker productivity.

(iv) **Deliver** – This is the part that many insiders refer to as logistics. Coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.

(v) **Return** – The problem part of the supply chain. Create a network for receiving defective and excess products back from customers and supporting customers who have problems with delivered products.



SN 2 Performance Evaluation

Question no. 4

Read the following Caselet and answer the following:

S Auto Industries is a manufacturer and exporter of Auto parts with an annual turnover of Rupees one thousand crores. It employs about 2,000 persons in its factory in Punjab and its other offices in India and abroad. The personnel Administration and Human resources Department of the company is headed by Mr. A, the Chief Personnel Manager. Mr. A, an Automobile Engineer joined the company 5 years ago as Product Development Manager. After a successful stint of 4 years as Product Development Manager, he was transferred to Personnel Administration and Human Resources Department as the Chief Personnel Manager as a part of Career development plan. Mr. V, MBA in Human Resources from a renowned Business school, joined the company as Personnel Manager only 3 months back. He reports to Mr. A-the Chief Personnel Manager. He handles all routine personnel and industrial relations matters.

One day, during informal discussion with Mr. A, Mr. V suggested him of linking Human Resources Management with Company's strategic goals and objectives to further improve business performance and also to develop Organizational culture that fosters more innovative ideas. He also advocated creating abundant 'Social Capital' on the ground that people tend to be more productive in an environment which has trust and goodwill embedded in it rather than which is highly hierarchical and formal. Mr. A disagreed with Mr. V and told him that the role of Human Resources Department was only peripheral to the business and all his suggestions about its strategic role were beyond the purview of Personnel Administration and Human Resources Department. After this, Mr. V started having number of arguments with Mr. A in several issues relating to personnel and industrial relations since he felt that a person with a degree in Human Resources Management was in a far better position to run Personnel Administration and Human Resources Department. Mr. A - the Chief Personnel Manager had often shown his displeasure on Mr. V's argumentative, tendency and had made it known to the General Manager. The General Manager called Mr. A in his office to inform him that he has been elected for an overseas assignment. He further told him to find a suitable person as his successor; he even suggested Mr. V as a possible candidate. Mr. A, however, selected Mr. Balram, who was working as Training Manager in a Multinational Company for the last 5 years. Mr. V, soon started having arguments with Mr. Balram also over number of issues relating to industrial relations since he felt that he had no experience in handling industrial relations matters. Mr. Balram now realized that Mr. V was trying to make things difficult for him. After a series of meetings with the General Manager, Mr. Balram eventually succeeded in convincing him to transfer Mr. V to an office outside Punjab. On learning about his impending transfer, Mr. V wrote a letter to the General Manager joining details of various instances, when Mr. Balram had shown his incompetence in handling problematic situations. When asked for explanation by the General Manager, Mr. Balram had refuted almost all the allegations. The General Manager accepted his explanation and informed Mr. V that most of his allegations against Mr. Balram were unwarranted and baseless. He further advised him to avoid confrontation with Mr. Balram. Mr. V then wrote a letter to the Chairman repeating all the allegations against Mr. Balram. On investigation, the Chairman found most of the allegations were true. He then called all the three-the General Manager, the Chief Personnel Manager and the Personnel Manager in his office and implored them to forget the past and henceforth to work in coordination with each other in an environment of Trust and Goodwill.

Required:

(a)Indentify and discuss the major issues raised in the case.

(b)Comment on the recruitment of the two Chief Personnel Managers.

(c)Would you justify Mr. V's argumentative tendency with the Chief Personnel Managers? Give reasons for your answer.

(d) Do you agree with suggestion offered by Mr. V to link Human Resources Management with the company's strategic goals? If yes, suggest prominent areas where Human

Resources Department can play role in this regard.

Answer

(a) The first major issue raised in the case pertains to failure of the administration to realize the significant role Personnel Administrative and Human Resources Department can play in corporate strategy. This is evident from the remarks made by Mr. A - the Chief Personnel Manager that the role of his department was only peripheral to company business and the strategic role playing was beyond its purview. He advised his Personnel Manager Mr. V to confine his functions to routine personnel and industrial relation matters. The company has also failed to follow the principle of matching an appropriate candidate to the job requirements when it comes to appointment of Chief Personnel Manager. The company decided to send Mr. A an automobile engineer from manufacturing department to Personnel Administration and Human Resources Department as head without realizing that latter job needed a person with qualification and experience in management of human resources. The company had almost adopted a similar attitude when it appointed Mr. Balram as replacement of Mr. A. Even there seems to be lack of clarity in the career development plans of the company as Mr. A a qualified automobile engineer is transferred to the personnel department. The whole idea behind career development plans is to develop a person's skills to match with his present job with the job he would be expected perform in future. The company has also failed to pay attention in developing organization culture in which superior-subordinate relationship, team work are strengthened to contribute to professional well-being, motivation and pride of employees. This become clear when the Personnel Manager's frequent arguments with the Chief Personnel Manager are not taken seriously and Mr. V is just let off free without any strictures or warning for his behaviour by the higher authorities. There is also need for a system to encourage social networking amongst different employees in the organization which can help to create "Social Capital" as was made clear by Mr. V when he suggested Mr. A to take necessary measure in building 'Social Capital'. Even the transfer policies of the company need improvement. Mr. A is transferred to Personnel Administration and Human Resources Department, and later to different assignment at company's overseas office. Even the General Manager had agreed to transfer Mr. V to another office of company outside Punjab simply at the insistence of Mr. Balram, the Chief Personnel Manager.

(b) On the matter of appointment of Chief Personnel Manager and in particular of Mr. A the company ignored to match the qualification, experience and merit of the candidate with the job description and profile. The company should have recruited a person with degree in human resource management with adequate work experience to the position of the Chief Personnel Manager. Practically, the same mistake was committed in the appointment of Mr. Balram who had essentially experience of working as a Training Manager. In both the cases persons appointed lacked the needed qualification and experience for the top job in the personnel department. The direct fallout of this was that Mr. V, the Personnel Manager did not have faith in the competence of his superior and he had frequent arguments whenever he differed with them in manner in which they handled some important issues relating to the industrial relations.

(c) Mr. A the Chief Personnel Manager did not possess any formal degree in personnel management and industrial relations. However, this did not give any right to Mr. V, Personnel Manager who reports to him to have frequent arguments on the manner of handling issues relating to personnel and industrial relations. If at all Mr. V had some serious differences with Mr. A and later with Mr. Balram who succeeded Mr. A, he should have brought his view points to their notice in a more dignified manner keeping in view the hierarchy of the department. There could be two possible reasons

for this tendency of Mr. V. First, he appears to have complex that he is superior on account of his relevant qualification and as a result he developed ego. Secondly, it also seems that Mr. V was rather impatient to rise in the career ladder and become the Chief Personnel Manager without gaining much work experience. To achieve this end, he wanted to belittle the Chief Personnel Managers on every opportunity that came his way. In any case, the argumentative tendencies tantamount to indiscipline and insubordination and cannot be justified. On the contrary, the top management should have sought his explanation on his frequent arguments with Chief Personnel Managers.

(d) Human resources policies and plans deal with the most precious resources of an organization. It is the people who carry out the various functions in production marketing, finance, etc. and the success of an organization depends upon the quality of people selected to their functions. This presupposes an integrated approach towards human resources functions and overall business functions of an organization. The human resources management practices of an organization can be important sources of competitive edges. In this context human resources manager / department can play an important strategic role in the following important areas:

- The human resources management must be able to lead people and organization towards desired goals and direction involving people right from the beginning.
- The human resources management can also help developing core competency by the firm.
- A significant role can also be played in building a highly committed and competent work force.

The human resources management can also help in developing healthy work ethics and culture and create an atmosphere of trust and goodwill to encourage creative and innovative ideas. Jobs can be redesigned to make them more challenging and rewarding.

Question No.5

(a) Amit & co. provides you with the following Trial Balance as at 31st March,2014.

Trial Balance
as at 31.03.2014

Particulars	L.F.	Dr. Amount (₹)	Cr. Amount (₹)
Share Capital			**981.46**
Reserve and surplus			**1,313.62**
Long Term Debt			**144.44**
Sundry Creditors			**20.38**
Fixed Assets (Net)		**2,409.90**	
Current Assets		**50.00**	
		2,459.90	**2,459.90**

Additional Information provided is as follows:

(i) Profit before interest and tax is ₹ 2,202.84 lakhs.
(ii) Interest paid is ₹ 13.48 lakhs.
(iii) Tax Rate is 40 % (say)
(iv) Risk free Rate = 11.00%
(v) Long term Market Rate = 12%
(vi) Beta (β) = 1.62 (highest during the period)

You are required to calculate Economic Value Added of Amit & co.

(b) Explain the 'Contractual Terms' in the context of interaction of Transfer pricing and Taxation – Post evaluation of strategic business arrangement.

(c) The following information relates to budgeted operation of Division X of a Manufacturing company

Particulars	₹
Sales (5,000 units of ₹ 8)	40,000
Less: Variable costs @ ₹ 6 per unit	30,000
Contribution margin	10,000
Less: Fixed costs	7,500
Divisional Profit	2,500

The amount of divisional investment is ₹ 15,000 and the minimum desired rate of return on the investment is the cost of capital of 20%.

Required:

(i) Calculate divisional expected ROI

(ii) Calculate divisional expected RI

(iii) Comment on the results of (i) and (ii)

(iv) The divisional manager has the opportunity to sell 1,000 units at ₹ 7.50 per unit. Variable cost per unit would be the same as budgeted, but fixed costs would increase by ₹ 500. Additional investment of ₹ 2,000 would also be required. If the manager accepts the special order, by how much and in what direction would his residual Income change?

Answer:

(a) EVA= NOPAT – Weighted average cost of capital x Capital employed

EVA= Economic value added

NOPAT= Net operating profit after tax

Weighted Average Cost of Capital (WACC)

$$= \frac{E}{CE} \times K_e + \frac{P}{CE} \times K_p + \frac{LTD}{CE} \times K_d$$

Where, E= Equity; P = Preference Share; LTD = Long Term Debt; CE = Capital Employed.

K_e (Cost of Equity) $= R_F + \beta (R_m - R_F)$

Where, R_F= Risk Free Rate = 11.00%

R_m = Return on market index = 12%

β = 1.62

$\therefore K_e$ = 11.00% + 1.62 (12% - 11.00%)

= 11.00% + 1.62% = 12.62%

$$K_d \text{ (Cost of Debt)} = \frac{\text{Interest}(1-\text{Tax Rate})}{\text{Debt}} \times 100$$

$$= \frac{₹13.48 \text{ lakhs}(1-0.4)}{₹144.44 \text{ lakhs}} \times 100$$

= 5.6%

$$\therefore \text{WACC} = \frac{E}{CE} \times K_e + \frac{P}{CE} \times K_p + \frac{LTD}{CE} \times K_d$$

$$= \frac{2,295.08^*}{(2,439.52^{**})} \times 12.62\% + 0 + \frac{144.44}{2,439.52} \times 5.6\%$$

= 11.87% + 0.33% = 12.2%

NOPAT = Profit BIT – Interest – Tax

= ₹ 2,202.84 lakhs – 13.48 lakhs – (2,189.36 x 0.40)

= ₹ 2,202.84 lakhs – 13.48 lakhs – 875.74 lakhs

= 1,313.62 lakhs

$\therefore$ EVA = NOPAT – WACC x CE

= ₹ 1,313.62 lakhs – (12.2% x 2,439.52 lakhs)

= ₹ 1,313.62 lakhs – ₹ 297.62 lakhs = ₹ 1,016.00 lakhs

Note:

*****981.46+1,313.62 = 2,295.08 lakhs

** 2,295.08 + 144.44 = 2,439.52 lakhs (Opening balance are not given for computation of Capital employed)

(b) Contractual Terms:

Contractual arrangements are the starting point for determining which party to a transaction bears the risk associated with it. Accordingly, it would be a good practice for associated enterprises to document in writing their decisions to allocate or transfer significant risks before the transactions with respect to which the risks will be borne or transferred occur, and to document the evaluation of the consequences on profit potential of significant risk reallocations. Where no written terms exist, the contractual relationships of the parties must be deduced from their conduct and the economic principles that generally govern relationships between independent enterprises.

A tax administration is entitled to challenge the purported contractual allocation of risk between associated enterprises if it is not consistent with the economic substance of the transaction. Therefore, in examining the risk allocation between associated enterprises and its transfer pricing consequences, it is important to review not only the contractual terms but also the following additional questions:

- Whether the conduct of the associated enterprises conforms to the contractual allocation of risks,
- Whether the allocation of risks in the controlled transaction is arm's length, and
- What the consequences of the risk allocation are.

(c)

(i) $ROI = \frac{₹2,500}{₹15,000} \times 100\% = 16.7\%$

(ii) RI = Divisional Profit – Minimum desired rate of return
= ₹ 2,500 – (20% x ₹ 15,000)
RI = (₹ 500)

(iii) The desired rate of return is 20% but the division X is expecting to achieve an ROI of 16.7%. The expected profit of ₹ 2,500 is less than the ₹ 3,000 minimum return required, resulting in the negative of ₹ 500 residual income.

(iv) Opportunity to sell additional 10,000 unit :

Particulars	Original Budget (₹)	Additional Budget (₹)	Total (₹)
Sales	40,000	7,500	47,500
Less: Variable cost	30,000	6,000	36, 000
Contribution	10,000	1,500	11,500
Less: Fixed costs	7,500	500	8,000
Divisional profit	2,500	1,000	3,500
Less: Cost of capital (20%)	3,000	400	3,400
Residual Income	(500)	600	100

The target residual income changes from a negative balance of ₹ 500 to a positive one of ₹ 100 as a result of the new opportunity to sell 1,000 units. This is due to the fact that ₹ 1,000 expected profit from additional order is offset by a further ₹ 400 cost of capital, thereby increasing residual income by ₹ 600.

Question No.6

(a) A company is organized into two large Divisions. Division 'A' produces a component which is used by Division 'B' in making a final product. The final product is sold for

₹400 each. Division A has a capacity to produce 2,000 units and the entire quantity can be purchased by Division B.

Division A informed that due to installation of new machines, its depreciation cost had gone up and hence wanted to increase the price of the component to be supplied to Division B to ₹220. Division B, however can buy the component from the outside market at ₹200 each. The variable cost of Division A is ₹190. The variable costs of Division B in manufacturing the final product by using the component are ₹150 (excluding the component cost).

Present statement indicating the position of each Division and the company as a whole taking each of the following situations separately.

(i) If there are no alternative used for the production facilities of A, will the company benefit if Division B buys from outside suppliers at ₹200 per component?

(ii) If internal facilities of A are not otherwise idle and the alternative use of the facilities will give an annual cash operating saving of ₹30,000 to Division A, should Division B purchase the component from outside suppliers?

(iii) If there are no alternative used for the production facilities of Division A and the selling price for the component in the outside market drops by ₹15, should Division B purchase from outside suppliers?

(iv) What transfer price would you fix for the component in each of the above circumstances?

(b) Explain the objectives of transfer pricing.

(c) "EVA is period-to-period computation, which can be used to monitor the process of value creation and record historically the growth of the enterprise. The MVA can be expressed as the present value of all EVAs." - Justify the statements

Answer:

(a)

(i) Statement of contribution

When component is purchased by Division B from outside

Particulars	Calculation	(₹)	(₹)	(₹)
Division A:				Nil
Division B : Sales	(2,000 x 400)		8,00,000	
Less: Cost of purchase	(2,000x 200)	4,00,000		
Variable costs	(2,000 x 150)	3,00,000	7,00,000	1,00,000
Company's total contribution				1,00,000

When component is purchased from Division A by Division B

Particulars	Calculation	(₹)	(₹)	(₹)
Division A				
Sales	(2,000 x 220)		4,40,000	
Less: Variable costs	(2,000 x 190)		3,80,000	60,000
Division B				
Sales	(2,000 x 400)		8,00,000	
Less: Variable costs:				
Purchase cost from Div. A	(2,000 x 220)	4,40,000		
Variable cost in Div. B	(2,000 x 150)	3,00,000	7,40,000	60,000
Company's total contribution				1,20,000

Thus, it will be beneficial for the company as a whole to ask Division B to buy the component from Division A.

(ii) Statement of total contribution if Division A could be put to alternative use:

Particulars	Calculation	(₹)	(₹)	(₹)
Division A:				

Contribution from alternative use of facilities				30,000
Division B:				
Sales	(2,000 x 400)		8,00,000	
Less: Variable costs :				
Cost of purchase	(2,000 x 200)	4,00,000		
Division B	(2,000 x 150)	3,00,000	7,00,000	1,00,000
Company's total contribution				1,30,000

Since, the company's contribution when component is purchased from outside, shows an increase of ₹30,000 as compared to when there is inters departmental transfer. Hence, it will be beneficial to purchase the component from outside.

(iii) Statement of total contribution when component is available from outside at ₹185

Particulars	Calculation	(₹)	(₹)	(₹)
Division A				Nil
Division B				
Sales	2,000 x 400)		8,00,000	
Less: Variable costs				
Cost of purchase	2,000 x 185)	3,70,000		
Division B	2,000 x 150)	3,00,000	6,70,000	1,30,000
Company's total contribution				1,30,000

If the component is purchased by Division B from Division A, the contribution is only ₹ 1,20,000 as calculated under (i) above. Hence it will be beneficial to buy the component from outside.

(iv) Fixation of transfer price

(A) When there are no alternative uses of production facilities of Dept. A: In such a case the variable cost i.e., ₹190 per component will be charged.

(B) **If facilities of Division A can be put to alternative uses:**

Particulars	(₹)
Variable cost	190
Opportunity cost (30,000/2,000)	15
Transfer Price	205

(C) If market price gets reduced to ₹185 and there is no alternative use of facilities of Division A. The variable cost of ₹ 190 per component should be charged.

(b) Any Transfer Pricing System Should Aim to

» Ensure that resources are allocated in an optimal manner

» Promote goal congruence

» Motivate divisional managers

» Facilitate the assessment of management performance

» Retain divisional autonomy.

There are varieties of transfer pricing methods but in order to assess the validity and acceptability of different transfer pricing methods, the criteria generally used are -

In the first place the transfer price should be objectively determinable.

Secondly, it should be equal to the value of the intermediate products being transferred that is the transfer price should compensate the transferring division and charge the buying acquiring division in keeping with the value of the functions performed and/or the value of the product exchanged.

Finally, it should be compatible with the policy that maximizes attainment of company goals and evaluation of segment performance.

(c) The above statement said that the difference between Economic value Added and Market Value Added. Discuss it,

EVA is period-to-period computation, which can be used to monitor the process of value creation and record historically the growth of the enterprise. The MVA can be expressed as the present value of all EVAs. The MVA measures the total performance of the firm in economic terms since its inception. It is cumulative measure while the EVA is a single period measure, usually a year. A firm having a positive EVA is expected to have positive MVA and vice- versa. However, there can be a contradiction in MVA and EVA because the MVA is derived from the share prices, which are forward looking discounting the future potential, while the EVA records performance during a period. We may have negative EVA, yet a positive MVA due to the good potential of the firm.

According to the proponents of EVA other parameters of value like growth, rates of return and dividends do not matter. Growth in EPS will increase MVA only when investments earn more than the cost of capital. Similarly, the rates of return do not matter. What matters is the creation of absolute EVA. Likewise dividend and its growth will be inconsequential as long as the market value falls by the amount of dividend. MVA will be affected only when change in dividend signals some change in fundamental investment policy. The only way for creation of value is undertaking all the projects with positive NPV and rejecting all negative NPV Projects – the standard rule of capital budgeting. Once this is done, growth in both returns and dividend will take care of themselves automatically. This will lead to maximization of both EVA and MVA.

SN 3: Strategic Performance Evaluation and Management Tools

Question No.7
Read the following Caselet and answer the following
Possibly the best-known pioneer of benchmarking in Europe is Rank Xerox, the document and imaging company, which created the original market for copiers. The virtual monopoly the company had in its sector almost became its undoing. However, spurred by the threat from the emerging Japanese copier companies, an in-depth study within the company recognized that fundamental changes were needed. To understand how it should change, the company decided to evaluate itself externally – a process which became known as competitive benchmarking. The results of this study shocked the company. Its Japanese rivals were selling machines for about what it cost Xerox to make them. Nor could this be explained by differences in quality. The study found that, when compared with its Japanese rivals, the company had nine times more suppliers, was rejecting 10 times as many machines on the production line and taking twice as long to get products to market. Benchmarking also showed that productivity would need to grow 18 per cent per year over five years if it was to catch up with its rivals.

Rank Xerox sees benchmarking as helping it achieve two objectives. At a strategic level it helps set standards of performance, while at an operational level it helps the company understand the best practices and operations methods which can help it achieve its performance objectives.

Its experience of using this approach has led Xerox to a number of conclusions:

- The first phase, planning, is crucial to the success of the whole process. A good plan will identify a realistic objective for the benchmarking study, which is achievable and clearly aligned with business priorities.
- A prerequisite for benchmarking success is to understand thoroughly your own processes. Without this it is difficult to compare your processes against those of other companies.

- Look at what is already available. A lot of information is already in the public domain. Published accounts, journals, conferences and professional associations can all provide information which is useful for benchmarking purposes.
- Be sensitive in asking for information from other companies. The golden rule is: 'Don't ask any questions that we would not like to be asked ourselves.'

Required:

(a) Discuss about the Competitive Benchmarking.
(b) Mentioning the steps in Benchmarking.
(c) What kind of information did Rank Xerox discover in its Benchmarking study?
(d) What did Rank Xerox get in its Benchmarking application?

Answer:

(a) Competitive Benchmarking

"A Measure of organizational performance compared against competing organization; studies the target specific product designs, process capabilities or administrative methods used by a company's direct competitors".

Competitive Benchmarking moved beyond product oriented comparisons to include comparisons of process with those of competitors. In this benchmarking, the process studied may include marketing, finance, human resource, R & D etc. A typical example would be the classical study the Rank Xerox performed with those of Canon and other photo copier manufacturers when it faced heightened competition from US and Japanese companies. By benchmarking Rank Xerox achieved significant performance improvements as given below:

- Unit manufacturing cost reduced to half; comparable to 1980 product costs
- Machine defects have improved by over 90%
- Incoming parts acceptance has improved to 99.5%
- Inventory methods of supply reduced by at least two thirds.
- Engineering drawings per person year more than doubled
- Marketing Productivity improved by one third.
- Service labour cost reduced by 30%
- Distribution productivity increased from 5% to 10%

Management Accountants are familiar with the technique of Inter Firm Comparison of financial performance of companies through ratios to draw meaningful inferences. For instance Hindalco's power cost is lowest in the world, due to the captive power plant set up by them long back. Other aluminum producers while endeavoring to move closer to this standard must improve in other areas to have competitive parity.

(b) Steps of Benchmarking:

Rank Xerox has given the following ten steps for Benchmarking

- Identify the benchmark Outputs
- Identify the best competitors
- Determine the data collection method,
- Determine the current competitive "gap".
- Project future performance level
- Establish functional goals; communication of data/ acceptance of Analysis
- Develop functional action plan
- Implement specific action plans
- Monitors results/ Report progress
- Recalibrate benchmarking

(c) The company adopt a process which known as Competitive Benchmarking. The study found that, when compared with its Japanese rivals, the company had nine times more suppliers, was rejecting 10 times as many machines on the production line and taking twice as long to get products to market. Benchmarking also showed that productivity

would need to grow 18 per cent per year over five years if it was to catch up with its rivals.

(d) Rank Xerox sees benchmarking as helping it achieve two objectives. At a strategic level it helps set standards of performance, while at an operational level it helps the company understand the best practices and operations methods which can help it achieve its performance objectives.

Question No.8

(a) List a few business applications of Activity Based Management.

(b) B manufacturing company sells its product at ₹ 1,000 per unit. Due to competition, its competitors are likely to reduce price by 15%. B wants to respond aggressively by cutting price by 20% and expects that the present volume of 1,50,000 units p.a. will increase to 2,00,000 units. B wants to earn a 10% target profit on sales. Based on

Particulars	Existing(₹)	Target(₹)
Direct Material Cost P.U.	400	385
Direct manufacturing labour P.U.	55	50
Direct machinery costs P.U	70	60
Direct manufacturing costs P.U	525	495
Manufacturing Overheads :		
No. of Orders (₹ 80 per order)	22,500	21,250
Testing hours (₹ 2 per hour)	45,00,000	30,00,000
Units reworked (₹100 per unit)	12,000	13,000

Manufacturing overheads are allocated using relevant cost drivers. Other operating costs per unit for the expected volume are estimated as follows:

Research and design	₹50
Marketing and Customer	₹130
	₹ 180

Required:

(i) Calculate target costs per unit and target costs for the proposed volume showing break up of different elements.

(ii) Prepare target product profitability statement.

(c) List the pre-requisites of Bench Marking.

Answer:

(a) Business Applications of ABM

(i) Cost Reduction: ABM helps the Firm to identify opportunities in order to streamline or reduce the costs or eliminate the entire activity, especially NVA activities. It is useful in identifying and quantifying process waste, leading to continuous process improvement through continuous cost reduction.

(ii) Activity Based Budgeting: Activity Based Budgeting analyses the resource input or cost for each activity. It provides a framework for estimating the amount of resources required in accordance with the budgeted level of activity. Actual results can be compared with budgeted results to highlight (both in financial and non-financial terms) those activities with major discrepancies for potential reduction in supply of resources. It is a planning and control system, which supports continuous improvement.

(iii) Business Process Re-Engineering (BPR): BPR is the analysis and redesign of workflows and processes in a Firm, to achieve dramatic improvement in performance, and

operational excellence. A business process consists of linked set of activities, e.g. purchase of materials is a business process consisting of activities like Purchase Requisition, Identifying Suppliers, preparing Purchase Orders, mailing Purchase Orders and follow up. The process can be reengineered by sending the production schedule direct to the suppliers and entering into contractual agreement to deliver materials according to the production schedule.

(iv) Benchmarking: It involves comparing the Firm's products, services or activities with other best performing organizations, either internal or external to the Firm. The objective is to find out how the product, service or activity can be improved and ensure that the improvements are implemented.

(v) Performance Measurement: Activity performance measures consist of measures relating to costs, time quality and innovation. For achieving product quality, some illustrative performance measures are -

Area	Measures
• Quality of purchased • component	• Zero Defects
• Quality of output	• Percentage yield
• Customer Awareness	• No. of orders, no. of complaints

(b)

(i)

Target selling price : ₹1,000 less 20%	₹ 800
Less: Target profit margin (10%)	₹80
Target costs per unit	₹720

The break-up of ₹ 720 per unit is as follows:

Target Costs per unit

Particulars	Per unit (₹)	
Direct materials		385
Direct manufacturing labour		50
Direct machining costs		60
Direct manufacturing costs		495
Add: Manufacturing overheads:		
Ordering and receiving (21,250 x ₹80)÷2,00,000	8.50	
Testing and inspection (30,00,000 x ₹2) ÷ 2,00,000	30.00	
Rework (13,000 x ₹100) ÷2,00,000	6.50	
		45
Total manufacturing costs		540
Other operating costs:		
Research and Design	50	
Marketing and Customer service	130	180
Full Product Costs		720

(ii) Target Product Profitability

Particulars	Per unit (₹)	2,00,000 units (₹)
1. Sales	800	16,00,00,000
2. Costs of goods sold:		

Direct Materials	385	7,70,00,000
Direct labour	50	1,00,00,000
Direct Machining Costs	60	1,20,00,000
	495	9,90,00,000
Manufacturing overheads	45	90,00,000
	540	10,80,00,000
3.Gross margin (1-2)	260	5,20,00,000
4. Operating costs:		
Research and Design	50	1,00,00,000
Marketing and customer service	130	2,60,00,000
	180	3,60,00,000
5.Operating profit (3-4)	80	1,60,00,000

(c) Following are the pre-requisites of Benchmarking.

(i) **Commitment**: Senior Managers should support benchmarking fully and must be omitted to continuous improvements.

(ii) **Clarity of Objectives**: The objectives should be clearly defined at the preliminary stage. Benchmarking teams have a clear picture of their Firm's performance before approaching others for comparisons.

(iii) **Appropriate Scope**: The scope of the work should be appropriate in the light of the objectives, resources, time available and the experience level of those involved.

(iv) **Resources**: Sufficient resources must be available to complete projects within the required time scale.

(v) **Skills**: Benchmarking teams should have appropriate skills and competencies.

(vi) **Communication**: Stakeholders, and also staff and their representatives, are to be kept informed of the reasons for benchmarking.

Question No.9

(a) Wipro is examining the profitability and pricing policies of its Software Division.The Software Division develops Software Packages for Engineers. It has collected data on three of its more recent packages - (i) EE Package for Electronics Engineers, (b) CE Package for Computer Engineers, and (c) IE Package for Industrial Engineers.

Summary details on each package over their two year cradle to grave product lives are -

Package	Selling Price	Number of units sold	
		Year 1	Year 2
EE	₹500	2,000	8,000
CE	₹600	2,000	3,000
IE	₹400	5,000	3,000

Assume that no inventory remains on hand at the end of year 2. Wipro is deciding which product lines to emphasize in its software division. In the past two years, the profitability of this division has been mediocre.

Wipro is particularly concerned with the increase in R & D costs in several of its divisions. An analyst at the Software Division pointed out that for one of its most recent packages (IE) major efforts had been made to reduce R&D costs.

Last week, Amit, the Software Division Manager, decides to use Life Cycle Costing in his own division. He collects the following Life Cycle Revenue and Cost information for the packages (in ₹)-

Particulars	Package EE		Package CE		Package IE	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Revenues	10,00,000	20,00,000	12,00,000	9,00,000	20,00,000	6,00,000
Costs						
R&D	7,00,000	-	4,50,000	-	2,40,000	-

Design of Product	1,15,000	85,000	1,05,000	15,000	76,000	20,000
Manufacturing	25,000	2,75,000	1,10,000	1,00,000	1,65,000	43,000
Marketing	1,60,000	3,40,000	1,50,000	1,20,000	2,08,000	2,40,000
Distribution	15,000	60,000	24,000	36,000	60,000	36,000
Customer Service	50,000	3,25,000	45,000	1,05,000	2,20,000	3,88,000

Present a Product Life Cycle Income Statement for each Software Package. Which package is most profitable and which is the least profitable? How do the three packages differ in their cost structure (the percentage of total costs in each category)?

(b) Explain the role of the Management Accountant in Value Chain Analysis.

(c) HP Ltd manufactures two parts 'A' and 'B' for Computer Industry.

- **A: Annual Production and Sales of 1,00,000 units at a Selling Price of ₹164.05 per unit.**
- **B: Annual Production and Sales of 50,000 units at a Selling Price of ₹150 per unit.**

Direct and Indirect Costs incurred on these two parts are as follows - (₹ in thousands)

Particulars	A	B	Total
Direct Material Cost (Variable)	8,400	6,000	14,400
Labour Cost (Variable)	3,000	2,000	5,000
Direct Machining Costs (See Note)	1,400	1,100	2,500
Indirect Costs:			
Machine Set Up Cost			462
Testing Cost			2,375
Engineering Cost			2,250
Total			26,987

Note: Direct Machining Costs represent the cost of machine capacity dedicated to the production of each product. These costs are fixed and are not expected to vary over the long-run horizon.

Additional information is as follows -

Particulars	A	B
Production Batch Size	1,000 units	500 units
Set up time per batch	30 hours	36 hours
Testing time per unit	5 hours	9 hours
Engineering Cost incurred on each product	₹8,40,000	₹14,10,000

A foreign competitor has introduced product very similar to 'A'. To maintain the Company's share and profit, HP Ltd. has to reduce the price to ₹86.25. The Company calls for a meeting and comes up with a proposal to change design of product 'A'. The expected effect of new design is as follows:

- **Direct Material Cost is expected to decrease by ₹5 per unit.**
- **Labour Cost is expected to decrease by ₹2 per unit.**
- **Machine time is expected to decrease by 15 minutes, previously it took 3 hours to produce 1 unit of 'A'. The machine will be dedicated to the production of new design.**
- **Set up time will be 28 hours for each set up.**
- **Time required for testing each unit will be reduced by 1 hour.**
- **Engineering Cost and Batch Size will be unchanged.**

Required:

(i) Company management identifies that cost driver for Machine Set-Up Costs is 'set up hours used in batch setting' and for Testing Costs is 'testing time'. Engineering Costs are assigned to products by special study. Calculate the full cost per unit for 'A' and 'B' using Activity-Based Costing.

(ii) What is the Mark-up on full cost per unit of A?

(iii) What is the Target cost per unit for new design to maintain the same mark up percentage on full cost per unit as it had earlier? Assume cost per unit of cost drivers for the new design remains unchanged.

(iv) Will the new design achieve the cost reduction target?

(v) List four possible management actions that the HP Ltd. should take regarding new design.

Answer:

(a) (i) **Life cycle Income Statement (in ₹000s)**

Particulars	**Package ECE**				**Package CE**				**Package IE**			
	Y1	**Y2**	**Total**	**%**	**Y1**	**Y2**	**Total**	**%**	**Y1**	**Y2**	**Total**	**%**
Revenues	500	2,000	2,500	100%	600	900	1,500	100%	1,000	600	1,600	100%
Costs												
R&D	700	-	700	28%	450	-	450	30%	240	-	240	15%
Design	115	85	200	8%	105	15	120	8%	76	20	96	6%
Manufacturing	25	275	300	12%	110	100	210	14%	165	43	208	13%
Marketing	160	340	500	20%	150	120	270	18%	208	240	448	28%
Distribution	15	60	75	3%	24	36	60	4%	60	36	96	6%
Cust. Service	50	325	375	15%	45	105	150	10%	220	388	608	38%
Total Costs	1065	1,085	2150	86%	884	376	1260	84%	969	727	1696	106%
Profit			**350**	**14%**			**240**	**16%**			**(96)**	**-6%**

(ii) **Observation:** Package EE is most profitable, while package IE is least profitable.

(b) Role of the Management Accountant in Value Chain Analysis

Management Accountants should recognize that the traditional, functional, internally oriented information m is inadequate or the Firm engaged in global competition. In order to facilitate Value Chain Analysis, should be a change in focus for Management Accounting. The Management Accountant's role will be scant in the following areas-

(i) Need for education, training and awareness:

Management Accountants should bring the importance of customer value to the forefront of Management's strategic thinking. They should take the initiative to bring the Value Chain message to major players in the Firm through seminars, articles, Value Chain examples and Company-specific applications.

(ii) Exploring for information:

VCA requires expertise in internal operations and information and also remands a great deal of external information. Management Accountants must seek relevant financial and non-financial information from sources outside the Firm.

(iii) Creativity:

Management Accountants must integrate databases and potential sources of timely information on competitive forces confronting the business. This calls for innovation and creativity in gathering and analyzing information for management decisions.

(iv) System design:

Designing internal and external information systems to assist managers in planning, monitoring and improving value-creating processes is another challenge facing Management Accountants.

(v) Cooperation:

Management Accountants should solicit support from all senior managers for allocating resources to develop and improve Value Chain-oriented Information Systems. The Management Accountant should ensure that the Top Management is committed to Value Chain Analysis and the organizational changes necessary for its successful implementation.

(c) (i) Computation of Quantities of Cost Drivers

Particulars	A	B	Total
a. Quantity	1,00,000 units	50,000 units	
b. Batch Size	1,000 units	500 units	
c. Number of Batches (a ÷ b)	100 batches	100 batches	
d. Set Up Time per batch	30 hours	36 hours	
e. Total Set Up Time for Production (c x d)	3,000 hours	3,600 hours	6,600 hours
f. Testing Time per unit	5 hours	9 hours	
g. Total Testing Time for Production (a x f)	5,00,000 hours	4,50,000	9,50,000 hours

Computation of ABC Recovery Rates

Activity	Activity Cost Pool	Cost Driver	Cost Driver Quantity	ABC Rate
Machine Set Up Testing	₹ 4,62,000 ₹23,75,000	Set Up Hours Testing Hours	6,600 Set Up Hours 9,50,000 Testing Hours	₹70 per hour. ₹2.50 per hour.

Note: Engineering Costs are assigned by special study. Hence ABC Rate is not calculated.

Computation of Cost per unit using ABC System

Particulars	A	B
Direct Costs:		
Direct Materials	84,00,000 ÷1,00,000 = 84.00	60,00,000 ÷ 50,000 = 120.00
Direct Labour	30,00,000 ÷1,00,000 = 30.00	20,00,000 ÷ 50,000 = 40.00
Direct Machining	14,00,000÷1,00,000 = 14.00	11,00,000÷50,000 = 11.00
Sub Total Direct Costs	128.00	182.00
Indirect Costs:		
Machine Set Up	(₹70 x 30 hrs) ÷1,000 uts =2.10	(₹70 x 36 hrs) ÷ 500 uts = 5.04
Testing	(₹2.5 ph x 5 hours) = 12.50	(₹2.5 ph x 9 hours) = 22.50
Engineering	8,40,000÷1,00,000= 8.40	14,10,000÷50,000 = 28.20
Sub Total Indirect Costs	23.00	55.74
Total Costs	151.00	237.74

(ii) Markup (or) Profit per unit of A = Selling Price - Full Cost = ₹ 164.05 - ₹151.00 = ₹13.05 p.u.
Percentage of Markup to Full Cost = ₹13.05 ÷ ₹151 = 8.64% i.e 9% on Cost.

(iii) Computation of Target cost for New Design of A

New Selling Price (given)	₹86.25
Less: Target Profit at 9% on Cost i.e. 15/115 on SP = 86.25 x 9/109	₹7.12
Target Cost for New Design of A	₹79.13

(iv) Computation of Cost per unit of New Design A

Particulars	A

Direct Costs: Direct Materials	42.00-5.00= 37.00
Direct Labour	15.00-2.00 =13.00
Direct Machining (dedicated machine, hence time saved is not relevant, as the costs continue to be fixed)	7,00,000 ÷ 1,00,000= 7.00
Sub Total Direct Costs	57.00
Indirect Costs: Machine Set Up (₹70 x 28 hours) ÷1,000 units	1.96
Testing (₹2.5 ph x 4 hours)	10.00
Engineering 8,40,000 ÷1,00,000 units	8.40
Sub Total Indirect Costs	20.36
Total Estimated Costs of New Design A	77.36

Target Cost is ₹79.13 only. Hence, the new design will achieve the cost reduction target.

(v) Possible management actions for new design

- Value Engineering and Value Analysis to reduce the Direct Material Costs.
- Time and Motion Study in order to redefine the Direct Labour time and related costs.
- Exploring possibility of cost reduction in costs of Direct Machining.
- Identifying non-value added activities and eliminating them in order to reduce Overheads.
- Analysis of effect of sale of New Design A on sale of B.

SN 4 Strategic Reasoning and Decision Analysis

Question No.10

Read the following caselet and answer the following:

Two local suppliers are seeking to win the right to upgrade the communications capability of the internal Aintranets that link a number of customers with their suppliers. The system quality decision facing each Competitor, and potential profit payoffs, is illustrated in the table. The first number listed in each cell is the profit earned by U.S. Equipment Supply; the second number indicates the profit earned by Business Systems, Inc. For example, if both competitors, U.S. Equipment Supply and Business Systems, Inc., pursue a high quality strategy, U.S. Equipment Supply will earn $25,000 and Business Systems, Inc., will earn $50,000. If U.S. Equipment Supply pursues a high-quality strategy while Business Systems, Inc., offers low-quality goods and services, U.S. Equipment supply will earn $40,000; Business Systems, Inc. will earn $22,000. If U.S. Equipment Supply offers low-quality goods while Business Systems, Inc., offers high quality goods, U.S. Equipment Supply will suffer a net loss of $25,000, and Business Systems, Inc., will earn $20,000. Finally, if U.S. Equipment Supply offers low quality goods while Business Systems, Inc., offers low-quality goods, both U.S. Equipment Supply and Business Systems, Inc., will earn $25,000.

		Business Systems,inc.	
U.S. Equipment Supply	Quality Strategy	High Quality	Low Quality

	High Quality	$25,000, $ 50,000	$40,000, $ 22,000
	Low Quality	-$25,000, $ 20,000	$25,000, $ 25,000

Required:

(a) Does U.S. Equipment Supply and/or Business Systems, Inc., have a dominant Strategy? If so, what is it?

(b) Does U.S. Equipment Supply and/or Business Systems, Inc., have a secure Strategy? If so, what is it?

(c) What is the Nash equilibrium concept, and why is it useful? What is the Nash equilibrium for this problem?

Answer:

(a) The dominant strategy for U.S. Equipment Supply is to provide high-quality goods. Irrespective of the quality strategy choosen by Business Systems, Inc., U.S. Equipment Supply can do no better than to choose a high-quality strategy. To see this, note that if Business Systems, Inc., chooses to produce high-quality goods, the best choice for U.S. Equipment Supply is to also provide high-quality goods because the $25,000 profit then earned is better than the $25,000 loss that would be incurred if U.S. Equipment Supply chose a low-quality strategy. If Business Systems, Inc., chose a low-quality strategy, the best choice by U.S. Equipment Supply would again be to produce high-quality goods. U.S. Equipment Supply high-quality strategy profit of $40,000 dominates the low-quality payoff for U.S. Equipment Supply of $25,000. Business Systems, Inc., does not have a dominant strategy. To see this, note that if U.S. Equipment Supply chooses to produce high-quality goods, the best choice for Business Systems, Inc., is to also provide high-quality goods because the $50,000 profit then earned is better than the $22,000 profit if Business Systems, Inc., chose a low-quality strategy. If U.S. Equipment Supply chose a low-quality strategy, the best choice by Business Systems, Inc., would be to produce low-quality goods and earn $25,000 versus $20,000.

(b) The secure strategy for U.S. Equipment Supply is to provide high-quality goods. By choosing to provide high-quality goods, U.S. Equipment Supply can be guaranteed a profit payoff of at least $25,000. By pursuing a high-quality strategy, U.S. Equipment Supply can eliminate the chance of losing $25,000, as would happen if U.S. Equipment Supply chose a low-quality strategy while Business Systems, Inc., chose to produce high-quality goods. The secure strategy for Business Systems, Inc., is to provide low-quality goods. By choosing to provide high-quality goods, Business Systems, Inc., can guarantee a profit payoff of only $20,000. Business Systems, Inc., can be assured of earning at least $22,000 with a low-quality strategy. Thus, the secure strategy for Business Systems, Inc., is to provide low-quality goods.

(c) A set of strategies constitute a Nash equilibrium if, given the strategies of other players, no player can improve its payoff through a unilateral change in strategy. The concept of Nash equilibrium is very important because it represents a situation where every player is doing the best possible in light of what other players are doing. Although useful, the notion of a secure strategy suffers from a serious shortcoming. In the present example, suppose Business Systems, Inc., reasoned as follows: A U.S. Equipment Supply will surely choose its high-quality dominant strategy. Therefore, I should not choose my secure low-quality strategy and earn $22,000. I should instead choose a high-quality strategy and earn $50,000. A natural way of formalizing the end result of such a thought process is captured in the definition of Nash equilibrium.

Question No.11

(a) Discuss the rule of dominance of the Game Theory.

(b) "Normally when new Investments have the same risk as existing operations, the discount rate applied is the average cost of capital of the operations, If the risk of the new project is greater……" – Explain the above statement.

(c) The Oil India Corporation is considering whether to go for an offshore oil drilling contract to be awarded in Bombay High. If they bid, value would be ₹ 600 million with a 65% chance of gaining the contract. They may set up a new drilling operation or move already existing operation, which has proved successful, to the new site. The probability of success and expected returns are as follows:

Outcome	New Drilling Operation		Existing Operation	
	Probability	Expected Revenue (₹ in millions)	Probability	Expected Revenue (₹ in millions)
Success	0.75	800	0.85	700
Failure	0.25	200	0.15	350

If the Corporation do not bid or lose the contract, they can use the ₹600 million to modernize their operation. This would result in a return of either 5% or 8% on the sum invested with probabilities 0.45 and 0.55.

(Assume that all costs and revenue have been discounted to present value)

(i) Construct a decision tree for the problem showing clearly the course of action.

(ii) By applying an appropriate decision criterion recommended whether or not the Oil India Corporation should bid the contract.

Answer:

(a) Rule of Dominance

This rule is applicable to a zero-sum game between two persons, with any number of strategies. For a pay-off matrix of large size, the rule of dominance can be applied to reduce the size by carefully eliminating rows and/or column prior to final analysis to determine the optimum strategy selection for each person.

In general the following rules are adopted:

(i) In a pay-off matrix if all the elements of any row (say ith) are less than or equal (i.e., <) to the corresponding elements of any other row (say jth), then the ith strategy is dominated by jth row; in other words the player (or person) A will ignore or reject the ith row. Thus the pay-off matrix is reduced.

(ii) In a pay-off matrix if all the elements of any column (say rth) arc greater than or equal to (i.e. >) to the corresponding elements of any other column (say sth) then the rth strategy is dominated by s-th strategy; in other words the player B will ignore or reject the r-th strategy, hence again the pay-off matrix is reduced.

(iii) A pure strategy may be dominated if it is inferior to the average of two or more other pure strategies.

(b) Above statement explained about Risk Adjusted Discount Rate Method. This method is very much akin to certainty equivalent method that is more popular. This is due to the fact that quantification of the risk premium is more concrete in this method. Normally when new investments have the same risk as existing operations, the discount rate applied is the average cost of capital of the operations. If the risk of the new project is greater, then a formula is applied for the computation of the risk adjusted discount rate, as follows:

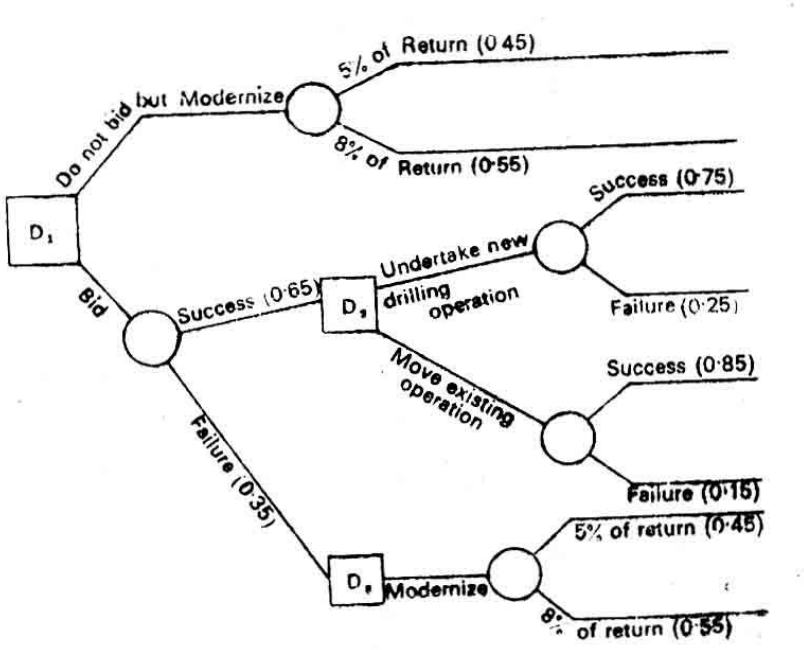
$r_p = r_f + n + d_p$

Where,
r_p = Risk adjusted discount rate for project 'p'
r_f = Risk free rate of interest
n = Premium for normal risk
d_p = Premium for additional risk differential for project 'p'

The risk premium so computed is based on the perception regarding the project risk and risk-return preference. Such premiums are normally calculated by comparing the returns obtained from different investments currently. The risk premium, normally varies between one per cent to 10 per cent, based on the risk assessment of such investments.

The offshoot of this method is the Risk Adjusted Return on Capital (RAROC). This computation is a risk-based profitability measurement framework for understanding the risk adjusted financial performance and providing an appropriate view. The RAROC can be represented as follows:
RAROC = Expected return/Economic capital or
RAROC = Expected return/Value at risk

(c)



Evaluation of Decision Points

Decision Points	Outcome	Probability	Conditional Values (₹)	Expected Values (₹)
D_3 (i) Modernize	5% of Return 8% of Return	0.45 0.55	600 x 0.05 600 x 0.08	13.5 26.4
				39.9
D_2(i) Undertaken new Drilling new	Success Failure	0.75 0.25	800 200	600 50
				650
(ii) Move Existing Operation	Success Failure	0.85 0.15	700 350	595 52.5
				647.5

D_1 (i) Do not bid	5% of return 8% of return	0.45 0.55	600 x 0.05 600 x 0.08	13.5 26.4
				39.9
(ii) Bid	Success Failure	0.65 0.35	650 +647.5 39.9	843.375 13.965
				857.34
			Less:	600.00
			Total	257.34

The decision on the basis of EMV will be to bid and if successful establish a new drilling operation.

Question No.12

(a) For the following pay-off matrix, find the value of the game and the strategies of players A and B using linear programming:

		Player B		
		1	**2**	**3**
Player A	**1**	**3**	**-1**	**4**
	2	**6**	**7**	**-1**

(b) Pay offs of three acts A, B and C and states of nature X, Y and Z are given below

	Payoff (in ₹)		
Acts → / State of Nature ↓	**A**	**B**	**C**
X	**-20**	**-100**	**200**
Y	**200**	**-50**	**-50**
Z	**400**	**600**	**300**

The probabilities of the states of nature are 0.3, 0.4and 0.3.
Calculate the Expected Monetary value (EMV), for the above data and select the best act.
Also find the EVPI.

Answer:

(a) Since two of the entries in the pay-off matrix are negative, we shall add a constant, say 3, to each of the values, by which each one of them would become a positive value. The pay-off matrix then becomes as shown here:

		Player B		
		1	**2**	**3**
Player A	1	6	2	7
	2	9	10	1

Now, let x_1 and x_2 represent the probabilities with which A chooses strategies 1 and 2 respectively, while y_1, y_2, and y_3 be the probabilities in respect of B choosing strategies 1, 2 and 3.
From A's point of view, the problem is,

Minimize $\frac{1}{U} = x_1 + x_2$

Subject to
$$6x_1 + 9x_2 \geq 1$$
$$2x_1 + 10x_2 \geq 1$$
$$7x_1 + x_2 \geq 1$$
$$x_1, x_2 \geq 0$$

Where $X_1 = x_1/U$, and $X_2 = x_2/U$.
Similarly, from B's view point, the problem is,

Maximize $\frac{1}{V} = Y_1 + Y_2 + Y_3$

Subject to
$$6Y_1 + 2Y_2 + 7Y_3 \leq 1$$
$$9Y_1 + 10Y_2 + Y_3 \leq 1$$
$$Y_1, Y_2, Y_3 \geq 0$$

Where $Y_i = y_i/V$.

Now we shall solve the problem from B's point of view. The problem can be augmented by introducing slack variables S_1, and S_2 as follows:

Maximize $\frac{1}{V} = Y_1 + Y_2 + Y_3 + OS_1 + OS_2$

Subject to
$$6Y_1 + 2Y_2 + 7Y_3 + S_1 = 1$$
$$9Y_1 + 10Y_2 + Y_3 + S_2 = 1$$
$$Y_1, Y_2, Y_3, S_1, S_2 \geq 0$$

The solution is contained in Table 1to 3.

Table 1 Simplex Tableau 1: Non-optimal Solution

Basis		**Y_1**	**Y_2**	**Y_3**	**S_1**	**S_2**	**b_i**	**b_i/a_{ij}**
S_1	0	6	2	7	1	0	1	1/6
S_2	0	9*	10	1	0	1	1	1/9 ← Outgoing variable
c_j		1	1	1	0	0		
Solution		0	0	0	1	1		
Δ_j		1	1	1	0	0		
		↑						
		Incoming variable						

Table 2 Simplex Tableau 2: Non-optimal Solution

Basis		**Y_1**	**Y_2**	**Y_3**	**S_1**	**S_2**	**b_i**	**b_i/a_{ij}**
S_1	0	0	-14/3	19/3*	1	-2/3	1/3	1/19 ← Outgoing variable
Y_1	1	1	10/9	1/9	0	1/9	1/9	1
c_j		1	1	1	0	0		
Solution		1/9	0	0	1/3	0		
Δ_j		0	-1/9	8/9	0	-1/9		
			↑					
			Incoming variable					

Table 3 Simplex Tableau 3: Non-optimal Solution

Basis		**Y_1**	**Y_2**	**Y_3**	**S_1**	**S_2**	**b_i**	**b_i/a_{ij}**
Y_3	1	0	-14/19	1	3/19	-2/19	1/19	---
Y_1	1	1	68/57*	0	-	7/57	2/19	3/34 ← Outgoing variable

					1/57			
c_j		1	1	1	0	0		
Solution		2/19	0	1/19	0	0		
Δ_j		0	31/57	0	-8/57	-1/57		
			↑					
			Incoming variable					

Table 4 Simplex Tableau 4: Optimal Solution

Basis		**Y_1**	**Y_2**	**Y_3**	**S_1**	**S_2**	**b_i**	
Y_3	1	42/68	0	1	5/34	-1/34	1/17	
Y_2	1	57/68	1	0	-1/68	7/68	3/34	
c_j		1	1	1	0	0		
Solution		0	3/34	2/17	0	0		
Δ_j		-31/68	0	0	-9/68	-5/68		

The optimal values for Y_1, Y_2, and Y_3 are 0, 3/34 and 2/17, respectively. From these, we have

$$\frac{1}{V} = 0 + \frac{3}{34} + \frac{2}{17} = \frac{7}{34}$$

Therefore, V = 34/7. Since a value 3 was added to the original pay-off values, the game value is equal to V – 3 or 34/7 – 3 = 13/7. Further, since $y_i = Y_iV$, we have $y_1 = 0 \times 34/7 = 0$, $y_2 = (3/34)\ (34/7) = 3/7$, and y3 = (2/17) (34/7) = 4/7.

The values of the duel variables X_1 and X_2 can be read from the Δ_j row of the Simplex Tableau 4. From this, X_1 = 9/68 and X_2 = 5/68. From these, 1/U = 9/68 + 5/68 = 7/34. Therefore, U = V = 34/7. Thus, $X_1 = (9/68)\ (34/7) = 9/14$ and $X_2 = (5/68)\ (34/7) = 514$.

The solution to the problem, therefore, is:

Players A		**Players B**		**Value of Game**
Strategy	Probability	Strategy	Probability	
1	9/14	1	0	13/7
2	5/14	2	3/7	
		3	4/7	

(b) Let us find the expected monetary value (EMV) of each act.

Act A = -20 x 0.3 + 200 x 0.4 +400 x 0.3 = ₹ 194

Act B = -100 x0.3 -50 x 0.4 + 600 x 0.3 = ₹ 130

Act C = 200 x 0.3 - 50 x 0.4 + 300 x 0.3 = ₹ 130

EMV of Act A is highest as seen in the table, so it should be selected.

State of nature	**Prob**	**A**	**B**	**C**	**Max for state of nature**	**Max pay off x Prob.**
X	0.3	-20	-100	200	200	200 x 0.3 = 60
Y	0.4	200	-50	-50	200	200 x 0.4 = 80
Z	0.3	400	600	300	600	600 x 0.3 = 180
Total						320

EVPI = Expected pay-off with perfect information (EPPI) - Maximum EMV = 320-194 = ₹ 126

SN 5 Economic Efficiency of the Firm – Impact Analysis on Performance

Question No. 13

(a) For the cost function $C = a_0 + b_1 - c_2x^2 + d_3x^3$, find x for which AVC & MC are minimum.

(b) For a monopolist P=10-4q and TC= 8q.

(i) If tax rate of t is imposed find the optimal p & q.

(ii) Determine the tax rate that maximizes tax revenue.

(c) Explain the Normal and Super Normal Profit.

Answer:

(i)

We have $C = a_0 + b_1 - c_2x^2 + d_3x^3$ and we assume that all coefficients are positive.

Now $TVC = b_1x - C_2X^2 + d_3x^3$

$$\Rightarrow AVC = \frac{TVC}{x} = b_1 - c_2x + d_3X^2$$

Now for minimum AVC, we must have $\frac{d(AVC)}{dx} = 0 \Rightarrow -c_2 + 2d_3x = 0 \Rightarrow x = \frac{c_2}{2d_3}$

The second order condition states $\frac{d^2(AVC)}{dx} > 0 \Rightarrow 2d_3 > 0$ which is true.

Now $MC = \frac{d(c)}{dx} = b_1 - 2c_2x + 3d_3x^2$

For Minimum MC we have $\frac{d(MC)}{dx} = 0$

$$\Rightarrow -2c_2 + 6d_3x = 0 \Rightarrow x = \frac{c_2}{3d_3}$$

The second order condition states $\frac{d^2(MC)}{dx^2} > 0 \Rightarrow 6d_3 > 0$ which is true.

(b) (i) As p= 10 - 4q is the demand curve, $TR = Pq = 10q - 4q^2$.

If T be the total tax yield, T =tq.

∴ Profit (π) after the imposition of taxes is given by

$\pi = TR - TC - T = 10q - 4q^2 - 8q - tq = -4q^2 + (2-t)q$

Now profit are maximum if $\frac{d\pi}{dq} = 0 \Rightarrow -8q + (2-t) = 0$

$$\Rightarrow q = \frac{2-t}{8}$$

The 2nd order condition states $\frac{d^2\pi}{dq^2} < 0$ i.e. $\frac{d}{dq}(\frac{d\pi}{dq}) = -8 < 0$

Putting $q = \frac{2-t}{8}$ in the demand function we get

$$p = 10 - 4(\frac{2-t}{8}) \Rightarrow p = \frac{18+t}{2}$$

(ii) The tax revenue $T = t.q = t\left(\frac{2-t}{8}\right) = \frac{2t-t^2}{8}$

Now t is maximum if $\frac{dT}{dt} = 0$ and $\frac{d^2\pi}{dt^2} < 2$

$$\frac{dT}{dt} = 0 \Rightarrow \frac{2-2t}{8} = 0 \Rightarrow t = 1 \text{ and } \frac{d^2t}{dt^2} = \frac{-2}{8} < 0$$

At t= 1 , the tax revenue is maximum and maximum value of

$$T= \frac{2\times1-1\times1}{8}=\frac{1}{8}$$

(c) Normal Profit

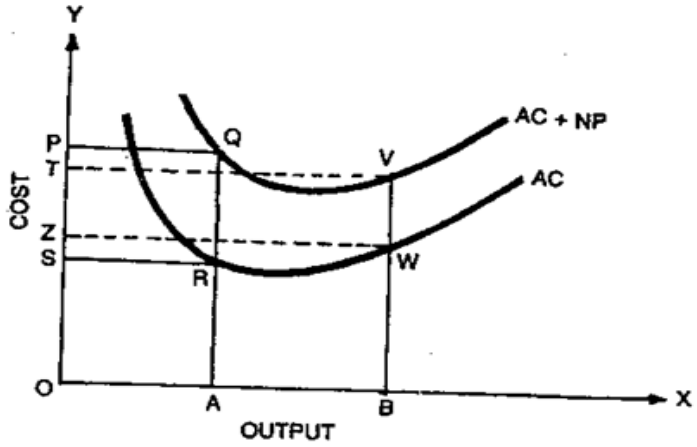
It refers to that amount of earnings which is just sufficient to induce the firm to stay in the industry. Normal profit is, thus, the minimum reasonable level of profit which the entrepreneur must get in the long run, so that he is induced to continue the employment of his resources in its present form.

Normal profit is the opportunity cost of entrepreneurship. It is equivalent to the transfer earnings of the entrepreneur. That means, if the entrepreneur fails to earn the normal rate of profit in the long run, he will close down the operation of his firm and quit the industry in order to shift his resources elsewhere.

Normal profit is considered as the least possible reward which in the long run must be earned by the entrepreneur, as compensation for his organizational services as well as for bearing the insurable business risks.

Normal profit is always regarded as a part of factor costs. Since entrepreneurial service is a factor of production, the price paid for it is the normal profit and it is to be incorporated while calculating the total cost. Of course, normal profit is the implicit money cost. Thus, in the economic sense, when the total cost (Q) is measured, it also covers the normal profit of the firm. As such, when *R = C*, ordinarily it will be inferred that there is no profit. In the economic sense, though we may say, there is no pure business profit, but there is normal profit, which is already embedded in the total cost.

It must be remembered that the entrepreneur desires a fixed amount as normal profit, which is independent of the output. So, normal profit as a factor cost is a fixed implicit cost element. Evidently, when output expands, total normal profit like *TFC* gets spread over the range of output. This has a bearing on the shape of the average cost curve *(AC)*, as shown in following Figure.



Following Stonier and Hague (1966), in above Figure, we have drawn two AC curves, one excluding normal profit-cost element *(AC)* and another by including it *(AC + NP)*. It may be observed that as we move from left to right, the vertical distance between *AC* and *AC + NP* curves tend to become narrow in a steady manner. This implies that as output increases, normal profit per unit of output diminishes.

However, the total normal profit at all levels of output remains the same. Geometrically, thus, when output is *OA,* the average normal profit is *QR.* When output rises to *OB,* the average normal profit diminishes to *VW*. Total normal profit is *PQRS* in the former case and *TVWZ* in the latter case. However, *PQRS = TVWZ.*

Normal profit is measured by the difference between *AC + NP* and *AC* curves.

In economic theory, thus, whenever the average cost curve is drawn, the normal profit as the factor cost element of a fixed nature is always included; hence, *ATC* curve means *AC + NP* curve.

A theoretical importance of the concept of normal profit is for determining the industry's equilibrium. When only normal profit is earned by the existing firms there will be no new entry in the competitive market or the industry.

Supernormal Profit

Profits in excess of normal profit are considered as supernormal. Since normal profit is included in the cost of production, supernormal profit is obtained when total revenue exceeds total costs *(i.e., TR > TC)*. It is also called pure business profit or "excess profit."

Supernormal profit depends on the demand conditions in the business, which is uncertain and unpredictable. Thus, supernormal profit is the reward for bearing uncertainties and unpredictable risks of business. Sometimes, in a competitive market, supernormal profit is also earned due to extraordinary efficiency on the part of the entrepreneur.

When the existing firms earn supernormal profit, new entries will be attracted to the industry, so the equilibrium of the industry is threatened.

Incidentally, when TR > TC, such that only a part of normal profit is earned by the firm, it is called subnormal profit. Subnormal profit is the profit below the normal profit earned when total revenue covers up explicit costs fully and a part of implicit cost of entrepreneurial services.

Question No. 14

(a) Let the demand curve be $P = \frac{10}{q}$ & $C = 5 + 2q + 5q^2$. If the objective of the firm is profit maximization only, will the firm produce?

(b) A monopolist faces the demand curve $P = 100 - \frac{1}{2}q$ and he produces the same product in 2 plants. The cost functions for these plants are $C_1 = 10q_1$, $C_2 = 0.25q_2^2$.

(i) How much will he allocate in both the markets?

(ii) How large are the profits?

(c) For a monopolist, the demand curve is q = 100 - 2q and total cost (c) = $0.05q^2 + 2q + 300$. Find profit maximizing output and price.

Answer :

(a)

Here $P = \frac{10}{q} \Rightarrow TR = pq = 10 \Rightarrow MR = \text{zero}$

Again, $C = 5 + 2q + 5q^2 \Rightarrow MC = 2 + 10q.$

At equilibrium, $MR = MC \Rightarrow 0 = 2 + 10q$

$\Rightarrow q = -\frac{1}{5} < 0.$

(b)

(i) This problem relates to the multiple plant monopolist where at equilibrium $MR = MC_1 - MC_2.$

As $P = 100 - \frac{1}{2}q, MR = 100 - q = 100 - (q_1 + q_2)$

As $q = q_1 + q_2$

Now $MC_1 = \frac{d}{dq_1}(TC_1) = 10$ and $MC_2 = \frac{d}{dq_2}(TC_2) = \frac{1}{2}q_2.$

$\therefore MR = MC_1 \Rightarrow 100 - q_1 - q_2 = 10 \Rightarrow q_1 + q_2 = 90 \ldots\ldots(1)$

$MR = MC_2 \Rightarrow 100 - q_1 - q_2 = \frac{1}{2}q_2 \Rightarrow + q_1 + 1.5q_2 = 100 \ldots\ldots(2)$

Solving equation (1) and (2) we get, $q_1 = 70$ and $q_2 = 20$ which is the optimal allocation.

(ii) We observe $P = 100 - \frac{1}{2}q$

$\Rightarrow P = 100 - \frac{1}{2}(q_1 + q_2) = 55.$

$\therefore \pi = TR - TC_1 - TC_2 = pq - 10q_1 - 0.25q_2$

$= 55 \times 90 - 10 \times 70 - 0.25(20)^2$ [as $q = q_2 + q_2 = 90$]

$= 4150.$

(c) We have $q = 100 - 2q \Rightarrow p = 50 - \frac{1}{2}q \Rightarrow MR = 50 - q.$

Also $MC = \frac{dc}{dq} = 0.1q + 2$

At equilibrium, $MR = MC \Rightarrow 50 - q = 0.1q + 2$

$\Rightarrow q = 43.6 \& p = 50 - \frac{1}{2}(43.6) = 28.2.$

Question No. 15:

(a) Target customers, Cost of the product, Market position of the firm, Distribution channel policy, Price elasticity of Demand – all are factors influencing the price of a product. Discuss each of the above factors.

(b) List the Objectives of pricing Policy.

(c) "Methods of pricing policy can be classified into 5 broad categories. One of them on that category is pricing Policies based on Market Conditions. There are 5 different types of market in Economics and certainly there are different types of pricing policies" – Explain about the Monopoly and Oligopoly.

Answer:

(a) Factors Influencing Price of a Product:

Generally, marketers consider the factors in setting price i.e. Target Customers, Cost of the Product, Competition, The law, Social Responsibility, Market Position of the Firm, Distribution Channel Policy, Price elasticity of Demand, Economic Environment etc. As required by the question we are discussing the following factors:

(i) Target customers: Price of product is depend on the capacity of buyers to buy at various prices, in other words, influence of price elasticity of demand will be examined.

(ii) Cost of the Product: Pricing is primarily based on, how much it costs to produce and market the product, i.e., both the production and distribution cost.

(iii) Market Position of the Firm: The position of the market may also influence the pricing decision of the firm. It is only why the different producers of identical products sell their products at different prices.

(iv) Distribution Channel Policy: The prices of products will also depend up the policy regarding distribution channel The longer the channel, the higher would be the distribution costs and consequently higher the prices.

(v)Price elasticity of Demand: Price elasticity refers to consequential change in demand due to change in price of the commodity. It is the relative responsiveness to the changes in price. As there an inverse relationship between price and demand for product, the demand will increase with fall in price.

(b) Objectives of a Pricing Policy

Each pricing decision of a firm has generally one of the following objectives:

- To achieve a given rate of return for the entire product line;
- To maintain or increase the existing market share of the firm;
- To maintain at least a particular level of price stability;
- To choose and adopt a price policy which fits into the market conditions faced by the different products in the product line;

(c) The method pricing policies can be classified into 5 broad categories. These are

(i) Cost Oriented Pricing
(ii) Competition Oriented Pricing
(iii) Demand Oriented Pricing
(iv) Pricing Based on Other Economic Considerations
(v) Pricing Policies based on Market Conditions

Pricing based on market conditions can be classified into 6 categories. These are

(i) Perfect Competition
(ii) Monopoly
(iii) Temporary Monopoly
(iv) Duopoly
(v) Oligopoly
(vi) Monopolistic Competition

Monopoly:

Monopolies are almost always nationalized enterprises for which criterion for maximization of profit is not justifiable. In reality, a firm enjoys monopoly position only because it has succeeded in eliminating or absorbing its competitors. It is therefore probable that, initially, it was better organized and more efficient.

The technical advantages which are benefit large firms in certain branches of industry can also neutralize, at least partly, the harmful effects of a monopoly. Finally, "any defacto monopoly must be prepared to defend itself, on the one hand, against the emergence of substitute competitors and, on the other, against the competition of substitute products, which imposes a limitation on its profit realization".

In general, to prevent the entry of new firms, a monopolist must set entry-preventing prices, i.e., it should hold prices at a level which will tend to discourage new firms from entering that particular branch of industry. This presupposes an implicit estimation of production costs of possible competitors, and of the profits which will be required to attract them.

On the contrary, in order to fight the competition of substitute products, a monopoly must establish its price policy on the basis of a demand curve which will actually take those products into account. When the uses of goods produced by a monopoly are many, the degree of monopoly can vary enormously from one use to another. In case of coal, for instance, sales range from the industrial market- in which the fuel oil competition is extremely active – to blast furnace coke market – in which coal enjoys a technical monopoly.

So profit maximization demands that management collect more detailed econometric data in the environment of monopoly, than in that of perfect competition.

Oligopoly:
In oligopolistic situations, entrepreneurs attempt to avoid price wars which are ruinous for the industry. Being aware of the fact that their rivals can do the same, they refrain from seeking to increase their share of the market through price cuts. As a result, oligopoly can attain certain stability characterized by: a) the 'price leadership' of a firm, b) the reduction of hidden prices, and c) competition in fields other than that of price (like competition in fields other than that of price (like promotion, packaging, etc.). We have already discussed the nature of oligopoly pricing with the help of models.

Now, about the lowering of hidden prices. It can assume various forms. It is contingent upon the customer, upon the size of the order, upon the geographical area and the existence of inferior brands. This policy has the advantage that it precedes adjustments of official prices and in this way contributes to the stability of oligopolists.

Finally, non-price competition is a substitute for price competition. It is much less dangerous because its effects are felt in the long run. So the possibilities of reactions from competition are more limited.

SN -6 Financial and Non – Financial Indicators and Profitability

Question No. 16
Read the following Case let and answer the following:
The Royal Botanical Gardens has been established for more than 120 years and has the following mission statement: "The Royal Botanical Gardens belongs to the nation. Our mission is to increase knowledge and appreciation of plants, their importance and their conservation, by managing and displaying living and preserved collections and through botanical and horticultural research."
Located towards the edge of the city, the gardens are visited regularly throughout the year by many local families and are an internationally well known tourist attraction. Despite charging admission, it is one the top five visitor attractions in the country. Every year it answers many thousands of inquiries from universities and research establishments, including pharmaceutical companies from all over the world, and charges for advice and access to its collection. Inquiries include requests for access to the plant collection for horticultural work, seeds for propagation or samples for chemical analysis to seek novel pharmaceutical compounds for commercial exploitation. It receives an annual grant in aid from central government, which is fixed once every five years. The grant is due for review in three years' time.
The finance director has decided that, in order to strengthen its case when meeting the government representatives to negotiate the grant, the management board should be able to present a balanced scorecard demonstrating the performance of the gardens. He has asked you, the senior management accountant, to help him. Many members of the board, which consists of eminent scientists, are unfamiliar with the concept of a balanced scorecard.
Required:
(i) Describe the benefit of the Balanced Scorecards.
(ii) Discuss the process you would employ to develop a suitable balanced scorecard for the Royal Botanical Gardens and give examples of measures that would be incorporated within it.

Answer:
(i) The benefits of adopting a Balanced Scorecard approach to performance management may include:
(a) It creates a longer term strategic view of performance rather than a myopic short term view.

(b) It broadens the view of divisional managers as to what represents good performance away from a solely financially orientated view.

(c) Organizations can develop performance measures that are explicitly aligned to the corporate strategy and in support thereof.

(d) It considers customer viewpoint which is critical in any business.

(e) It helps to promote accountability as each performance measure could be the responsibility of a nominated individual or individuals.

The implementation of the Balanced Scorecard should be relatively simple and understandable.

(ii) We should look at the specific measures that the Royal Botanical Gardens could introduce. As well as considering the organization from a financial viewpoint, Kaplan and Norton discussed three new perspectives that businesses should consider: the customer perspective, the internal business perspective and the learning and growth perspective. We should start the task of developing a balanced scorecard by looking at the organization from all of these perspectives. The customer perspective considers areas such as customer satisfaction and how the organization adds value to these customers. In the Royal Botanical Gardens' case this would include everyone who makes an inquiry as well as all of its Visitors. The internal business perspective considers the internal processes that the organization needs to perform well in order to be successful. For the Royal Botanical Gardens these would include the procedure it goes through to reply to a query from a university. The learning and growth perspective considers areas that require constant improvement. For the Royal Botanical Gardens this would include staff training and investment in modern equipment. The organization could then look at a range of measures for each area mentioned in the mission statement. For example, one of the aspects was "displaying living and preserved collections". The balanced scorecard could turn these into specific measures:

- **Financial Perspective:** Budget for the cost of adding new preserved collections.
- **Customer Perspective:** Attractiveness of displays. Quality of information provided about displays.
- **Internal Business Perspective:** Time spent on maintaining preserved collections.
- **Learning and growth Perspective:** Number of new displays presented during the year. Number of visits made to overseas equivalents of the Royal Botanical Garden.

Question No. 17

(a) Describe the important Key Performance Indicators.
(b) Explain about the Financial Gearing Ratio.
(c) Mention the Advantages of Balanced Score Card

(a) The following are some important KPIs that should be monitored:

- **Stock turnover – days.** Reflects the number of days that it takes to sell inventory. The lower the ratio means the quicker the stock is sold.
- **Debtors turnover – days.** Reflects average length of time from sale to cash collection. The lower the ratio means the quicker that accounts are paid. From a cash flow perspective, it is important to keep days outstanding to a minimum.
- **Current ratio.** Indicates the extent to which current assets cover current liabilities and is a measure of the ability to meet short-term obligations. The rough rule of thumb is a ratio of 2:1. That is for every `1 of liabilities (within 12 months), there should be at least `2 in current assets to meet such liabilities.
- **Debt/equity.** This is a measure of the extent to which a business relies on external borrowings to fund its on-going operations. The higher the ratio, the more heavily that

debt financing is used. In order to provide a reliable measure, assets should be valued at market value.

- **Interest coverage.** Provides a measure of the ability of the business to meet its interest commitments out of profits and is linked to the debt/equity ratio. The rough rule of thumb used by banks is a ratio of 3:1. That is, operating profit before income tax exceeding interest expense three times.
- **Return on investment.** Represents the after-tax return that owners are receiving on their investment and should be compared with alternative forms of investment.
- **Gross profit margin.** An indication of the profitability of the business and reflects control over cost of sales and pricing policies. This ratio should be compared with prior periods and to any available industry data.
- **Breakeven sales.** Reflects the sales that need to be generated in order to cover expenses. In other words, this is the level of activity at which neither a profit nor loss is incurred, or where total costs equate with total revenue. This is a very important ratio that every owner should monitor on a monthly basis.

(b) Gearing ratios

In addition to managing profitability and liquidity it is also important for a company to manage its financial risk. The following ratios may be calculated:

Financial gearing

This is the long term debt as a percentage of equity.

$$\text{Gearing} = \frac{\text{debt}}{\text{equity}} \times 100$$

or

$$\frac{\text{debt}}{\text{debt} + \text{equity}} \times 100$$

A high level of gearing indicates that the company relies heavily on debt to finance its long term needs. This increases the level of risk for the business since interest and capital repayments must be made on debt, where as there is no obligation to make payments to equity.

The ratio could be improved by reducing the level of long term debt and raising long term finance using equity.

(c) Advantages of Balanced Scorecard

i. **Holistic approach:** It brings strategy and vision as the center of Management focus. It helps Companies to assess overall performance, improve operational processes and enable Management to develop better plans for improvement. It provides Management with a comprehensive picture of business operations.

ii. **Overall Agenda:** It brings together in a single Management Report, various aspects like customer oriented, shortening response time, and improving quality etc. of competitive agenda.

iii. **Objectivity:** It emphasizes the need to provide the user with a set of information, which address all relevant areas of performance in an objective and unbiased manner.

iv. **Management by Objectives:** The methodology of BSC facilitates communication and understanding of business goals and strategies at all levels of the Firm. Thus it enables Management by Objective.

v. **Feedback and Learning:** It provides strategic feedback and learning. BSC guards against sub-ordination. It emphasizes an integrated combination of traditional and non-traditional performance measures.

vi. **System Approach:** It helps Senior Managers to consider all the important performance measures together and allows them to see whether an improvement in one area has been achieved at the expense of another.

Question No. 18

(a) State the main types of information which will be required by a Manager to implement the Balanced Score Card approach to performance Measurement.

(b) Discuss the benefits of Branding.

(c) Explain the advantages and disadvantages Return on Capital Employed (ROCE).

Answer:

The Balanced Scorecard suggests that we view the organization from four perspectives, and to develop metrics, collect data and analyze it relative to each of the following perspectives:

Perspective:

The Learning & Growth Perspective:

This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement. In a knowledge worker organization, people, the only repository of knowledge, are the main resource. In the current climate of rapid technological change, it is becoming necessary for knowledge workers to be in a continuous learning mode. Kaplan and Norton emphasize that 'learning' is more than 'training'; it also includes things like mentors and tutors within the organization, as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed.

The Business Process Perspective:

This perspective refers to internal business processes. Metrics based on this perspective allow the managers to know how well their business is running, and whether its products and services conform to customer requirements (the mission). These metrics have to be carefully designed by those who know these processes most intimately.

The Customer Perspective:

Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business. These are leading indicators. If customers are not satisfied; they will eventually find other suppliers that will meet their needs. Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good.

The Financial Perspective:

Kaplan and Norton do not disregard the traditional need for financial data. Timely and accurate funding data will always be a priority, and managers will do whatever necessary to provide it. In fact, often there is more than enough handling and processing of financial data. With the implementation of a corporate database, it is hoped that more of the processing can be centralized and automated. But the point is that the current emphasis on financials leads to the "unbalanced" situation with regard to other perspectives. There is perhaps a need to include additional financial-related data, such as risk assessment and cost-benefit data, in this category.

(b) Benefits of Branding:

Provides benefits to buyers and sellers

To Buyer:

- Help buyers identify the product that they like/dislike.
- Identify marketer
- Helps reduce the time needed for purchase.
- Helps buyers evaluate quality of products especially if unable to judge a products characteristics.
- Helps reduce buyers perceived risk of purchase.
- Buyer may derive a psychological reward from owning the brand, i.e. Rolex or Mercedes.

To Seller:

- Differentiate product offering from competitors
- Helps segment market by creating tailored images, i.e. **Contact lenses**

- Brand identifies the companies' products making repeat purchases easier for customers.
- Reduce price comparisons
- Brand helps firm introduce a new product that carries the name of one or more of its existing products half as much as using a new brand, lower co. designs, advertising and promotional costs.

(c) The advantages and disadvantages of the Return on Capital Employed:

Advantages	**Disadvantages**
Easy to calculate.	Research shows a correlation between ROCE and Shareholder value.
Figures are readily available.	Care must be taken to ensure that like is compared with like, when comparing with different companies- e.g. inclusion of intangibles in capital employed.
Measures how well a business is utilizing the funds invested in it.	Can be distorted by accounting policies.
Often used by external analysts / investors.	ROCE can be improved by cutting back investment- this may not be in the company's long term best interest.

Section – B

SN 7 Application of IT and Econometric tools in Performance Management

Question no. 19

(a) Describe about the Elman and Jordon Artificial Neural Networks.

(b) Discuss the importance of Decision Support Systems for gaining the Competitive Advantage.

(c) Explain about the Spread Sheet.

Answer:

(a) Elman network also referred as Simple Recurrent Network is special case of recurrent artificial neural networks. It differs from conventional two-layer networks in that the first layer has a recurrent connection. It is a simple three-layer artificial neural network that has back-loop from hidden layer to input layer trough so called context unit. This type of artificial neural network has memory that allowing it to both detect and generate time-varying patterns.

The Elman artificial neural network has typically sigmoid artificial neurons in its hidden layer, and linear artificial neurons in its output layer. This combination of artificial neurons transfer functions can approximate any function with arbitrary accuracy if only there is enough artificial neurons in hidden layer. Being able to store information Elman artificial neural network is capable of generating temporal patterns as well as spatial patterns and responding on them. Jordan network is similar to Elman network. The only difference is that context units are fed from the output layer instead of the hidden layer.

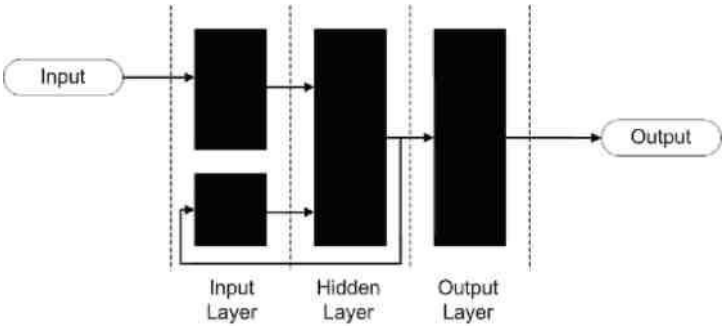


Fig. Jordan Artificial Neural Network

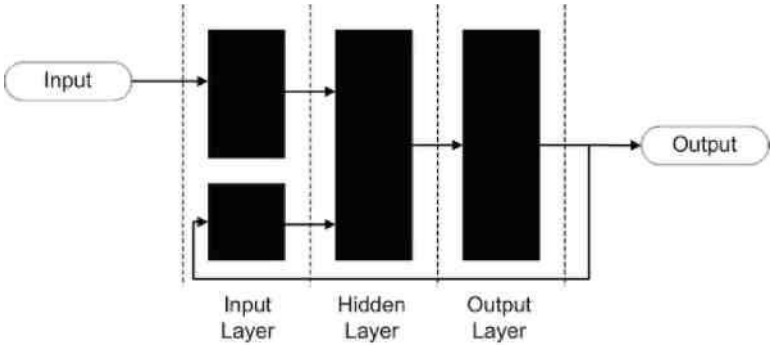


Fig. Jordan Artificial Neural Network

(b) In a world of constant flux, informed and thoughtful decision-making is the cornerstone of business success. As a manager, you must make decisions that affect your business every day, some critical and some not so important. Decision Support Systems allow faster decision making, identification of negative trends, and better allocation of business resources all to the benefit of you and your organization.

Decision Support Systems (DSS): DSS are a specific class of computer-based information systems that support your decision-making activities. A decision support system analyzes business data and provides interactive information support to managers and business professionals during the decision-making process, from problem recognition to implementing your decision. Decision Support Systems use (1) Analytical models, (2) specialized databases, (3) a decision maker's own insights and judgments, and (4) an interactive, computer-based modeling process to support semi-structured business decisions.

A key component to any DSS is Business Intelligence reporting tools, processes, and methodologies. These provide you with rich reporting, monitoring, and data analysis, which are necessary for effective and fast decision-making.

Gain competitive advantage with Decision Support Systems In today's competitive business environment, what you need for maximum performance is to achieve competitive advantage. Without competitive advantage, your company will not be able to operate and will eventually cease to exist.

One way of gaining competitive advantage is through the use of computerized Decision Support Systems. The simplest and most tangible benefit of a Decision Support System is the ability to help you toward making better decisions. Your decisions are better in the sense that, once they are implemented, they have such effect as reducing costs, using assets more efficiently, increasing revenue, reducing risks, improving customer service, and so on.

However, Decision Support Systems can provide your company with many other benefits including:
Speeding up process of decision making
- Increasing organizational control
- Speeding up problem solving in an organization
- Helping automate managerial processes
- Improving personal efficiency
- Eliminating value chain activities

(c) Spread Sheet

A **spreadsheet** is a program designed specifically for processing data in tabular form. These data may be numerical or textual, although most of the functions of a spreadsheet are for the former kind.
The spreadsheet is modeled on the paper device once used by accountants for tabulating numerical figures—a large sheet of paper spread out to show the financial state of a business. Apart from its ease of correction the electronic version differs from the paper spreadsheet principally in its database and numerical functions, most notably sorting and the ability to display the results of formulae which depend on values entered elsewhere in the sheet. Automatic calculation and graphical display have meant a radical increase in speculative, "as if" presentations, which has made the spreadsheet an essential tool of all commercial business and certain kinds of academic research. The rapidity with which graphical displays may be generated from quantitative information represents a potential for communication of facts and ideas that may as easily be abused as used. Hence the increased need, explored in this course, for understanding visual forms.

Spreadsheet software allows you to
- create simple lists and tables of alphabetic or numerical data
- create and manipulate simple (flat-file) databases
- establish relationships between sets of numerical data
- apply arithmetic, mathematical or statistical functions to numerical datasets
- represent datasets in graphical or chart form

In the humanities, potential uses of spreadsheets include:
- maintaining lists of short items you wish to sort, e.g. vocabulary, categories, instances of phenomena
- studying quantifiable information, such as word-distributions across textual corpora; demographics; other sociological statistics; voting patterns; inventories; etc.
- managing budgets, e.g. for grant applications and project expenses

Question no. 20

(a) Define the following terms in the context of Supply Chain Management:
(i)Activity Based Management, (ii) Capacity Management, (iii) Customer Relationship Management, (iv) Customer Value, (v) Information Sharing, (vi) Lean Manufacturing.

(b) Describe about the different types of On-Line Analytical Processing.

Answer:

(a)

(i) Activity-Based Management (ABM)

The use of activity-based costing information about cost pools and drivers, activity analysis, and business processes to identify business strategies; improve product design, manufacturing, and distribution; and remove waste from operations.

(ii) Capacity Management

The function of establishing, measuring, monitoring, and adjusting limits or levels of capacity in order to execute all manufacturing schedules; i.e., the production plan, master production schedule, material requirements plan, and dispatch list. Capacity management is executed at four levels: resource requirements planning, rough-cut capacity planning, capacity requirements planning, and input/output control.

(iii) Customer Relationship Management (CRM)

A marketing philosophy based on putting the customer first. It involves the collection and analysis of information designed for sales and marketing decision support to understand and support existing and potential customer needs. It includes account management, catalog and order entry, payment processing, credits and adjustments, and other functions.

(iv) Customer Value

The customer value approach focuses on how people choose among competing suppliers, customer attraction and retention, and market-share gains.

By highlighting the best performer on each key buying factor, marketers obtain a market derived, empirical aggregate of each supplier's customer value proposition. Often the view from the marketplace differs from the organization's internally developed customer value proposition

(v) Information Sharing

A strategic partnering relationship between suppliers and buyers is characterized by a willingness to be open, and to share forecasted demand and cost data as well as the benefits resulting from the information sharing. Both parties in the relationship generally follow a continuous improvement philosophy towards total cost of material acquisition and ownership along with quality and service. Cost, quality and schedule information that is confidential is shared both ways between firms during the early and ongoing stages of design and during the production life-cycle of the supplying relationship. This openness exists because of the high degree of trust earned through multiple successful interactions between the two organizations.

(vi) Lean Manufacturing

A philosophy of production that emphasizes the minimization of the amount of all the resources (including time) used in the various activities of the enterprise. It involves identifying and eliminating non-value-adding activities in design, production, supply chain management, and dealing with the customers. Lean producers employ teams of multi skilled workers at all levels of the organization and use highly flexible, increasingly automated machines to produce volumes of products in potentially enormous variety. It contains a set of principles and practices to reduce cost through the relentless removal of waste and through the simplification of all manufacturing and support processes.

(b) Different Types of OLAP

OLAP systems have been traditionally categorized using the following taxonomy.

- **Multidimensional**

MOLAP is a "multi-dimensional online analytical processing".'MOLAP' is the 'classic' form of OLAP and is sometimes referred to as just OLAP. MOLAP stores this data in optimized multidimensional array storage, rather than in a relational database. Therefore it requires the pre-computation and storage of information in the cube - the operation known as processing. MOLAP tools generally utilize a pre-calculated data set referred to as a data cube. The data cube contains all the possible answers to a given range of questions. MOLAP tools have a very fast response time and the ability to quickly write back data into the data set.

- **Relational**

ROLAP works directly with relational databases. The base data and the dimension tables are stored as relational tables and new tables are created to hold the aggregated information. Depends on a specialized schema design. This methodology relies on manipulating the data stored in the relational database to give the appearance of traditional OLAP's slicing and dicing functionality. In essence, each action of slicing and

dicing is equivalent to adding a "WHERE" clause in the SQL statement. ROLAP tools do not use pre-calculated data cubes but instead pose the query to the standard relational database and its tables in order to bring back the data required to answer the question. ROLAP tools feature the ability to ask any question because the methodology does not limit to the contents of a cube. ROLAP also has the ability to drill down to the lowest level of detail in the database.

- **Hybrid**

There is no clear agreement across the industry as to what constitutes "Hybrid OLAP", except that a database will divide data between relational and specialized storage. For example, for some vendors, a HOLAP database will use relational tables to hold the larger quantities of detailed data, and use specialized storage for at least some aspects of the smaller quantities of more-aggregate or less-detailed data. HOLAP addresses the shortcomings of MOLAP and ROLAP by combining the capabilities of both approaches. HOLAP tools can utilize both pre-calculated cubes and relational data sources.

- **Other types**

The following acronyms are also sometimes used, although they are not as widespread as the ones above:

- **WOLAP** - Web-based OLAP
- **DOLAP** - Desktop OLAP
- **RTOLAP** - Real-Time OLAP

Question no. 21

(a) Describe about the Long Short Term Memory of Recurrent Artificial Neural Networks Topologies.

(b) "The technology stack is designed to highlight the different layers of technology that will be affected by a BI project" – Mentioning the different layer for justifying the statement.

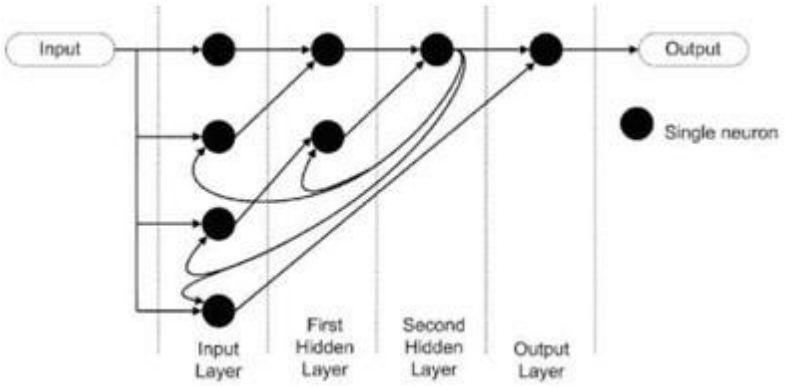
(c) Explain about the Data Quality Measurement and Metrics. And mention aspects of this practice.

Answer:

(a) Long Short Term Memory

Long Short Term Memory is one of the recurrent artificial neural networks topologies. In contrast with basic recurrent artificial neural networks it can learn from its experience to process, classify and predict time series with very long time lags of unknown size between important events. This makes Long Short Term Memory to outperform other recurrent artificial neural networks. Long Short Term Memory artificial neural network is build from Long Short Term Memory blocks that are capable of remembering value for any length of time. This is achieved when the input is significant enough remembering.

Architecture of Long Short Term Memory block is shown in the following figure where input layer consists of sigmoid units. Top neuron in the input layer process input value that might be sent to a memory unit depends on computed value of second neuron from the top in the input layer. The third neuron from the top in the input layer decide how long will memory unit hold (remember) its value and the bottom most neuron determines when value from memory should be released to the output. Neurons in first hidden layer and in output layer are doing simple multiplication of their inputs and a neuron in the second hidden layer computes simple linear function of its inputs. Output of the second hidden layer is fed back into input and first hidden layer in order to help making decisions.



(b) To build a Business Intelligence solution, enterprises will need to consider new investments and upgrades to current technology to build out the BI technology stack. The technology stack is designed to highlight the different layers of technology that will be affected by a BI project, all the way from the hardware hosting your data at the bottom of the stack to the portal product used to present information to users at the top. Starting from the bottom, this seven-layer stack includes:

(i) Storage and computing hardware: To implement BI, firms will need to invest or upgrade their data storage infrastructure. This includes Storage Area Networks (SAN), Network Attached Storage (NAS), Hierarchical Storage Management (HSM), and silo-style tape libraries. The trend over the next five years is for storage resources to be amalgamated into a single, policy-managed, enterprise-wide storage pool.

(ii) Applications and data sources: To develop an effective BI solution, source data will need to be scrubbed and organized. The challenge is that source data can come from any number of applications, most using proprietary data formats and application-specific data structures. Customer Relationship Management (CRM), Supply Chain Management (SCM), and Enterprise Resource Planning (ERP) systems, and other applications are the common sources of data. The trend over the next five years will be for applications to standardize the data format using extensible Markup Language (XML) schema and leverage BI specific standards like XML for Analysis.

(iii) Data integration: Middleware allows different systems supporting different communication protocols, interfaces, object models, and data formats to communicate. Firms will need to invest in these "connectors" to allow data from source applications to be integrated with the BI repository. Extraction, transformation and loading (ETL) tools pull data from multiple sources, and load the data into a data warehouse. Again, the trend in data integration and Enterprise Application Integration, in general, is toward standardization through XML and web services.

(iv) Relational databases and data warehouses: Firms will need a data warehouse to store and organize tactical or historical information in a relational database. Organizing data in this way allows the user to extract and assemble specific data elements from a complete dataset to perform a variety of analyses.

(v) OLAP applications and analytic engines: Online analytic processing (OLAP) applications provide a layer of separation between the storage repository and the end user's analytic application of choice. Its role is to perform special analytical functions that require high-performance processing power and more specialized analytical skills.

(vi) Analytic applications: Analytic applications are the programs used to run queries against the data to perform either "slide-and-dice" analysis of historical data or more predictive analyses, often referred to as "drill-down" analysis. For example, a customer intelligence application might enable a historical analysis of customer orders and payment history. Alternatively, users could drill down to understand how changing a price might affect future sales in a specific region.

(vii)Information presentation and delivery products: The results of a query can be returned to the user in a variety of ways. Many tools provide presentation through the analytic application itself and offer dashboard formats to aggregate multiple queries. Also, enterprises can purchase packaged or custom reporting products, such as Crystal Reports. An important trend in BI presentation is leveraging XML to deliver analyses through a portal or any other Internet-enabled interface, such as a personal digital assistant (PDA).

(c) Data Quality Measurement and Metrics

Having used an assessment to identify areas for data quality improvement, the next step is to synthesize the results of the assessment to narrow the scope by concentrating on the data elements that are deemed critical based on the business users' needs. Defining performance metrics for reporting using a data quality scorecard requires processes for the determination of dimensions and corresponding units of measure and acceptability thresholds, and the presentation of quantifiable metrics that are relevant to the business data consumers.

To continue our example, once we have determined using the data quality assessment process that problems with addresses impacts the ability to optimally deliver shipped items, we can narrow the focus for data quality measurements to specific metrics associated with the critical data elements that contribute to the delivery failures. Some items might not be delivered due to missing street information, while others might have incorrect zip codes. The first problem is one of completeness, while the second of consistency with defined reference data. Measurements associated with the data quality dimensions of completeness and consistency can be defined using data quality validation rules for each address, and the resulting measures can be presented as metrics to the business users in the fulfillment department to estimate how invalid addresses are related to increased costs.

Aspects of this Practice Include:

i. **Select dimensions of data quality –** A dimension of data quality describes a context and a frame of reference for measurement along with suggested units of measurement. Commonly measured dimensions of data quality include completeness, consistency, timeliness, and uniqueness, although the range of possible dimensions is only limited by the ability to provide a method for measurement. During this process, the data quality analysts select the dimensions that are to be measured and consider the tools, techniques, and skills needed to capture the measurements. The result of this process is a collection of specific measures that can be combined to contribute to qualitative data quality metrics.

ii. **Define data quality metrics –** Having identified the dimensions of data quality that are relevant to the business data consumers as well as the dimensions and the specific measures, the analyst can create specific reportable metrics that can be presented to the business data stewards. These may be basic metrics composed of directly measured rules, or may be more complex metrics that are composed as weighted averages of collected scores. Other aspects include reporting schemas and methods for drilling into flawed data for root cause analysis.

iii. **Define data validity rules –** The assessment process will expose potential anomalies, which are reviewed with the business users to identify data quality measures and, ultimately, data quality metrics. Yet in order to transition away from a reactive approach that seeks to remediate data quality issues once they are manifested at the end-user interface, the organization must engineer data controls into the application development process so that data errors can be identified and addressed as they occur. This process has the data quality analysts developing data validity rules; these rules can be integrated into the business applications as controls to verify that data meet expectations throughout the information flow.

iv. **Set acceptability thresholds –** Once the data quality dimensions and metrics have been validated, the business users are consulted to express their acceptability thresholds. When a metric score is below the acceptability threshold, it means that the data does not meet business expectations. Integrating these thresholds with the methods for measurement completes the construction of the data quality metric.

v. **Devise data quality scorecard –** A data quality scorecard presents metric scores to the data stewards observing the business data sets. Metrics scores can be captured within a repository over a long time period to enable trending and demonstrate continuous improvement or (conversely) show that progress is not being made. The process of devising the scorecard include managing the metrics definitions, measurement processes, weightings, how the scores are captured and stored, as well as composing the tools and technologies for delivery and presentation.

Question no. 22

"It may be useful for development organizations to consider the many issues involved before embarking on an e-commerce initiative, in relation to the organization's mandate, development goals, and organizational structure. The primary issues involved would include: (i) Resource Expansion, (ii) Capital Costs, (iii) Marketing, (iv) Staff/ Training,(v) Types of products offered for sale online, (vi)Purchasing patterns of online customers etc" – Discuss the points.

Answer:

It may be useful for development organizations to consider the many issues involved before embarking on an e-commerce initiative, in relation to the organization's mandate, development goals, and organizational structure. The primary issues involved would include:

(i) Resource Expansion – Is the main goal of selling goods and services online the generation of revenue to offset operational costs? If so, how much revenue does the organization expect/wish to generate? These strategic questions will allow the organization to assess how much funding will go toward e-commerce activities. If the organization is approaching e-commerce as a means of covering not only the costs of producing the goods and services and disseminating development-focused products, but wishes to expand its revenue base to support other project costs, then it may want to develop an e-commerce platform and strategy that can attract customers. The organization may have to approach e-commerce as a resource expansion activity that uses business strategies and a full marketing approach. This leads to the question of whether this fits in with the development mandate of the organization and its charitable organization status. Will e-commerce activities distort the tax-free status of the development organization? Is the organization liable in the case of legal conflicts? Most development organizations have already faced these questions if they sell publications and other products by "traditional" means.

(ii) Capital Costs – How much funding is the organization willing to put into e-commerce activities? E-commerce platforms can be high priced, depending on the level of sophistication. A development organization undertaking e-commerce activities should consider whether it wants to incur higher costs, with the possibility of cost recovery from an expected higher level of sales. What are the possibilities of receiving financial assistance from donor agencies or partner organizations for this activity? Development organizations pursuing e-commerce activities may have to decide between varieties of options for their online selling activities, depending on their financial capacities. These options can be divided into 1) technical hardware and 2) site design and maintenance. The organization will have to decide whether it wants to invest in setting up its own in-house server, depending on the organization's size and computing requirements, or find a third party that is willing to host the site on its server. Is the third party another development-focused organization, or is it a

private company/ISP? Regarding design and maintenance of the e-commerce site, is the organization able to hire in-house technical personnel to handle design, development, and maintenance, or is it more cost effective to hire an outside party to handle these tasks? Developing an e-commerce site that generates high levels of revenue will have to respond to the changes in e-commerce platforms in the commercial sector. The development organization may want to consider using security encryption software for credit card payment, increasing costs to an extent yet benefiting from increasing customer confidence in the transaction process. Will the site be eye-catching, with the hope of attracting customers, possibly increasing site development costs for higher level graphics and design? Pan Partners currently do not have to bear all of the above-mentioned capital costs, but may one day have to consider them when they initiate an e-commerce site on their own.

(iii) Marketing – As evident from the discussion above, a good marketing strategy forms the basis of the operational strategy, in order to attract customers to the e-commerce site and ensure a steady pattern of sales. Development organizations often need not employ capital-intensive marketing programs in order to have a successful marketing campaign. The marketing strategy can be divided into two main categories: 1) online markets and 2) offline markets.

- **Online markets** include those customers that have already used, or are able to use, e-commerce for purchasing products. The Internet can be used as a tool in itself in order to capture online markets. Techniques include identifying other sites that would be willing to link to the organization's e-commerce site, or cross selling on these sites. These sites include organization partners and sites that offer links to development information and online resources. Another technique includes identifying target markets that would be interested in purchasing the specific development- focused products that the organization is selling online. Once the target markets are identified, potential customers can be identified and a personalized e-mail sent, providing a description of the products being offered and why they might be of interest to the potential customer. As well, individuals and organizations that have already been in contact with the organization can be contacted by e-mail with a similar message. In this way, the development organization is targeting markets that it knows will be interested in the products it offers.

- **Offline markets** include those individuals and organizations that have access to the Internet, but have never used e-commerce or are unlikely to do so. In these cases, "traditional" means of marketing can be employed to attract the potential customer to the e-commerce site. This includes advertisements in publications, newsletters, announcements at conferences and events, mailings to members, and supporters. Other innovative means of marketing can be employed, such as advertising promotional offers (e.g., "buy one, get one free," or announcements of discounted items) on the home page of the development organization's website.

(iv) Staffing/Training -- Along with the capital costs comes the assessment of whether the organization has trained staff that can maintain an e-commerce site, including both the technical staff mentioned above, and the administrative staff that can process and fulfill the orders. Is the current staff able and willing to take on these activities? Will capacities be taken away from other projects and activities? Will the organization have to employ new staff to concentrate on e-commerce? Would it be cheaper/more effective to hire an outside company to do this? Can the organization afford these costs? Will the staff have to receive training? All of the above questions are important, not only for the success of the e-commerce initiative, but also to ensure that capacities are not taken away from other development activities. Once the above-mentioned issues are addressed, it is possible to move on to the operational strategy. The operational strategy addresses

the issues highlighted in the examples above. These issues are important to address because of their impact on the overall expected sales patterns of development organizations.

(v) Types of Products Offered for Sale Online -- As previously noted, the products that are produced by development organizations primarily serve the purpose of disseminating information on a specific development topic or issue. These are products that are not often produced for mass markets, but for particular groups with an interest in the development sector. Should development organizations wish to broaden their market sector, they can develop products that have a wider appeal, while still maintaining a focus on the dissemination of information on development issues. These products could include general information and educational publications on a particular development theme (e.g., a survey of regional environmental issues). Such products could draw in new markets, such as schools and libraries. Development organizations could also look at innovative ways of using the Internet to create Web-based products for sale. For example, electronic versions of books and journals can provide a low-cost means of both producing these products and distributing them. Text can be digitized and offered for sale online. The product can then be sent to the customer electronically, cutting down on the cost of printing the text and sending the item by post. Other products could include digitized audio and video materials and electronic greeting cards. One such initiative is E-cards, an online greeting card company that supports the World Wildlife Fund (WWF). The virtual cards contain photographs of endangered animals and habitats. The site is sponsored by advertisers and for every greeting card sent, E-cards donates a significant portion of the revenue to the WWF. It also assists by sending Web traffic to the WWF website and, as an extension, drawing attention to the cause of endangered species and the environment. Another possibility that development organizations could pursue is allowing charitable donations and contributions to be made online. This would allow individuals that would like to support the efforts of a particular organization to submit their contribution in the form of an online transaction. This may increase overall contributions, as it provides a convenient way for individuals with access to the Internet to donate.

(vi) Purchasing Patterns of Online Customers -- The frequency of updating new products can impact the number of items purchased by customers and the number of returning customers. In order to encourage customers to purchase more than one item at a time, it is important to offer a (wide) variety of products. Returning to the marketing strategies, development organizations can offer sales promotions mentioned above. This can increase the per-customer volume of sales, increasing overall revenue. Development organizations can consider organizing a schedule for updating their e-commerce site, adding new products and promotional offers on a regular basis. This way, previous customers will see that new products are available for sale and may be attracted to purchasing a second or third time. It may be useful to form a general profile of who the organization's likely customers might be, and what their purchasing patterns could be. Are they individuals, companies, research institutes, universities, donors, libraries, or governments? Further research on e-commerce customers could provide a useful tool for assessing online purchasing patterns. Developing an e-commerce strategy can allow development organizations to approach this initiative with an understanding of what they want to achieve and how to achieve it. This can encourage strategic thinking of how to attract potential customers to the site and how to keep them returning. In order for e-commerce initiatives to be successful, whether generating revenue to offset production costs or increasing overall revenue to offset operational costs, development organizations can often use business strategies to more effectively achieve their overall goals.

Question no. 23
(a) Discuss about the Hopfield Artificial Neural Network.
(b) Explain about the Data Quality and System Development Life Cycle.
(c) Describe about the Data Quality practices and Core Data Services
(d)"Supply Chain activity can be grouped into Strategic, Tactical and Operational Activity". – Describe about the Operational Activity.

Answer:

(a) Hopfield Artificial Neural Network
A Hopfield artificial neural network is a type of recurrent artificial neural network that is used to store one or more stable target vectors. These stable vectors can be viewed as memories that the network recalls when provided with similar vectors that act as a cue to the network memory. These binary units only take two different values for their states that are determined by whether or not the units' input exceeds their threshold. Binary units can take either values of 1 or -1, or values of 1 or 0. Consequently there are two possible definitions for binary unit activation a_i (equation (6) and (7)):

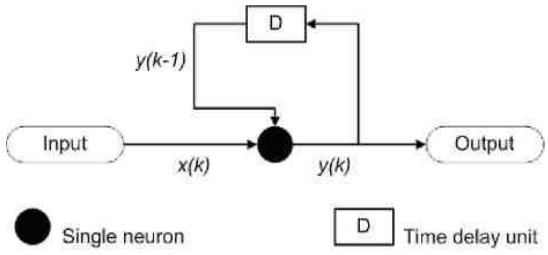
$$a_i = \begin{cases} -1 & \text{if } \sum_i w_{ij} s_j > \theta_i, \\ 1 & \text{otherwise.} \end{cases} \qquad (6)$$

$$a_i = \begin{cases} -1 & \text{if } \sum_i w_{ij} s_j > \theta_i, \\ 1 & \text{otherwise.} \end{cases} \qquad (7)$$

Where:
- w_{ij} is the strength of the connection weight from unit j to unit I,
- s_j is the state of unit j,
- θ_i is the threshold of unit i.

While talking about connections w_{ij} we need to mention that there are typical two restrictions: no unit has a connection with itself (w_{ij}) and that connections are symmetric $w_{ij} = w_{ji}$.

The requirement that weights must be symmetric is typically used, as it will guarantee that the energy function decreases monotonically while following the activation rules. If non-symmetric weights are used the network may exhibit some periodic or chaotic behaviour. Training a Hopfield artificial neural network involves lowering the energy of states that the artificial neural network should remember.



Simple "one neuron" Hopfield artificial neural network.

(b) Data Quality and the System Development Life Cycle

Data quality becomes an afterthought, with staff members reacting to discovered errors instead of proactively rooting out the causes of data flaws. Because data quality cannot just be an afterthought, once there are processes for identifying the business impact of data quality as well as the capability to define rules for inspection and monitoring, the next step is to integrate that inspection directly into the business applications. In essence, the next practice is to establish the means by which data quality management is designed and engineered across the enterprise application architecture.

However, because traditional approaches to system requirements analysis and design have concentrated on functional requirements for transactional or operational applications, the information needs of downstream business processes are ignored until long after the applications are put into production. Instead, engineering data quality management into the enterprise requires reformulating the view to requirements analysis, with a new focus on horizontal and downstream information requirements instead of solely addressing immediate functional needs.

To continue our example, with the understanding that invalid addresses lead to increased shipping costs, there are two approaches for remediation. The reactive approach is to subject all addresses to a data cleansing and enhancement process prior to generating a shipping label as a way of ensuring the best addresses. While this may result in reducing some of the increased costs, there may be records that are not correctable, or are not properly corrected. Yet if the data validity rules are known, they can be integrated directly into the application when the location data is created. In other words, validating and correcting the address when it is entered by the customer prevents invalid addresses from being introduced into the environment altogether.

(c) Instituting a data quality management program means more than just purchasing data cleansing tools or starting a data governance board, and establishing a good data management program takes more than just documenting a collection of processes. An iterative cycle of assessment, planning, execution, and performance management for data quality requires repeatable processes that join people with the right sets of skills with the most appropriate tools, and the staff members who are to take part in the program need to have the right kinds of tools at their disposal in order to transition from theory to actual practice. This suggests a combination of the right technology and the proper training in the use of technology, employing data services such as:

- Data integration, to ensure suitable means for extracting and transforming data between different kinds of systems.
- Data profiling, used for data quality assessment, data Validation, and inspection and monitoring.
- Parsing and standardization and identity resolution, which is used for data validation, identification of data errors, normalization, and data correction.
- Record linkage and merging, also used to identify data errors and for resolving variance and subsequent data correction.

These are a subset of the core data services for standardizing sound data management practices. Standardizing the way data quality is deployed and using the right kinds of tools will ensure predictable information reliability and value. When developing or reengineering the enterprise architecture, implementing the fundamental data quality practices will ultimately reduce the complexity of the data management framework, thereby reducing effort, lowering risk, and leading to a high degree of trust in enterprise information.

(d) Operational Activity

- Daily production and distribution planning, including all nodes in the supply chain.
- Production scheduling for each manufacturing facility in the supply chain (minute by minute).
- Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
- Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
- Inbound operations, including transportation from suppliers and receiving inventory.
- Production operations, including the consumption of materials and flow of finished goods.
- Outbound operations, including all fulfillment activities, warehousing and transportation to customers.
- Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers.
- From production level to supply level accounting all transit damage cases & arrange to settlement at customer level by maintaining company loss through insurance company.
- Managing non-moving, short-dated inventory and avoiding more products to go short dated.

Question No. 24

(a) Discuss the key roles required for successful implementation of Six Sigma.

(b) Explain about the Dashboard and comparison with the Scorecard.

Answer:

(a) Six Sigma identifies several key roles for its successful implementation:

(i) Executive Leadership includes CEO and other key top management team members. They are responsible for setting up a vision for Six Sigma implementation. They also empower the other role holders with the freedom and resources to explore new ideas for breakthrough improvements.

(ii) Champions are responsible for the Six Sigma implementation across the organization in an integrated manner. The Executive Leadership draws them from the upper management. Champions also act as mentors to Black Belts. At GE this level of certification is now called "Quality Leader".

(iii) Master Black Belts, identified by champions, act as in-house expert coaches for the organization on Six Sigma. They devote 100% of their time to Six Sigma. They assist champions and guide Black Belts and Green Belts. Apart from the usual rigour of statistics, their time is spent on ensuring integrated deployment of Six Sigma across various functions and departments.

(iv) Experts this level of skill is used primarily within Aerospace and Defense Business Sectors. Experts work across company boundaries, improving services, processes, and products for their suppliers, their entire campuses, and for their customers. Raytheon Incorporated was one of the first companies to introduce Experts to their organizations. At Raytheon, Experts work not only across multiple sites, but across business divisions, incorporating lessons learned throughout the company.

(v) Black Belts operate under Master Black Belts to apply Six Sigma methodology to specific projects. They devote 100% of their time to Six Sigma. They primarily focus on Six Sigma project execution, whereas Champions and Master Black Belts focus on identifying projects/functions for Six Sigma.

(vi) Green Belts are the employees who take up Six Sigma implementation along with their other job responsibilities. They operate under the guidance of Black Belts and support them in achieving the overall results.

(vii)Yellow Belts are employees who have been trained in Six Sigma techniques as part of a corporate-wide initiative, but have not completed a Six Sigma project and are not expected to actively engage in quality improvement activities.

(b) Dashboard

In information technology, a dashboard is a user interface that, somewhat resembling an automobile's dashboard, organizes and presents information in a way that is easy to read. However, a computer dashboard is more likely to be interactive than an automobile dashboard (unless it is also computer- based). To some extent, most graphical user interfaces (GUIs) resemble a dashboard. However, some product developers consciously employ this metaphor (and sometimes the term) so that the user instantly recognizes the similarity.

Some products that aim to integrate information from multiple components into a unified display refer to themselves as dashboards. For example, a product might obtain information from the local operating system in a computer, from one or more applications that may be running, and from one or more remote sites on the Web and present it as though it all came from the same source. Hewlett Packard developed the first such product, which began as a tool for customizing Windows desktops. Called Dashboard, the HP product was subsequently acquired by Borland and then a company called Starfish. Microsoft's Digital Dashboard tool incorporates Web-based elements (such as news, stock quotes, and so on) and corporate elements (such as e-mail, applications, and so on) into Outlook. Dashboards may be customized in a multitude of ways and named accordingly, generally, for example as a general corporate or enterprise dashboard, or more specifically, as a CIO or CEO dashboard.

Comparison between Scorecard and Dashboard

The two terms – scorecards and dashboards – have a tendency to confuse, or rather get used interchangeably, but each brings a different set of capabilities. The sources of the confusion are:

- Both represent a way to track results.
- Both use traffic lights, dials, sliders and other visual aids.
- Both have targets, thresholds and alert messages.
- Both provide linkage or drill down to other metrics and reports.

The difference comes from the context in how they are applied. To provide some history, as busy executives and managers struggled to keep up with the amount of information being thrust at them, the concept of traffic lighting were applied to virtually any and all types of reporting. As technology has improved, more bells and whistles were added – the ability to link to other reports and to drill down to finer levels of detail. The common denominator was the speed of being able to focus on something that required action or further investigation. The terminology evolved to reflect how technology vendors described the widgets that provided this capability – dashboards. As a consequence, both dashboard and scorecard terms are being used interchangeably.

Some refer to dashboards as "dumb" reporting and scorecards as "intelligent" reporting. The reason is dashboards are primarily for data visualization; they display what is happening during a time period. Most organizations begin with identifying what they are already measuring and construct a dashboard dial from there. However, dashboards do not communicate why something matters, why someone should care about the reported measure or what the impact may be if an undesirable declining measure continues. In short, dashboards report what you can measure.

Section – C
SN- 8 Enterprise Risk Management

Question no. 25
(a) Explain about the Risk Pooling.
(b) Describe about the Value at Risk.
(c) Describe 'Asset Liability Model' and its utility for managing liquidity risk and exchange rate risk.

Answer 25:
(d) Risk Pooling:
One of the forms of risk management mostly practiced by insurance companies is Risk Pool. Under this system, insurance companies come together to form a pool, which can provide protection to insurance companies against catastrophic risks such as floods, earthquakes etc. The term is also used to describe the pooling of similar risks that underlies the concept of insurance. While risk pooling is necessary for insurance to work, not all risks can be effectively pooled. In particular, it is difficult to pool dissimilar risks in a voluntary insurance market, unless there is a subsidy available to encourage participation.

Risk pooling is an important concept in supply chain management. Risk pooling suggests that demand variability is reduced if one aggregates demand across locations because as demand is aggregated across different locations, it becomes more likely that high demand from one customer will be offset by low demand from another. This reduction in variability allows a decrease in safety stock and therefore reduces average inventory.

The three critical points to risk pooling are:

a. Centralized inventory saves safety stock and average inventory in the system.

b. When demands from markets are negatively correlated, the higher the coefficient of variation, the greater the benefit obtained from centralized systems i.e., the greater the benefit from risk pooling.

c. The benefits from risk pooling depend directly on the relative market behaviour. If we compare two markets and when demand from both markets is more or less than the average demand, we say that the demands from the market are positively correlated. Thus the benefits derived from risk pooling decreases as the correlation between demands from the two markets becomes more positive.

The basis for the concept of risk pooling is to share or reduce risks that no single member could absorb on their own. Hence, risk pooling reduces a person or fim's exposure to financial loss by spreading the risk among many members or companies. Actuarial concepts used in risk pooling include:

(i) Statistical variation.
(ii) The law of averages.
(iii) The law of large numbers.
(iv) The laws of probability.

(b) Value at Risk
Value at Risk (VaR) is one of the popular methods of measuring financial risks. There are different types of VaR—long-term VaR, marginal VaR, factor VaR etc . VaR is also defined as the threshold value such that the probability of a portfolio making a market to a market loss over a specific time horizon exceeds this value. For example, if a portfolio stock has a one day 3 per cent VaR of ₹10 million, there is 0.03 probability that the portfolio may face a reduction in value by more than ₹10 million over a specific time period. This is on assuming that normal market operations and there is no trading. A loss which exceeds VaR threshold is known as 'VaR break'. VaR has

applications in financial risk management, risk measurement, control and reporting. It can also be used in calculating regulatory capital.

VaR essentially identifies the boundary between normal days and extreme occurrences. The probability level is specified as 1 minus probability of a VaR Break. Normally VaR parameters are 1 per cent and 5 per cent probabilities and 1 day and 2 week horizons. While VaR represents loss, a negative VaR would indicate that a portfolio has a high probability for making profits.

There are two types of VaR—one is applied primarily in risk management and the other in risk measurement. For a manager who is managing financial risk, VaR is essentially a system and not just a number as it runs periodically and is compared with the movement of computed prices in opening positions over the particular time horizon. An interesting application of VaR is the governance of endowments, trusts and pension plans. VaR utilized for this purpose is to monitor risk.

VaR has the advantage of a structured methodology for critically analyzing a risk that is available as part of management function. Daily publication of a number on time and with particular statistical data enables an organization to maintain a high objective standard. However, robust backup systems and assumptions regarding default need to be established. A quotation runs thus, 'risk taking institution that does not compute VaR might escape disaster but an institution that cannot compute VaR will not' according to Aaaron Brown.

Another advantage of VaR is that it differentiates risks into two regimes, that is, normal days and extreme occurrences. Inside the VaR limit, application of the conventional statistical methods is reliable. Out VaR limit risk should be analyzed with stress testing on the basis of data available on the long-term and in the broad market. Distribution losses beyond VaR point are both impossible and useless. As such the finance manager should concentrate on developing plans to limit the loss if possible or to survive the loss.

VaR as a risk measurement is usually reported with other risk measurements such as standard deviation, expected shortfall, partial derivatives of portfolio value, etc.

Application of VaR is to segregate extreme occurrences in a systematic way. They can be studied over the long-term in a qualitative manner on the basis of day-to-day movement of prices, both quantitatively and qualitatively. As VaR can at best be utilized to define risk as a market to market loss on a fixed portfolio over a fixed time horizon in normal markets, it is not useful in abnormal situations.

There has been criticism against VaR. It is said that this concept has led to excessive risk taking and leveraging by financial institutions. Again VaR is not sub-additive which means that VaR of a combined portfolio can be larger than the sum of the VaRs of its components.

(c) Asset Liability Management Model

Risks encountered in portfolio management need to be addressed more emphatically. In passive portfolio management, normally the mean variance and mean absolute deviation are employed to arrive at an optimal fixed mix strategy. However, this method does not recognize the high volatility in financial markets and as such the volatility risk is not addressed. However, active portfolio management is more aggressive, and involves reviewing the initial investment strategy every time rebalancing of the portfolio is required. Carino and Turner (1998) present the superiority of dynamic asset allocation framework using stochastic programming applications. Any financial planning strategy should be such that the mix of asset classes in a portfolio is able to grow and satisfy future goals with the best possible returns. This is the crux of asset liability management.

Asset liability management applications with the aid of stochastic programming conceptualize the problem of creating a portfolio by allocating a set of assets. The investor needs to decide the three factors, namely:

- Amount of assets to buy

- Amount of assets to sell
- Amount of assets to hold

The indices are defined and the problem parameters and decision variables are set out so that the stochastic programming model can develop a solution.

In this deterministic model, uncertainty is introduced to take care of risk. A refinement to the deterministic model is to apply a more sophisticated technique for estimation of asset prices that takes into consideration any unusual occurrence in the market as well as volatility. Sub-models based on randomness are introduced into the programming to take care of the risk as well. The randomness introduced is able to generate a set of scenarios which can be incorporated into the optimization model.

This model can be further improved using a two-stage stochastic program because an investor tries to use this model for making a contingent decision involving future risk. The first stage involves fixing a time period for stage two observation followed by finally taking a decision. The observation part of it can be likened to a 'wait and see' period of observation.

Asset liability management model can also be conceptualized as a method to compute the matching of assets and liabilities to generate a cautious investment portfolio. The purpose of this model is to optimize risk-adjusted returns to the shareholders over a long run. Two approaches for matching assets and liabilities are as follows:

Duration: This is defined as a measure of price sensitivity in relation to interest rates. It refers to the It refers to the weighted average maturity where the weights are applied in terms of present value. This can be represented by the following formula:

Modified duration =Duration / [1+ (Yield to maturity/Number of coupon payments per year)]

Convexity: This is defined as the change in duration corresponding to changes in yield as follows:

Convexity = $(P_+ + P_- - 2P_0) / 2P_0(\Delta i)^2$

Δi = Change in Yield (in decimal)

P_0 = Initial Price

P_+ = Price if yields increase by Δi

P_- = Price if yields decline by Δi

Combining convexity and duration is a good approach to examining the influence on change in yield on the market values of assets and liabilities.

Liquidity Risk Management through Asset-Liability Management:
It is difficult to measure liquidity risk as it entails expected likely inflow of deposits, loan dispersals, changes in competitive environment, etc. The most commonly used techniques for measurement of liquidity risks is the gap analysis.
The Assets and Liabilities are arranged according to their maturity pattern in time brackets. The gap is the difference between the maturing Assets to the maturing liabilities. A positive gap indicates that maturities of assets are higher than those liabilities. A negative gap indicates that some re-arrangement of funds will have to be done during that time-bracket. It can be from sale of assets or issue of new liabilities or rolling over existing liabilities.

Exchange Rate Risk Management through Asset-Liability Management:
At a particular exchange rate, assets and liabilities of financial institution match exactly. As exchange rate fluctuates, the balance gets disturbed. A simple solution to correct this risk is to match assets and liabilities of the same currency. Many financial institutions do not have foreign exchange exposure, as all their assets and liabilities are in rupee currency. The risk of foreign exchange borrowings of these institutions is passed on to the

lenders through dollar denominator loans. The uncovered loans are hedged at the time of contacting them through forward covers for the entire amount.

Question no. 26

(a) Explain the objectives of Risk Management.

(b) Discuss the benefits of Risk Mapping.

(c) Distinguish between Basel 1 and Basel 2.

Answer:

(a) Objectives of Risk Management

Risk management basically has the following objectives:

(i) Anticipating the uncertainty and the degree of uncertainty of the events not happening the way they are planned.

(ii) Channelizing events to happen the way they are planned.

(iii) Setting right, at the earliest opportunity, deviations from plans, whenever they occur.

(iv) Ensuring that the objective of the planned event is achieved by alternative means, when the means chosen proves wrong, and

(v) In case the expected event is frustrated, making the damage minimal.

(b) Benefits of risk mapping

- Promotes awareness of significant risks through priority ranking, facilitating the efficient planning of resources.
- Enables the delivery of solutions and services across the entire risk management value chain.
- Serves as a powerful aid to strategic business planning.
- Aids the development of an action plan for the effective management of significant risks.
- Assigns clear responsibilities to individuals for the management of particular risk areas.
- Provides an opportunity to leverage risk management as a competitive advantage.
- Facilitates the development of a strategic approach to insurance programme design.
- Supports the design of the client's risk financing and insurance programmes, through the development of effective/optimal retention levels and scope of coverage etc.

(c) Comparison between Basel I and Basel II

Basel - 1(1988 and amended in 1996) – Based on Methodology for Capital Adequacy	**Basel- II (to be in place by 2006 in G-10 countries and in India in 2008)- Basel II based on 3 pillars**
1. Capital adequacy based on Risk Weighted Assets	1. Capital adequacy based on Risk Weighted Assets)
2. Not risk sensitive. Prescriptive.	2. Risk sensitive.
3. All credit exposures carried risk weight of 100 per cent - except for some sovereign exposures and mortgages	3. Credit exposures carry risk weights based on credit qualities.
4. Risk Capital = Credit exposure * Risk Weights * 8 per cent can have lesser Capital than others	4. Risk capital: Similar to Basel I. But efficient Banks can have lesser capital than others

Implications were	Implications are
• Every bank had to maintain same 8 per cent capital. Thus Banks with good quality assets had no incentives. As a result credit quality had to be lowered to increase returns • Low rated exposures were subsidized by high rated exposures • No provision for economic pricing by banks • Banks with good quality assets have incentives because they can manage with lower capital	• Banks with good quality assets have incentives because they can manage with lower capital • Better quality assets requires lesser capital • Risk pricing can be done by banks based on credit risk perception • Provision exists for economic pricing by banks

Question no. 27
(a) Explain about the Total Loss Distribution and Probability of Ruin.
(b) Describe about the Risk Retention.
(c) Explain about the Project Risk Management

Answer:
(a) Total Loss Distribution
Probability distributions can be very useful tools for evaluating the expected frequency and/or severity of losses due to identified risks. In risk management, two types of probability distribution are used: empirical and theoretical. To form an empirical probability distribution, the risk manager actually observes the events that occur, as explained in the previous section. To create a theoretical probability distribution, a mathematical formula is used. To effectively use such distributions, the risk manager must be reasonably confident that the distribution of the firm's losses is similar to the theoretical distribution chosen.
Three theoretical probability distributions that are widely used in risk management are: the binomial, normal, and poison.

Probability of Ruin
Ruin theory also known as collective risk theory, was actually developed by the insurance industry for studying the insurers vulnerability to insolvency using mathematical modeling. It is based on the derivation of many ruin-related measures and quantities and specifically includes the probability of ultimate ruin. This can be also related to the sphere of applied probability as the techniques used in the ruin theory as fundamentally arising out of stochastic processes. Many problems in ruin theory relate to real-life actuarial studies but the mathematical aspects of ruin theory have really been of interest to actuarial scientists and other business research people.

Normally an insurers' surplus has been computed as the net of two opposing cash flows, namely, cash inflow of premium income collected continuously at the rate of c and the cash outflow due to a series of insurance claims that are mutually independent and identically distributed with a common distribution function P(y). The path of the series of claims is assumed to respond to a Poisson process with intensity rate λ which would mean that the number of claims received N(t) at a time frame of t is controlled by a Poisson distribution with a mean λ_t. Therefore, the insurer's surplus at any time t is represented by the following-formula:

$$X(t) = x + ct - \sum_{i=0}^{N(t)} Y_i$$

Where, the business of the insurer starts with an initial level of surplus capital.
X(0) = x under probability measure as explained in the previous paragraph.

Towards the end of the 20th century, Garbur and Shiu introduced the concept of the expected discounted penalty function derived from the probability of ultimate ruin. This concept was utilized to gauge the behaviour of insurer's surplus using the following formula:

$$m(x) = E^{x}\left[e^{-\delta T}K_{T}\right]$$

where, δ is the discounting force of interest, K_T is a general penalty function representing the economic costs of the insurer at the time of ruin and the expectation relates to the probability measure. Quite a few ruin-related quantities fall into the category of the expected discounted penalty function.

In short, this theory of the probability of ruin is applied in the case of risk of insolvency of a company with diversified business activity. For the purpose of study, resources between diversified activities are allowed to be transferred and are limited by costs of transaction. Terminal insolvency happens when capital transfers between the business lines are not able to compensate the negative positions. Actuarial calculations are involved in the determination of ultimate ruin as discussed.

(b) Risk Retention

This denotes acceptance of the loss or benefit arising out of a risk when it takes place. In short, it is also termed as self insurance. This strategy is viable when the risks are small enough to be transferred at a cost that may be higher than the loss arising out of the risk itself. On the other hand, the risk can be so big that it cannot be transferred or insured. Such risks will have to be phased out when the eventuality occurs. War is an example as also are 'Acts of God' such as earthquakes and floods. The reasons for risk retention can be cited as follows:

(i) While risk in a business is taken to increase its return, risk retention relates to such risks which have no relation to return but are part of an individual's life or organization or a company operational risk can be cited as such a risk that is inherent and needs to be accepted for retention.

(ii) Sometimes, such risks are so small that they are ignored and/or phased out when they surface.

(iii) This method is also useful when the probability of occurrence is very low and a reserve built within the system over a period can take care of such losses arising out of risk retention. This is normally resorted to in businesses against credit risks that are inherent due to marketing on credit basis.

(iv) In some cases, the subject, who is susceptible to risk, also becomes fully aware of the nature of risk. In these situations, there is a certain amount of preparedness in the system due to risk retention.

Certain guidelines relating to risk retention should be followed:

(i) Determine the risk retention level through proper estimation of risk using sales projections, cash flows, contracts, liquidated damages, and guarantees.

(ii) Though there is no precise formula for estimation of risks to be retained, statistical averages of such losses over a period of time give an indication to estimate such losses. For instance, bad debts occurring over a period of time are taken into consideration as an estimate to create a reserve for doubtful debts.

(iii) It is also necessary to ascertain the capacity for funding a loss arising out of retained risk that is the measure for transferring the risk beyond that level.

Risk retention as an exercise and a strategy is attempted mainly in the case of operational risk in business.

(c) Project Risk Management:

Projects are one time processes-unique in nature. Each project will be different and has different gestation periods. By its own nature, a project is based on many assumptions, to be realized at a future and is subjected to environmental changes and changes due to statutory policies. With a gestation period running into a few years, any change

or revision in assumptions can transform itself into a big risk. Management of such risks is called as Project Risk Management, which can be difficult and would require special tools and models. Risks in Project Management are basically:

(i) Market Related Risks - mainly due to changes in demands.

(ii) Completion Risks - due to both administrative & technical risks during implementation.

(iii) Institutional Risks - due to unexpected changes in the conditions and norms laid down by the institutions that have funded the projects.

All the three risks can create certain consequences of events, compounded by unforeseen circumstances. This may lead to 'turbulence', when multiple issues arise, initiating moves and counter-moves and often ending in deadlock and the entire project may collapse.

SN- 9 Performance Evaluation and Corporate Failures

Question no. 28

(a) "Symptoms are interrelated. The classic path to corporate failure starts with the company experiencing low profitability. This may be indicated by trends in the ratios for:
(i) Profit margin,(ii) Return on Capital Expenditure and (iii) Return on Net Assets" – Discuss it.

(b) "Several techniques have been developed to help in prediction why companies fail." – Describe the Altman: Z Score Model in this regard.

(c) Explain the Neural Network (NN) under the Corporate Bankruptcy Prediction Models.

Answer:

(a) There are three classic symptoms of corporate failure. These are namely:

1. Low profitability
2. High gearing
3. Low liquidity

Each of these three symptoms may be indicated by trends in the company's accounts. Symptoms are interrelated. The classic path to corporate failure starts with the company experiencing low profitability. This may be indicated by trends in the ratios for:

- **Profit margin**
- **Return on Capital Expenditure**
- **Return on Net Assets**

A downward trend in profitability will raise the issue of whether and for how long the company can tolerate a return on capital that is below its cost of capital. If profitability problems become preoccupying, the failing of the company may seek additional funds and working capital by increasing its borrowings, whether in the form of short term or long-term debt. This increases the company's gearing, since the higher the proportion of borrowed funds, the higher the gearing within the capital structure. The increased debt burden may then aggravate the situation, particularly if the causes of the decreasing profitability have not been resolved.

The worsening profit situation must be used to finance an increased burden of interest and capital repayments. In the case of a publicly quoted company, this means that fewer and fewer funds will be available to finance dividend payments. It may become impossible to obtain external credit or to raise further equity funds.

Confidence in the company as an investment may wither away leaving the share price to collapse. If the company is sound, for instance, but ineptly managed, the best that can

be hoped for is a takeover bid for what may be now a significantly undervalued investment.

At this point, a company may not be really failing but unfortunately, more often rescue attempts are not mounted. This may be because the company's management does not recognize the seriousness of the situation, or is by now too heavily committed or too frightened to admit the truth to its stakeholders, when refinancing is attempted profits fail to cover payments leading to a cash flow crisis.

What are the causes of corporate failure, and can they be avoided? Numerous studies reveal the alarmingly high failure rate of business initiatives, and corporate survival rates have recently declined across the major European economies. This article examines the range of explanations for failure, before considering whether failure can sometimes even be 'good'.

After addressing growth strategies in the last Henley Manager Update, we'll now review recent writing on corporate failures. What are the causes of company failure and how can these be stopped? In what ways can companies learn from failure? Of course, not all failures in business actually lead to the failure of the business. There are, though, many examples in recent times of growth strategies that failed. Unilever, for example, embarked upon its well-published Path to Growth strategy in 2000. Since then, it has not only failed to grow profitably but has also seen its European sales decline. Part of the problem was in not being quicker to address emerging market trends, such as the one for low-carb diets. Similarly, Volkswagen embarked on a burst of growth in the late '90s by acquiring other well-known automobile brands, only to find these began competing against each other as competition intensified by the middle of this decade.

(b) The Altman Model: Z-Score

The Z-Score model is a quantitative model developed by Edward Altman in 1968, to predict bankruptcy or financial distress of a business. The Z-score is a multi variate formula that measures the financial health of a company and predicts the probability of bankruptcy within 2years. This model involves the use of a specified set of financial ratios and a statistical method known as a Multiple Discriminant Analysis. (MDA). The real world application of the Altman score successfully predicted 72% of bankruptcies two years prior to their failure.

The model of Altman is based on a linear analysis in which five measures are objectively weighted and summed to arrive at an overall score that then becomes the basis for classification of companies into one of the two a priori groupings that is bankrupt or non-bankrupt. These five indicators were then used to derive a Z-Score. These ratios can be obtained from corporations' financial statements.

The five Z-score constituent ratios are:

(i) Working Capital/Total Assets (WC/TA):- a firm with negative working capital is likely to experience problems meeting its short-term obligations.

(ii) Retained Earnings/Total Assets: - Companies with this ratio high probably have a history of profitability and the ability to stand up to a bad year of losses.

(iii) Earnings Before Interest & Tax/ Total Assets: - An effective way of assessing a firm's ability to profit from its assets before things like interest and tax are deducted.

(iv) Market Value of Equity/ Total Liabilities: - A ratio that shows, if a firm were to become insolvent, how much the company's market value would declines before liabilities exceed assets.

(v) Sales/Total Assets: - A measure of how management handles competition and how efficiently the firm uses assets to generate sales.

Based on the Multiple Discriminate Analysis, the general model can be described in the following form:

$Z=1.2WC/TA + 1.4\ RE/TE + 3.3\ EBIT/TA + 0.6\ MVE/TL + 1.0\ SL/TA$

Probability of failure according to the Z-Score result:

Z-Score	Probability of Failure
Less than 1.8	very High
Greater that 1.81 but less than 2.99	Not Sure
Greater than 3.0	Unlikely

Calculation of the Z-Score for a fictitious company where the different values are given to calculate the Z-Score.

Sales	25,678
Total Assets	49,579
Total liabilities	5,044
Retained earnings	177
Working Capital	-1,777
Earnings before interest and tax	2,605
Market value of Equity	10,098
Book value of Total Liabilities	5,044

The calculations of the ratios are as follows:

1. Working Capital/Total Assets (-1,777/ 49579) = -0.036
2. Retained Earnings/Total Assets (177/ 49579) =0.004
3. Earnings Before Interest & Tax/ Total Assets (2605/ 49579)= 0.053
4. Market Value of Equity/ Total Liabilities (10098/ 5044)= 2.00
5. Sales/Total Assets (25978/ 49579)=0.52

Thus according to the formula the answer should be:

Z=1.2(-0.036) + 1.4 (0.004) + 3.3 (0.053) + 0.6 (2.0) + 1.0(0.52)

Z= -0.04+ 0.01+0.17+1.20+0.52

Z=1.86

According to Altman, this company may or may not fail as it is greater than 1.81 but less than 2.99, which situates it neither on the safe side nor on the failure side.

(c) Neural Networks (NN)

Although capable of outperforming human brain in basic arithmetic calculations, computers are certainly inferior when it comes to tasks involving symbolic recognition like signs of bankruptcy in a firm. Neural networks are enthused by biological works related to brain and its nervous system to triumph over this lack of computational efficiency in computers. Neural networks perform the classification task, in response to impending signals of financial health of a firm, in the way a brain would do for example in deciding whether the food is salty or sweet by its taste signal.

Human brain is made up of certain types of neurons (nerve cells), which is the base of neuroscience. Neurons, in neural networks, are called 'processing elements' or 'nodes. Like real neurons, these nodes are connected to each other through 'weighted interconnections' (synapses in neuroscience terms). Nodes are organized in layers. Each node takes delivery of, joins, and converts input signals into a single output signal via weighted interconnections. This output signal is accepted as the classifying decision if it satisfies the researcher; otherwise it is transmitted again as an input signal to many other nodes (possibly including itself). Process keeps going until satisfaction is gained from researchers' point of view.

Perhaps the major task of any neural network is to determine appropriate weights to interconnections of different nodes. Neural networks perform this task by a training process in which knowledge about the relationship between input and output signals is learned following certain principle. This knowledge produces a distinct structure of nodes (in one of the network layers called 'hidden layer') and connection weights, which correctly classifies the objects into their respective known groups.

Technically, this process of mapping is termed as 'convergence'. Following a mathematical theorem, the network is always able to converge.

While predicting corporate bankruptcy, NN would take information on explanatory variables at input nodes via input layer. The hidden layer nodes, connected to input

nodes through weighted interconnections, collect and process this information to suggest a probability of a firm getting failed or succeeded.

Question no. 29

(a)"It is a fact that some companies perform well and that some underperform and some fails. In many, if not most cases, these companies are led by executives that are quite experienced. Below are some recommendations that can help to reduce the risk of failures of organizations"- Justify the statements.

(b) Explain the L. C. Gupta Model under the Predictions of Corporate Failure.

(c) Describe the causes of corporate failure and their examples.

Answer:

(a) Preventing Corporate Failures

It is a fact that some companies perform well and that some underperform and some fails. In many, if not most cases, these companies are led by executives that are quite experienced. Below are some recommendations that can help to reduce the risk of failures of organizations:

(i) Appointment of non-executive directors

The non-executive directors will bring their special expertise and knowledge on strategies, innovative ideas and business planning of the organization. They will monitor the work of the executive management and will help to resolve situations where conflict of interest arises. Overall, the non-executive directors will act as a Cross Check.

(ii) Audit committees

Very often, there is occurrence of fraud in management and financial reporting. The presence of the audit committees will help to resolve this problem. Audit committees have the potential to reduce the occurrence of fraud by creating an environment where there is both discipline and control.

(iii) Development of environment learning mechanism

Some organizations fail because they lose touch with their environment. Therefore, to counter this problem, there is a need to develop the environmental learning mechanism. Through it, new information can be brought on continuous basis. This is mainly done by carrying customer-feedback surveys. In this way, the organization can realign itself with the new needs and challenges.

(iv) Focus on research and development

Organizations can generate new knowledge by investing and focusing more on research and development. Thus, there will be more ideas how to make the products much better than that of their competitors.

It can be deducted that a director has a big responsibility that he has to assume there commendations mentioned above can help directors to reduce corporate failure, provided that the directors abide. Proper planning also is critical to the success of a business.

(b) Dr. L.C. Gupta's Sickness Prediction Model

Dr. L.C. Gupta made an attempt to distinguish between sick and non-sick companies on the basis of financial ratios. He used a simple non-parametric test for measuring the relative predicting power of different financial ratios. A mixed sample of sick and non-sick companies was made and the companies in the sample were arranged in a single ordered sequence from the smallest to the largest, according to the financial ratio that is tested for its predictive power. Let [profit after tax ÷ Net worth] is a financial ratio that is to be tested for its predictive power. The companies in the sample are arranged in increasing order of this particular ratio. Let the sick companies be denoted by the letter

'S' and the non-sick ones by the letter 'N'. Let us assume that 8 sick companies and 8 non-sick companies are taken for building up the sample. When arranged in a sequential order as stated above, the sequence may result in any pattern as shown below:

(A) S -N-S-N-S-S-N-S-N-N-S-N-S-N-S-N
(B) S -S-S-S-S-S-S-S-N-N-N-N-N-N-N-N
(C) S -S-S-S-N-N-N-N-N-N-N-N-S-S-S-S
(D) S -S-S-N-S-S-N-N-S-S-N-N-S-N-N-N

Observing the pattern of occurrence of 'S' and 'N' a cutoff point is chosen to separate the sick group from the non-sick group. Companies that fall to the left of the cutoff point lie in the sick group while companies that fall to the right of the cutoff point lie in the non-sick group. The cutoff point is so chosen that the number of misclassifications is minimized. The ratio that showed the least percentage classification error at the earliest possible time is deemed to have the highest predicative power. Referring to the four patterns shown above, the pattern of sequence shown in (B) is the most accurate one since the cutoff point will be located exactly midway in the sample group and the percentage of classification error will be zero since there are no misclassifications. Pattern shown in (C) is bound to have a higher error since the sick companies are concentrated on both the extreme ends.

Dr. L.C. Gupta used Indian data on a sample of 41 textile companies of which 20 were sick companies and 21 were non-sick companies. He studied the predictive power of 63 financial ratios and observed that the following two ratios have comparatively better predictive power.

(i) (Earnings before Interest and Taxes) ÷ Sales

and

(ii) (Operating cash flow) ÷ Sales

[Note: Operating cash flow = profit after tax + depreciation]

(c) Causes Of Corporate Failure and their Examples:

(i) Technological causes:

Traditional methods of doing work have been turned upside down by the development of new technology. If within an industry, there is failure to exploit information technology and new production technology, the firms can face serious problems and ultimately fail.

By using new technology, cost of production can be reduced and if an organization continues to use the old technology and its competitors start using the new technology; this can be detrimental to that organization. Due to high cost of production, it will have to sell its products at higher prices than its competitors and this will consequently reduced its sales and the organization can serious problems.

This situation was seen in the case of Mittal Steel Company taking over Arcelor Steel Company. Arcelor Steel Company was using its old technology to make steel while Mittal Steel Company was using the new technology and as a result, Mittal Steel Company was able to sell steel at lower price than Arcelor Steel Company due to its low cost of production. Arcelor Steel Company was approaching corporate failure and luckily, Mittal Steel Company merged with Arcelor Steel Company and became Arcelor Mittal Steel Company, thus preventing Arcelor from failure.

(ii) Working capital problems:

Organizations also face liquidity problems when they are in financial distress. Poor liquidity becomes apparent through the changes in the working capital of the organization as they have insufficient funds to manage their daily expenses.

Businesses, which rely only on one large customer or a few major customers, can face severe problems and this can be detrimental to the businesses. Losing such a customer

can cause big problems and have negative impact on the cash flows of the businesses.
Besides, if such a customer becomes bankrupt, the situation can even become worst, as the firms will not be able to recover these debts.

(iii) Economic Distress:
A turndown in an economy can lead to corporate failures across a number of businesses. The level of activity will be reduced, thus affecting negatively the performance of firms in several industries. This cannot be avoided by businesses.
The recent economic crisis in the USA led to many cases of corporate failures. One of them is the insurance AIG insurance company. It is facing serious problems and it might close its door in the near future.

(iv) Mismanagement:
Inadequate internal management control or lack of managerial skills and experience is the cause of the majority of company failures. Some managers may lack strategic capability that is to recognize strengths, weaknesses, opportunities and threats of a given business environment. These managers tend to take poor decisions, which may have bad consequences afterwards.
Furthermore, managers of different department may not have the ability to work closely together. There are dispersed department objectives, each department will work for their own benefits not towards the goal of the company. This will bring failure in the company. One example can be WorldCom, where the finance and legal functions were scattered over several states and communication between these departments were poor.

(v) Over-Expansion and Diversification
Research has shown that dominant CEO is driven by the ultimate need to succeed for their own personal benefits. They neglect the objective set for the company and work for their self-interest. They want to achieve rapid growth of the company to increase their status and pay level. They may do so by acquisition and expansion.
The situation of over expansion may arise to the point that little focus is given to the core business and this can be harmful as the business may become fragment and unfocused. In addition, the companies may not understand the new business field. Enron and WorldCom can be an example for this situation where the managers did not understand how growing overcapacity would influence its investment and therefore did not comprehend the risks associated with it.

(vi) Fraud by Management
Management fraud is another factor responsible for corporate collapse. Ambitious managers may be influenced by personal greed. They manipulate financial statements and accounting reports. Managers are only interested in their pay checks and would make large increase in executive pay despite the fact that the company is facing poor financial situation. Dishonest managers will attempt to tamper and falsify business records in order to fool shareholders about the true financial situation of the company. These fraudulent acts or misconduct could indicate a serious lack of control. These frauds can lead to serious consequences: loss of revenue, damage to credibility of the company, increased in operating expenses and decrease in operational efficiency.

(vii) Poorly Structured Board
Board of Directors is handpicked by CEO to be docile and they are encouraged by executive pay and generous benefits. These directors often lack the necessary competence and may not control business matters properly. These directors are often intimated by dominant CEO and do not have any say in decision making. Example Enron and WorldCom where poorly structured board was a contributor towards their failure.

(viii) Financial distress

Firms that become financially distressed are found to be under- performing relative to the other companies in their industry. Corporate failure is a process rooted in the management defects, resulting in poor decisions, leading to financial deterioration and finally corporate collapse. Financial distresses include the following reasons also low and declining profitability, investment Appraisal, Research and Development and technical insolvency amongst others.

A firm may fail, as its returns are negative or low. A firm that consistently reports operating losses probably experiences a decline in market value. If the firm fails to earn are turn greater than its cost of capital, it can be viewed as having failed. Falling profits have an obvious link with both financial and bankruptcy as the firm finds it is not generating enough money to meet its obligations as they fall due.

Another cause that will lead the company to fail is the investment appraisal. Many organizations run into difficulties as they fail to appraise investment projects carefully. The long-term nature of many projects means that outcomes are difficult to forecast and probabilities are usually subjective. "Big project gone wrong" is a common cause of decline. For example, the acquisition of a loser company, this has happen in the case for the failure of Parmalat Co Ltd of Italy, which made the acquisition of several losses making company where Inappropriate evaluation of the acquired company, its strengths and weaknesses.

Question no. 30

(a) Describe the Argenti Model in the context of Predict Corporate Failure.

(b)"Just as diseases are identified by certain symptoms; industrial sickness can be identified by the following symptoms. These symptoms act as leading indicators of sickness, and if immediate remedial actions are not taken, the sickness will grow to the extent that the organization will find its natural death." – Justify the statements.

(c)"The causes of sickness can be categorized into two viz., internal causes and external causes. Internal causes are those that are internal to the organization over which the management of the organization has control. "- Explain the Statement and explaining the Point Project formulation, Project Implementation, production.

Answer

(a) The models to predict Corporate Failure:

Several techniques have been developed to help predict why companies fail. However, these are not accurate and do not guarantee that the prediction will turn out to be true. These models are The Z-Score, Argenti Model, and the L.C. Gupta model amongst others.

Argenti Model

Another model for predicting corporate failure is the Argenti Model. Argneti's Model is perhaps the most distinguished from other models. J.Argenti developed a model which is intended to predict the likelihood of company failure. In his classification, Argenti (1976) distinguished 3 types of failure namely Type 1, Type 2 and Type 3 failures. Type 1 failure characterizes the failure of newly formed and therefore mainly small companies. Whereas, Type 2 is characterized by the presence of a very ambitious, charismatic and active manager with an outstanding personality. Due to over ambition the company is brought down. These failure types can occur to young organizations, but they usually survive longer than Type1 companies. Type 3 failures only occur to mature companies that have been operating successful over a fair number of years and that often are of a major social and economic importance to the community. The largest characteristic of Type 3 companies is its insensitivity towards changes in the environment, whereas the world around it is changing with its environment.

(b) Above statement relates to Leading Indicator of Sickness in the perspective of Leading Indicator of sickness. Industrial sickness can be identified by following symptoms:

- Continuous reduction in turnover.
- Piling up of inventory,
- Continuous reduction of net profit to sales ratio.
- Short term borrowings M high interest rate,
- Continuous cash losses leading to erosion of tangible net worth,
- Default in payment of interest on borrowings and default in repayment of term loan installments.
- The 'sundry debtors' as well as the 'sundry creditors' keep growing and reaching a disproportionately high level.
- Approaching the banker for temporary overdraft at frequent intervals.
- High turnover of personnel, especially at senior levels,
- Change in accounting procedure with to view to window dressing.
- Delay in finalization of accounts

These symptoms act as leading indicators of sickness, and if immediate remedial actions are not taken, the sickness will grow to the extent that the organization will find its natural death.

(c) The areas/stages in which these causes may exist and their effects can be studied under the following heads.

- Project formulation.
- Project implementation.
- Production.
- Marketing.
- Finance.
- General and personnel administration.

(i) Project Formulation: Most of sickness is attributed to ill-conceived projects. A project that may, prima facie present a rosy picture may have many hidden pitfalls. Irrational, hasty, over-optimistic decisions may result in choosing projects that may have inherent weaknesses. A project that has an inherent weakness is very unlikely to be a successful project. The existence of a few players in the chosen field, who are doing well, is not always a sound proof that the project will be a success. The existing players may have their own special advantages due to which they could have overcome the hurdles and Pitfalls those are present in the project.
A thorough investigation of the project during the identification and formulation stage is the *sine qua- non* of any project proposal. "Think before you act"—is the proverb that is worth practicing; Any amount of time and efforts spent at this stage is worth it as any hasty decision made at this stage will be very costly.
External factors play a major role in project formulation stage. The present stage of and the future course of the external environment are to be carefully studied for their influence on the project.

(ii) Project Implementation: Delayed implementation gives a project a difficult start. Unduly long time taken for project implementation results in time-overrun which is invariably followed by cost-overrun. Cost-overrun has the ill effect of affecting the financial viability of the project. The problem of Cost-Overrun will get more compounded if the finance necessary to meet the increased cost cannot be arranged in time. Any delay in arranging for the finance needed to meet the cost overrun will only further tend to increase the cost and this may land the project in trouble leading eventually to the death of the project and the project may not take off.

The following are some of the problem areas in implementation stage.

- The promoters may not be in a position to bring in funds to the required extent in time. In general Banks/Financial institutions insist that the promoters shall bring in their capital contribution to the project upfront before release of loan. Any delay in bringing the stipulated capital by the promoters will delay the withdrawal of loan, which will lead to delay in implementation.

- The loan disbursement may be delayed if the promoters are not able to comply with major terms and conditions of the loan agreement, For example, the loan agreement, inter-alia, may stipulate that collateral security to cover, say 25% of the loan amount shall be offered, The value of the property that the promoters offer as collateral security to the bank/financial institution may be short of the requirement. Or, when the value of the property meets the requirement, there may be other impediments like legal hurdles for clear, unencumbered title to the property etc.

- The cost of different components of project-cost may increase due to price escalation. The cost provided for some of the elements of project-cost might have been under estimated. It is also likely that some elements which are essential might have been left out. These factors lead to cost overrun which may delay the project implementation.

- There may be delay in getting power connection, water connection, approval from local bodies, approval from pollution control authorities etc., which may postpone project implementation.

(iii) Production: The major aspects of production that may lead to sickness are

- Increase in the cost of product ion.
- Decrease in the quantity of production.
- Quality of product not meeting the standards/customer expectation.
- Producing more quantity than can be sold, leading to accumulation of stock.

The increase in cost of production may be due to external factors like increase in the cost of raw materials, increase in the cost of consumables, power, etc., or due to internal factors like improper choice of raw material/raw material-source, wrong choice of production process etc.

Decrease in quantity of production may be due to defects/under performance of plant and machinery, defects in production process etc,

Defects in quality of products may be due to defects in raw material used, or due to unsatisfactory performance of machinery or due to ineffective supervision. Inspite of the raw material, machinery and supervision being good, the advent of new technology may bring in product-obsolescence and the product may loose customer preference.

Lack of proper planning of product mix and lack of co-ordination between productions and marketing departments may lead to piling up of inventory, which will only add to the cost of the product.