Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper – 9 : Operation Management and Strategic Management

Full Marks : 100 **Time allowed: 3 hours**

The figures in the margin on the right side indicate full marks.
This question paper has two sections.
Both the sections are to be answered subject to instructions given against each.

Section I : (Operation Management)

1. (a) Choose the most correct alternative: **[1*10]**

(i) The desire objective of Production and Operation Management is

(A) Use of cheap machinery to produce,

(B) To train unskilled workers to manufacture goods perfectly,

(C) Optimal utilization of available resources,

(D) To earn good profits.

(ii) Most suitable layout for job Production is

(A) Line layout,

(B) Matrix layout,

(C) Process layout,

(D) Product layout.

(iii) To activity of specifying when to start the job and when to end the job is known as:

(A) Planning,

(B) Scheduling,

(C) Timing,

(D) Follow-up.

(iv) Routine and Scheduling becomes relatively complicated in

(A) Job production,

(B) Batch production,

(C) Flow production,

(D) Mass production.

(v) The lead-time is the time:

(A) To place holders for materials,

(B) Time of receiving materials,

(C) Time between receipt of material and using materials,

(D) Time between placing the order and receiving the material

(vi) The first stage in production planning is:

(A) Process planning,

(B) Factory planning,

(C) Operating planning,

(D) Layout planning.

(vii) The time horizon selected for forecasting depends on

(A) The salability of the product,

(B) The selling capacity of salesman,

(C) Purpose for which forecast is made,

(D) Time required for production cycle.

(viii) In transportation models, points of demand is classified as

(A) Ordination,

(B) Transportation,

(C) Destinations,

(D) Origins.

(ix) Jigs are used in machine tool for holding:

(A) Tools,

(B) Work piece,

(C) Head stock,

(D) Tail stock

(x) Addition of value to raw materials through application of technology is:

(A) Product,

(B) Production,

(C) Advancement,

(D) Transformation.

(b) Match the terms in Column I with the relevant terms in Column II. [1*6]

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Hydro-electricity	(ii) Refinery
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Turbo-alternator
(E) Aviation Fuel	(v) Rotary kiln
(F) Tools	(vi) Machine shop

(c) State whether the following statements are True or False: [1×6]

(i) In carrying out Job Evaluation studies, point system is the best method ( )

(ii) Increase in productivity leads to retrenchment of work force ( )

(iii) Project costs increase as the duration of the project increases ( )

(iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job ( )

(v) There is a limit beyond which labour productivity cannot be improved ( )

(vi) Breakdown maintenance doesn't require use of standby machines ( )

Answer: 1 (a)

(i) C
(ii) C
(iii) B
(iv) B
(v) D
(vi) B
(vii) C
(viii) C
(ix) A
(x) B

Answer: 1 (b)

Column I	Column II
(A) Furniture	(iii) Carpentry
(B) Hydro-electricity	(iv) Turbo-alternator
(C) Television set	(i) Assembly line
(D) Cement	(v) Rotary kiln
(E) Aviation Fuel	(ii) Refinery
(F) Tools	(vi) Machine shop

Answer: 1 (c)

(i) True
(ii) True
(iii) True
(iv) True
(v) True
(vi) False

2. (a) Define forecasting. Why sales forecasting is the most important activity in the business? [6]

Demand in (000 MT) for sugar of S Ltd is given below:

Year	2010	2011	2012	2013	2014	2015	2016

Demand	**77**	**88**	**94**	**85**	**91**	**98**	**90**

(b)

(i) Fit a straight line trend by method of least square;

(ii) Obtain the forecast of demand for the year 2017 **[10]**

Answer: 2 (a)

Forecasting means peeping into the future. As future is unknown and is anybody's guess but the business leaders in the past have evolved certain systematic and scientific methods to know the future by scientific analysis based on facts and possible consequences. Thus, this systematic method of probing the future is called forecasting.

All business and industrial activities revolve around the sale and its future planning. To know what a business will do we must know its future sales. All other activities depend upon the sales of the concern. Sales forecasting as a guiding factor for a firm because it enables the firm to concentrate its efforts to produce the required quantities, at the right time at reasonable price and of the right quality. Sales forecasting is the basis of planning the various activities i.e.; production activities, pricing policies, programme policies and strategies, personnel policies as to recruitment, transfer, promotion, training, wages etc.

Answer: 2 (b) (i)

The trend line is represented as $Y_t = a + bX$

Where Y_t = the trend value (which is to be predicated);

a = the Y axis intercept;

b = slope of the trend line;

x = the independent variable, the time;

a and b are computed as

$$b = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2}, \quad a = \bar{Y} - b\bar{X}$$

The computations are in the following table

Year	X	Demand, (Y)	XY	X^2	Trend Values Yt
2010	0	77	0	0	83
2011	1	88	88	1	85
2012	2	94	188	4	87
2013	3	85	255	9	89
2014	4	91	364	16	91
2015	5	98	490	25	93
2016	6	90	540	36	95
Total	21	623	1925	91	125

$$\bar{x}\ \frac{21}{7} = 3 \ \& \ \bar{Y} = \frac{623}{7} = 89 \text{ So } b = \frac{\left(1925 - 7 \times 3 \times 89\right)}{\left(91 - 7 \times 3 \times 3\right)} = 2 \text{ and } a = 89 - 2 \times 3 = 83$$

(ii) Forecast value for 2017 = 83 + 2 × 7 = 97

3. (a) What does Product Design do? Discuss – Process design and selection. **[6]**

(b) Machine A costs of ₹ 80,000. Annual operating costs are ₹2,000 for the first year, and they increase by ₹15,000 every year (for example, in the fourth year the operating costs are

₹47,000). Determine the least age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted.

(i) Another machine B costs ₹1,00,000. Annual operating cost for the first year is ₹4,000 and they increase by ₹7,000 every year. The firm has a machine of type A which I sone year old. Should the firm replace it with B and if so, when?

(ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets an information that the machine B will become available in a year. What should the firm do? [10]

Answer: 3 (a)

The activities and responsibilities of product design include the following:

(i) Translating customer needs and wants into product and service requirements (marketing).

(ii) Refining existing products (marketing).

(iii) Developing new products (marketing, product design and production).

(iv) Formulating quality goals (quality assurance, production).

(v) Formulating cost targets (accounting).

(vi) Constructing and testing prototype (marketing, production).

(vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

(i) Characteristics of the product or service offered to the customers.

(ii) Expected volume of output.

(iii) Kinds of equipments and machines available in the firm.

(iv) Whether equipments and machines should be of special purpose or general purpose.

(v) Cost of equipments and machines needed.

(vi) Kind of labour skills available, amount of labour available and their wage rates.

(vii) Expenditure to be incurred for m anufacturing processes.

(viii) (viii)Whether the process should be capital-intensive or labour-intensive.

(ix) Make or buy decision.

(x) Method of handling materials economically.

Answer: 3 (b)

The operating cost of machine A in successive years are as follows:

Year	1	2	3	4	5
Operating cost (₹)	2,000	17,000	32,000	47,000	62,000

CALCULATIONS FOR AVERAGE COST OF MACHINE A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation cost (in ₹)	Total cost (in ₹)	Average cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

CALCULATIONS FOR AVERAGE COST OF MACHINE B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation cost (in ₹)	Total cost (in ₹)	Average cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	158,000	39,500
5	90,000	1,00,000	1,90,000	**38,000**
6	1,29,000	1,00,000	2,29,000	38,166

It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹ 38,000) is less than the lowest average cost for machine A (₹43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows :

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows :

Year	1	2	3	4	5
Total cost in the year (in ₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. Therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

(ii) Install new machine now and replace it with machine *B* during the *third* year.

4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at D, E and F. Monthly factory capacities are 10, 80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table:

	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for satisfying demand at the warehouses E, E and F are ₹5, ₹3 and ₹ 2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the know algorithms. [10]

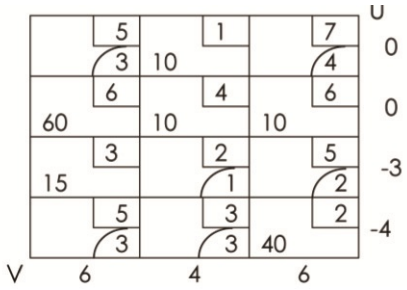
(b) Enumerate four differences between PERT and CPM. [6]

Answer: 4 (a)

	D	E	F		
A	5	1 10	7 200	10/0	4*
B	6 60	4 10	6 10	80/0	2/2/2
C	3 15	2	5	15/0	1/1/1
Dummy D	5	3	2 40	40/0	1/1
	75	20	50		
	60	10	10		
	0	0	0		
	2	1	3		
	2	1	3*		
	3*	2	1		

Since there are m + n – 1 allocations optimality test can be performed.

Since $\Delta ij \geq 0$, the solution is optimum.



		Quantity	Minimum Cost
A	E	10 × 1	10
	D	60 × 6	360
B	E	10 × 4	40
	F	10 × 6	60
C	D	15 × 3	45
	F	40 × 2	80
Dummy		145	₹595

(including penalty cost of ₹80)

Answer: 4 (b)

Four differences between PERT and CPM are enumerated in the following table:

PERT	CPM
It is applicable when time estimate are uncertain as regards duration of activities and measured by pessimistic time.	It is good when time estimates are possible with certainty.
It is concerned with events which are the beginning or ending points of operation.	It is concerned with activities.
It is relevant for non- repetitive projects.	It is designed for repetitive process.
It is not concerned with the relationship between time and cost	It establishes a relationship between time and cost, and cost is proportionate to time.
It can be analyzed statistically.	It is not so in case of CPM

5. (a) The following table gives data on normal time & cost and crash time & cost for a project.

Activity	Normal		Crash	
	Time (days)	Cost (₹)	Time (days)	Cost (₹)
1 – 2	6	600	4	1,000
1 – 3	4	600	2	2,000
2 – 4	5	500	3	1,500
2 – 5	3	450	1	650
3 – 4	6	900	4	2,000
4 – 6	8	800	4	3,000
5 – 6	4	400	2	1,000
6 – 7	3	450	2	800

The indirect cost per day is ₹100.

1. **Draw the network and identify the critical path.**
2. **What are the normal project duration and associated cost? [10]**

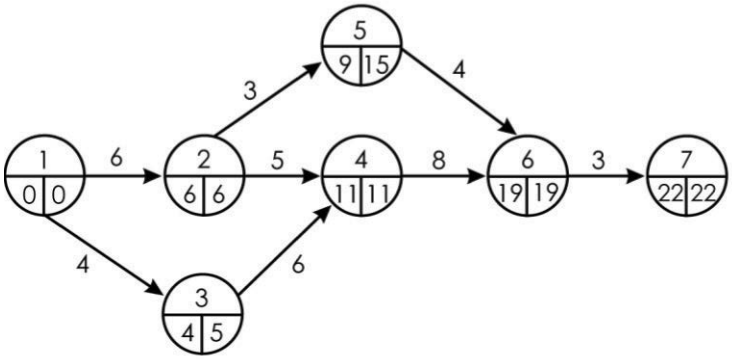
(b) A fleet owner finds from his past records that the costs per year of running a vehicle whose purchase price is ₹1,00,000 are as under:

Year	1	2	3	4	5
Running costs (₹)	10,000	12,000	13,500	15,000	18,000
Resale value (₹)	80,000	65,000	55,000	25,000	6,000

Thereafter, running cost increases by ₹3,000, But resale value remains constant at ₹6,000. At what age is a replacement due? [6]

Answer: 5 (a)

The network for normal activity times indicates a project time of 22 weeks with the critical path 1-2-4-6-7.



Normal project duration is 22 weeks and the associated cost is as follows:
Total cost = Direct normal cost + Indirect cost for 22 weeks.
= 4,700 + 100 × 22 = ₹ 6,900.

Answer: 5 (b)

Chart showing Optimal Replacement Period

Year	Net Capital Cost (C-S) (₹)	Running Cost (₹)	Cumulative operation Cost (₹)	Total Cost (₹) (2) + (4)	Average Annual Cost (₹) (5) / (1)
(1)	(2)	(3)	(4)	(5)	(6)
1	20,000	10,000	10,000	30,000	30,000
2	35,000	12,000	22,000	57,000	28,500
3	45,000	13,500	35,500	80,500	26,833
4	75,000	15,000	50,500	1,25,500	31,375
5	94,000	18,000	68,500	1,62,500	32,500

Optimal replacement is the end of 3rd year.

Section – B

6. Choose the correct answer: [1*6]

(i) Behaviour modification includes
- **A. Involving employees in decision making**
- **B. Positive reinforcement**
- **C. Job enlargement**
- **D. Job enrichment and Flexi time.**

(ii) Successful differentiation strategy allows the company to:
- **A. gain buyer loyalty to its brands**
- **B. charge too high a price premium**
- **C. depend only on intrinsic product attributes**
- **D. have product quality that exceeds buyers needs**
- **E. segment a market in to distinct group of buyer**

(iii) Matrix structure
- **A. structural grouping is geographic**
- **B. simultaneous combination of similar activities on the basis of function**
- **C. adopts parts of both functional and divisional structures at the same level of management**
- **D. creates a dual chain of command**

(iv) The conditional of Low share, Negative growth, and negative cash flow indicates –
- **A. Dogs**
- **B. Dodos**
- **C. Donkey**
- **D. Dinosaurs**

(v) Benchmarking is :
- **A. The analytical tool to identifying high cost activities based on the 'Pareto Analysis'**
- **B. The search for industries best practices that lead to superior performance**
- **C. The simulation of cost reduction schemes that help to build commitment and improvement of actions**
- **D. The process of marketing and redesigning the way a typical company works**
- **E. The framework that earmarks a linkage with suppliers and customers**

(vi) A product line is a group of product that
- **A. are closely related**
- **B. are marketed through the same channel**
- **C. performance a similar function for being sold to the same customers**
- **D. all of the above**

Answer: 6

(i) B

(ii) A

(iii) D

(iv) B

(v) B

(vi) D

Answer any one question from the following:

7. (a) State the approaches of Strategic Planning.

(b) Discuss Contingency Planning & its seven steps. [6+6]

Answer: 7(a)

Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

(i) A top-down process, in which managers are given targets to achieve which they pass on down the line.

(ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.

(iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to and- from movement between different levels until agreement is reached.

However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

Answer: 7(b)

Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemam and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss various stages in strategic planning.

(b) Define SBU. What are its merits & demerits? [6+6]

Answer: 8(a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm"s product and markets, its competitors and so forth. Examples of strategies might be:

(a) increase market share

(b) penetration into international market

(c) concentration on core competencies

(d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

(a) does it increase existing strengths ?

(b) does it alleviate existing weaknesses ?

(c) is it suitable for the firm"s existing position ?

(d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

Answer: 8(b)

SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

(i) Promotes accountability since units" heads are responsible for individual SBU profitability

(ii) Career development opportunities are further higher in this structure

(iii) Allow better control of categories of products manufacturing, marketing and distributions

(iv) Helps to expand in different related and unrelated businesses

Disadvantages:

(i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it"s own way to handle situations

(ii) High cost approach

9. Write short notes on any three of the following four questions: [4*3]

(a) PEST Framework;

(b) Limitation of B.C.G Model;

(c) SWOT Analysis;

(d) Market Penetration Strategy.

Answer: 9

(a) PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment. SWOT analysis refers to Strengths, Weaknesses, Opportunity and Threats. These factors are prime determinants of strategic planning. Without SWOT and PEST analysis companies might fail to achieve desired goals.

PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT
analysis:

(i) **Political** – These are the external factors that influence the business environment. Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future. These factors are importantand need to be managed in order to overcome uncertainty.

(ii) **Economical** – Economical factors are the most important since it impacts business in the long run. Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.

(iii) **Social** – Social factors involve the trends of population, domestic markets, cultural trends and demographics. These factors help businesses assess the market and improve their products/service accordingly.

(iv) **Technological** – This analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.

(i) It presents a business' standing and position, i.e. whether it is weak or strong

(ii) It informs about both internal and external factors that affect a firm's success and/or failure

(iii) It helps firms assess the report and take counter measures for improvement and analyzing threats

(iv) It forecasts the future and sheds light on the current situation

(v) Evaluates business environment and allows firms to make strategic decisions

(vi) Prevents future failure and creates a system of continuous success

(vii) Provides companies with a reality check on their performance and shortcoming

(viii) Enables firms to understand the economy and market and expand

(ix) Provides a mechanism to identify threats and opportunities

(x) Enables companies to learn about markets and enter new markets nationally or globally.

(b) **Limitations of the BCG Model:**

The BCG model analyses products in the light of two variables: the growth in the market as a whole, and the growth of the product's share of the market in relation to other products. It suggests that there is a relationship between these variables and the product's propensity to generate cash or consume it. It rests on the assumption that the firm with the highest market share can be the lowest cost producer. The model suggests that cash cows should be used to fund stars. There are a number of limitations to the model.

(i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy. Firms can profit servicing small low-growth niches.

(ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.

(iii) R elative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.

(iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.

(v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.

(vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.

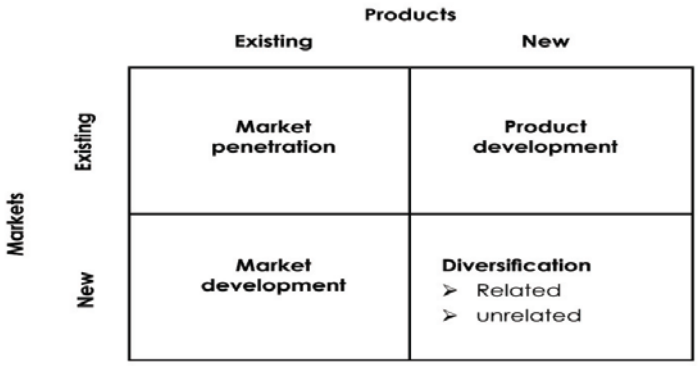
(vii) It ignores the threat of substitute products.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that it"s external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(d) MARKET PENETRATION Strategy:



Firm increases its sales in its present line of business. This can be accomplished by:

(i) price reductions;

(ii) increases in promotional and distribution support;

(iii) acquisition of a rival in the same market;

(iv) modest product refinements.

These strategies involve increasing the firm"s investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.