Paper – 17 - Strategic Performance Management

Section A
[Question No. 1 and 2 are Compulsory and any 3 from Question No.3,4,5,6]

1. 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. [5+10]

Answer of 1:

(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.

2. Game Theory Strategies

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:

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

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

(iii) What is the Nash equilibrium concept, and why is it useful? What is the Nash equilibrium for this problem? [3x5=15]

Answer of 2:

(i) 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.

(ii) 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.

(iii) 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.

3(a) ABC Ltd has two divisions A and B. A division is currently operating at full capacity. It has been asked to supply its product to division B. Division A sells its product to its regular customers for ₹ 30 each. Division B (currently operating at 50 per cent capacity) is willing to pay ₹ 20 each for the component produced by division A (this represents the full absorption cost per component at division A). The components will be used by division B in supplementing its main product to conform to the need of special order. As per the contract terms of sale, the buyer calls for of full cost to division B, plus 10 per cent. Division A has a variable cost of ₹ 17 per component. The cost per unit of division B subsequent to the buying part from division A is estimated as follows:

Particulars	Amount (₹)

Purchased parts - outside vendors	**90.00**
Purchased part - division A	**20.00**
Other variable costs	**50.00**
Fixed overheads and administration	**40.00**
	200.00

Required:

(i) As manager of division A would you recommend sales of your output to division B at the stipulated price of ₹ 20?

(ii) Would it be in the overall interest of the company for division A to sell its output to division B?

(iii) Suggest an alternative transfer price and show how could it lead to goal congruence?

(b) Explain the strengths of the ROI. [(2+3+2)+3]

Answer of 3:

(a)

(i) As manager of division A, I would not recommend sales at ₹ 20 per unit to division B. The division is already operating at its full capacity and the market is presumably absorbing all its output at ₹ 30 per unit. The internal transfer made to division B, hence, would reduce its profit (by ₹ 10 per unit) as well as the ROI.

(ii) Decision Analysis (whether to transfer part from division A to division B at ₹ 20 per unit or not).

Particulars	Sold externally	Transferred to division
Sale price (division A)	30.00	
Sale price (division. B) (₹ 200 + 10%)		220.00
Less relevant/incremental cost:	17.00	17.00
Purchased parts from outside		90.00
Other variable costs		50.00
Profit per unit	13.00	63.00

Yes it will be in the overall interest of the company that transfer takes place, as it would augment the company's profit by ₹ 50 per unit.

(iii) Dual price basis of effecting transfer is the most appropriate. In this case, the relevant transfer price will be ₹ 30.00 (sale) so far as division A is concerned, and ₹ 20 (purchase) so far as division B is concerned. It will keep the profits of division unaffected and will facilitate the utilization of the idle capacity of division B, as also increase its profit:

Particulars	₹
Sale price (₹ 210 + 10 per cent)	231.00
Less: costs (₹ 90 + ₹ 30 + ₹ 50)	170.00
	61.00

(b) Strengths:

- The amount of return (earnings) is related to the investment base required to generate that return. Thus, the emphasis is on the rational allocation of scarce capital resources.

- ROA normalizes the size effect since it is a ration. This, we can compare entities of different sizes.

- As a percentage-return measure, ROA is comparable to cost-of-capital and market rate of return measures.

- Changes in ROA will lead to changes in EPS. Thus, achieving ROA objectives consistent with a firm's cost of capital will lead to the achievement of desirable levels of total earnings, EPS and corporate ROA.

4(a) "The better partner will not stand still but will be booking continuously for ways to improve his own performance. To leapfrog it becomes imperative for an organization to continuously do a P.E.S.T Scan - monitor the developments in the political, economic social and technological fronts and identify future gaps that may be created by significant market changes, customer preferences, innovation threats new entrants and other environmental variables critical to the long term success of the firm." - Explain the statement and describe the strategic consideration.

(b) List the steps of Business Process Re- Engineering. [(2+4) +4]

Answer of 4:

(a) The above statement explained about the Benchtrending. While the benefits of benchmarking are quite impressive, it results in the benchmarking partner to be forever in a catch up situation. The better partner will not stand still but will be booking continuously for ways to improve his own performance. To leapfrog it becomes imperative for an organization to continuously do a P.E.S.T Scan - monitor the developments in the political, economic social and technological fronts and identify future gaps that may be created by significant market changes, customer preferences, innovation threats new entrants and other environmental variables critical to the long term success of the firm. Such trend studies are known as "bench trending" which is similar to benchmarking, but with a structural dimension. There are two types of bench trending- Strategic Bench Trending is used to set direction for a business unit and Operations or Process Bench Trending which is used to identify technological trends and steps initiated to bridge the gaps in current performance levels.

The Steps in strategies bench trending are as follows:

(i) Firstly the market is defined by determining its size, customer preferences, competitors and relative business position of the company within the market.

(ii) The industry direction, technology shifts, geopolitical changes, customer changes and potential threats from outside sources are assessed.

(iii) The strongest current and potential competitors are then determined by evaluating

the trends in industry.

(iv) Data on performance of competitors is gathered and the current and future performance of the unit is compared with that of its competitor.

(v) A performance baseline for the business units is then established and the relative performance of current and projected competition is estimated.

(vi) A set of initiatives which form the basis of an improvement plan are identified to maintain strengths while reducing projected gaps.

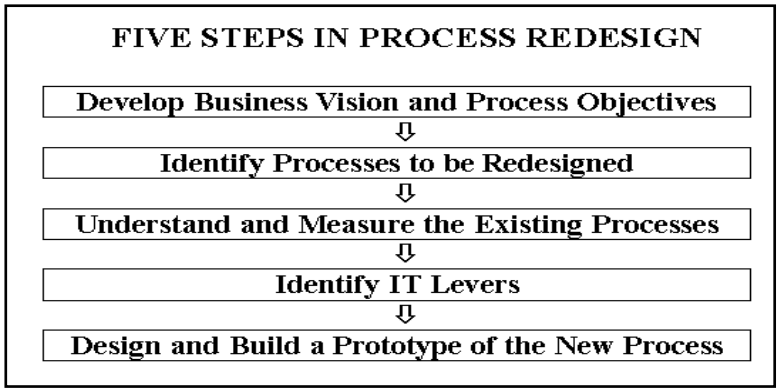
For instance Indian Auto companies must plan to design their products to meet Euro III standards which will become the order of the day. Even a company like Microsoft was late in spotting the emergence of the Internet, though it woke up in time to change gear and adapt to the requirements of the new technology.

Pharma companies in US must take note of the changing demographic profile to develop medicines to meet the needs of ageing population.

To sum up, to effectively compete in the global market, companies should be adept at the techniques if not only benchmarking but more importantly, bench trending too.

(b) Steps of Business process Re- Engineering:

Assuming that a company has decided its processes are inefficient or ineffective, and therefore in need of redesign, how should it proceed? This is a straight forward activity, but *Davenport & Short (1990)* prescribe a five-step approach to BPR:



(i) **Develop Business Vision and Process Objectives:**
BPR is driven by a business vision which implies specific business objectives such as Cost Reduction, Time Reduction, Output Quality Improvement, Quality of Work life (QWL)/Learning/Empowerment.

(ii) **Identify Processes to be Redesigned:**
Most firms use the *High-Impact* approach which focuses on the most important processes or those that conflict most with the business vision. Lesser number of firms use the *Exhaustive* approach that attempts to identify all the processes within an organization and then prioritize them in order of redesign urgency.

(iii) **Understand and Measure the Existing Processes:**

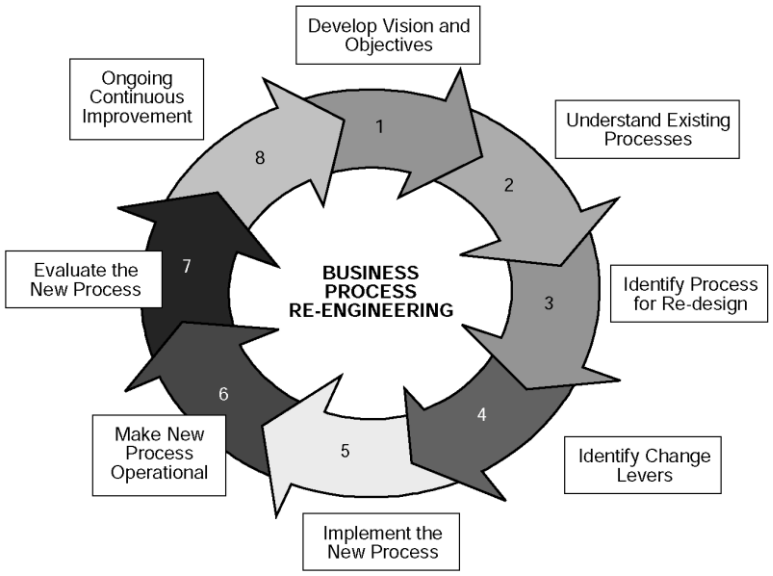
Understanding and measuring the existing processes before redesigning them is especially important, because problems must be understood so that they are not repeated. On the other hand, accurate measurement can serve as a baseline for future improvements.

(iv) **Identify IT Levers:**
In the broadest sense, all of IT's capabilities involve improving coordination and information access across organizational units, thereby allowing for more effective management of task interdependence. An awareness of IT capabilities can -and should influence process design. Therefore, the role of IT in a process should be considered in the early stages of its redesign.

(v) **Design and Build a Prototype of the New Process:**
The actual design should not be viewed as the end of the BPR process. Rather, it should be viewed as a prototype, with successive iterations expected and managed. Key factors and tactics to consider in process design and prototype generation include using IT as a design tool, understanding generic design criteria, and creating organizational prototypes.

These prototypes of business process changes and organizational redesign initiatives, after agreement by owners and stakeholders, would be implemented on a pilot basis, examined regularly for problems and objective achievement, and modified as necessary. As the process approached final acceptance, it would be phased into full implementation.

Another view for BPR of pictorial description is given below:



5 (a) Discuss the rule of dominance of the Game Theory.
(b) Describe the Normal Profit and Super Normal Profit.
(c) The cost function 'c' for the commodity 'q' is given by $C = q3 – 4q^2 + 6q$ find Average Variable Cost and also find the value of q for which average variable cost is minimum.
[3+ (3+2) +2]

Answer of 5:

(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) Normal Profit

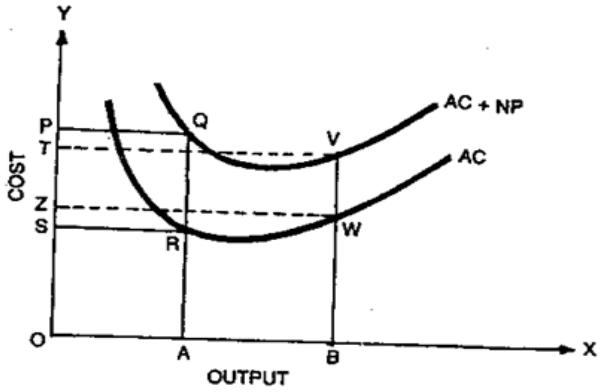
It refers to that amount of earnings which is just sufficient to induce the firm to stay in the industry. Normal profit is, thus, the minimum reasonable level of profit which the entrepreneur must get in the long run, so that he is induced to continue the employment of his resources in its present form.

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.



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.

(c)

$$C = q^3 - 4q^2 + 6q$$

$$\text{Average Variable Cost} = q^2 - 4q + 6 (\text{'y' say})$$

$$\Rightarrow \frac{d}{dp}(q^2 - 4q + 6) = 0$$

$$\Rightarrow 2q - 4 = 0$$

$$\therefore q = \frac{4}{2} = 2$$

$$\frac{d^2y}{dx^2} = 2 > 0, \text{positive}$$

$$\therefore \text{Average Cost is minimum at } q = 2$$

6(a) Describe the important Key Performance Indicators.
(b) Explain about the Financial Gearing Ratio. [8+2]

Answer of 6:

(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.

Section B
[Any one from Question No. 7 and 8]

7. (a) Explain the following terms:-
(i) Business 2 Business, (ii) Business 2 Customer, (iii) Customer to Business, (iv) Customer to Customer.
(b) Describe the doctrine demand of Six Sigma.
(c) Explain the usage of Artificial Neural Network.
(d) Describe about On – Line Analytical Processing [OLAP] [(4x2) +4+4+4]

Answer of 7:
(a) (i) Business to Business (B2B)
Business to Business or B2B refers to e-commerce activities between businesses. These transactions are usually carried out through Electronic Data Interchange or EDI. This allows more transparency among business involved; therefore business can run more efficiently.

(ii) Business to Customer (B2C)
Business to Customer or B2C refers to e-commerce activities that are focused on consumers rather than on businesses.

(iii) Customer to Business (C2B)
Customer to Business or C2B refers to e-commerce activities, which uses reverse pricing models where the customer determines the prices of the product or services. There is increased emphasis on customer empowerment.

(iv) Customer to Customer (C2C):
Customer to Customer or C2C refers to e-commerce activities, which uses an auction style model. This model consists of person-to-person a transaction that completely excludes businesses from the equation.

(b) Six Sigma:
Six Sigma at many organizations simply means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving toward six standard deviations between the mean and the nearest specification limit) in any process – from manufacturing to transactional and from product to service.
The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects. This is

accomplished through the use of two Six Sigma sub-methodologies: DMAIC and DMADV. The Six Sigma DMAIC process (defines, measure, analyze, improve, control) is an improvement system for existing processes falling below specification and looking for incremental improvement. The Six Sigma DMADV process (define, measure, analyze, design, verify) is an improvement system used to develop new processes or products at Six Sigma quality levels. It can also be employed if a current process requires more than just incremental improvement. Both Six Sigma processes are executed by Six Sigma Green Belts and Six Sigma Black Belts, and are overseen by Six Sigma Master Black Belts.

Six Sigma doctrine demands the following conditions:

- Continuous efforts to achieve stable and predictable process results (i.e., reduce process variation) are of vital importance to business success.
- Manufacturing and business processes have characteristics that can be measured, analyzed, controlled and improved.
- Achieving sustained quality improvement requires commitment from the entire organization, particularly from top-level management.
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(c) Artificial Neural Network (ANN)

An Artificial Neural Network (ANN) is a mathematical model that tries to simulate the structure and functionalities of biological neural networks. Basic building block of every artificial neural network is artificial neuron, that is, a simple mathematical model (function). Such a model has three simple sets of rules: multiplication, summation and activation.

Usage of Artificial Neural Networks

One of the greatest advantages of artificial neural networks is their capability to learn from their environment. Learning from the environment comes useful in applications where complexity of the environment (data or task) make implementations of other type of solutions impractical. As such artificial neural networks can be used for variety of tasks like classification, function approximation, data processing, filtering, clustering, compression, robotics, regulations, decision making, etc. Choosing the right artificial neural network topology depends on the type of the application and data representation of a given problem. When choosing and using artificial neural networks we need to be familiar with theory of artificial neural network models and learning algorithms. Complexity of the chosen model is crucial; using to simple model for specific task usually results in poor or wrong results and over complex model for a specific task can lead to problems in the process of learning. Complex model and simple task results in memorizing and not learning. There are many learning algorithms with numerous tradeoffs between them and almost all are suitable for any type of artificial neural network model. Choosing the right learning algorithm for a given task takes a lot of experiences and experimentation on given problem and data set. When artificial neural network model and learning algorithm is properly selected we get robust tool for solving given problem.

(d) On-Line Analytical Processing (OLAP)

On-Line Analytical Processing (OLAP) is a category of software technology that enables analysts, managers and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information that has been transformed from raw data to reflect the real dimensionality of the enterprise as understood by the user.

OLAP functionality is characterized by dynamic multi-dimensional analysis of consolidated enterprise data supporting end user analytical and navigational activities including:

- calculations and modeling applied across dimensions, through hierarchies and/or across members
- trend analysis over sequential time periods
- slicing subsets for on-screen viewing
- drill-down to deeper levels of consolidation
- reach-through to underlying detail data
- rotation to new dimensional comparisons in the viewing area

OLAP is implemented in a multi-user client/server mode and offers consistently rapid response to queries, regardless of database size and complexity. OLAP helps the user synthesize enterprise information through comparative, personalized viewing, as well as through analysis of historical and projected data in various "what-if" data model scenarios. This is achieved through use of an OLAP Server.

8. (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 the objectives of Management Information Systems.
(c) List the steps to start of Total Productivity Management. [(6x2)+5+3]

Answer of 8:

- **Terms & Definitions of Supply Chain Management:**

(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) Management Information System is a systematic process of providing relevant information in right time in right format to all levels of users in the organization for effective decision making. MIS is also defined to be system of collection, processing, retrieving and transmission of data to meet the information requirement of different levels of managers in an organization.

According to CIMA-

MIS is a set of procedures designed to provide managers at different levels in the organization with information for decision making, and for control of those parts of the business for which they are responsible.

MIS comprises of three elements viz., management, information and system.

Objectives of MIS

- To provide the managers at all levels with timely and accurate information for control of business activities
- To highlight the critical factors in the operation of the business for appropriate decision making
- To develop a systematic and regular process of communication within the organization on performance in different functional areas
- To use the tools and techniques available under the system for programmed decision making
- To provide best services to customers
- To gain competitive advantage
- To provide information support for business planning for future

(c) Total Productivity Management:

Total Productive Management (TPM) provides a system for coordinating all the various improvement activities for the company so that they contribute to the achievement of corporate objective. Starting with a corporate vision and broad goals, these activities are developed into supporting objectives, or targets, throughout the organization. The targets are specifically and quantitatively defined. This seminar therefore emphases how to improve the competitiveness of products and services in quality, price, cost and customer responsiveness, thereby increasing the profitability, market share, and return on investment in human, material, capital, and technology resources.

Steps to start TPM are Identifying the key people

- Management should learn the philosophy.
- Management must promote the philosophy.

- Training for all the employees.
- Identify the areas where improvements are needed.
- Make an implementation plan.
- Form an autonomous group.

Section C
[Any one from Question No. 9 and 10]

9. (a) Define the Risk Management and describe the objectives of that.
(b) Explain about the Total Loss Distribution and Probability of Ruin.
(c) Describe the benefits of Risk Mapping. [(3+5)+(4+5) +3]

Answer of 9:

(a) Definition of Risk Management

Risk management is the process of measuring or assessing risk and developing strategies to manage it. Risk management is a systematic approach in identifying, analyzing and controlling areas or events with a potential for causing unwanted change. It is through risk management that risks to any specific program are assessed and systematically managed to reduce risk to an acceptable level. Risk management is the act or practice of controlling risk. It includes risk planning, assessing risk areas, developing risk handling options, monitoring risks to determine how risks have changed and documenting overall risk management program.

Risk management is a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues. A Key ingredient of the risk measurement process is the accuracy and quality of master data that goes into the computation of different aspects of risk. It is no surprise therefore that Master Data Management is a key area. Risk management is first and foremost a 'science' and then an 'art'. Given the appetite for risk, if one uses accurate and relevant data, reliable financial models and best analytical tools, one can minimize risk and make the odds work in one's favour.

Risk Management process needs to identify measure and manage various risks so that comparison of risks and returns is possible to set corporate strategies. Risk Management is the identification and evaluation of risks to an organization including risks to its existence, profits and reputation (solvency) and the acceptance, elimination, controlling or mitigation of the risks and the effects of the risks.

Risk Management framework need a common metric to rank return and potential losses from different portfolios and risk categories.

Integrated risk management is a continuous, proactive and systematic process to understand, manage and communicate risk from an organization-wide perspective. It is about making strategic decisions that contribute to the achievement of an organization's overall corporate objectives.

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) 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:

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

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.

(c) 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.

10. (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. [4+6+10]

Answer of 10:

(a) The statement explained about the 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.

Conclusion

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:

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.

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.

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.

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.

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.

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.

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.

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.