# Paper 9 – OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

# Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

[1x10=10]

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 – A

- 1. (a) Choose the correct answer:
  - (i) Number of product varieties that can be manufactured in Mass production is:
    - (a) One only
    - (b) Two only
    - (c) Few verities in large volumes
    - (d) Large varieties in small volumes

#### (ii) Routing and Scheduling becomes relatively complicated in

- (a) Job production
- (b) Batch production
- (c) Flow production
- (d) Mass production

#### (iii) Long range forecasting is useful in:

- (a) Plan for research and development,
- (b) to schedule jobs in job production
- (c) in purchasing the material to meet the present production demand
- (d) to assess man power required in the coming month
- (iv) The scope of production planning and control is:
  - (a) Limited to production of products only
  - (b) Limited to production of services only
  - (c) Limited to production of services and products only
  - (d) Unlimited, can be applied to any type of activity
- (v) Most suitable layout for job production is:
  - (a) Line layout
  - (b) Matrix layout
  - (c) Process layout
  - (d) Product layout
- (vi) JIT stands for
  - (a) Just in time purchase
  - (b) Just in time production
  - (c) Just in time use of materials
  - (d) Just in time order the material

#### (vii)The first stage in production planning is:

- (a) Process planning
- (b) Factory planning
- (c) Operation planning
- (d) Layout planning

(viii) Total station time/cycle time x Number of work stations)x100 is known as:

- (a) Line efficiency
- (b) Line smoothness
- (c) Balance delay of line
- (d) Station efficiency
- (ix) Scheduling deals with:
  - (a) Number of jobs to be done on a machine
  - (b) Number of machine tools used to do a job
  - (c) Different materials used in the product
  - (d) Fixing up starting and finishing times of each operation in doing a job
- (x) The act of releasing the production documents to production department is known as:
  - (a) Routing
  - (b) Scheduling
  - (c) Expediting
  - (d) Dispatching

(b) Match the products in column-I with production centers in column –II [1x6=6]

I	I
1. Ranking Method	(a) Method study
2. Motion economy	(b) job evaluation
3. Work sampling	(c) Inventory Control
4. Crashing	(d) Network Analysis
5. Replacement	(e)work measurement
6. Stock Level	(f) Maintenance

(c) State whether the following statements are True or False:

[1x6=6]

- (i) Training boosts employee morale ( )
- (ii) No handling is the best handling ( )
- (iii) Increase in productivity leads to retrenchment of work force ()
- (iv) Results available from work sampling study is not 100% accurate ( )
- (v) Break-even analysis a management tool ()
- (vi) General purpose machine are less prone to obsolescence ()

Answer any three questions from the following: [3x16=48]

#### Answer:

- (1) (a) (i) (c) Few verities in large volumes
  - (ii) (b) Batch Production
  - (iii) (a) Plan for research and development
  - (iv) (d) Unlimited, can be applied to any type of activity
  - (v) (c) Process layout
  - (vi) (b) Just in time production
  - (vii) (b) Factory planning
  - (viii) (a) Line efficiency
  - (ix) (d) Fixing up starting and finishing times of each operation in doing a job
  - (x) (d) Dispatching

(b)

I	I
1. Ranking Method	(a) job evaluation
2. Motion economy	(b) Method study

Academics Department, The Institute of Cost Accountants of India (Statutory Body under an Act of Parliament) Page 3

3. Work sampling	(c) work measurement	
4. Crashing	(d) Network Analysis	
5. Replacement	(e) Maintenance	
6. Stock Level	(f) Inventory Control	

(c) (i) Method study should precede work measurement (T)

(ii) Increased productivity leads to cost reduction (T)

(iii) A good materials handling system always consists of conveyors ( F )

- (iv) Project costs increase as the duration of the project increases (T)
- (v) It is desirable to conduct work measurement after method study(T)
- (vi) No handling is the best handling (T).
- 2. (a) List the scope of operations management.(b) What is forecasting? What are its advantages?

[8] [8]

# Answer:

- (2) (a) Operations Management concern with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability. It distinguishes itself from other functions such as personnel, marketing, finance, etc. by its primary concern for 'conversion by using physical resources'. Following are the activities, which are listed under Production and Operations Management functions:
  - 1. Location of facilities.
  - 2. Plant layouts and Material Handling.
  - 3. Product Design.
  - 4. Process Design.
  - 5. Production and Planning Control.
  - 6. Quality Control.
  - 7. Materials Management.
  - 8. Maintenance Management.



(b) Forecasting is the process of making statements about events whose actual outcomes (typically) have not yet been observed.

A Forecast is a prediction of future events and their quantification for planning purposes. Forecasting involves the estimation of the trend in future variables sales, tastes or profit using both quantitative and judgment techniques whereas extrapolation is a purely statistical exercise. Forecasting includes the assessment of environmental changes and in this respect, forecasting assist in obtaining strategic fit.

The strategic environment of the firm consists of economic, political, legal, social and technological factors, which influence the ability of the organization to survive and make profits, examples of environmental variables with which a fit must be achieved include the following:

- (a) The changing tastes of the customers
- (b) Developments in the market demand for a product
- (c) The likely trend of interest and exchange rates.

Forecasting can be more than just a numerical exercise on estimated trends. Whilst trends in price, interest rates, market growth rates and margins will involve numbers, other forecast does not;

- (i) Value profiles are long range forecasts of consumers and social attitudes.
- (ii) Geopolitical forecasts consider changes in national economic power and can alert the firm to new markets or potential competitive threats.

After all, the forecast that 'the political situation is unstable' is not quantitative but it would be relevant.

The important role which Forecasting plays in strategic planning is therefore to forewarn managers of possible changes in environmental factors. The long-term nature of strategic change means that effective forecasting is necessary to given the organization time to adopt and obtain a good fit with its environment.

3. (a) What does Product Design do? Discuss — Process design and selection. [3+7=10]
(b) A department works on 8 hours shift, 288 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (standard time in hours)
Α	325	5.0
В	450	4.0
С	550	6.0

Calculate (a) processing time needed in hours to produce products A, B and C, (b) Annual production capacity of one machine in standard hours, and (c) Number of machines required. [6]

#### 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 manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.
- (b) Step 1: Calculate the processing time needed in hours to produce product x, y and z in the quantities demanded using the standard time data.

Product	Annual demand (units)	Standard processing per unit (Hrs.)	Processing needed (Hrs.)
Х	300	4.0	300 x 4 = 1200 Hrs.
Y	400	6.0	400 x 6 = 2400 Hrs.
Z	500	3.0	500 x 3 = 1500 Hrs.
			Total = 5100 Hrs

Step 2: Annual production capacity of one machine in standard hours =  $8 \times 250 =$ 2000 hours per year

Work load per year 5100 Step 3 : Number of machines required = Production capacity per machine = 2000 =

- 2.55 machines = 3 machines.
- 4. (a) The cost conscious company requires for the next month 300, 260 and 180 tonnes of stone chips for its three constructions  $C_1$ ,  $C_2$  and  $C_3$  respectively. Stone chips are produced by the company at three mineral fields taken on short lease by the company. All the available boulders must be crushed into chips. Any excess chips over the demands are sites  $C_1$ ,  $C_2$  and  $C_3$  will be sold ex-fields.

The fields are  $M_1$ ,  $M_2$  and  $M_3$  which will yield 250,320 and 280 tones of stone chips respectively.

Transportation costs from mineral fields to construction sites vary according to distances, which are given below in monetary unit (MU)

	То	<b>C</b> <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>
Form	<b>M</b> 1	8	7	6
	<b>M</b> 2	5	4	9
	M <sub>3</sub>	7	5	5

- (i) Determine the optimal economic transportation plan for the company and the overall transportation cost in MU.
- (ii) What are the quantities to be sold form  $M_1$ ,  $M_2$  and  $M_3$  respectively? [10]

(b) The following jobs have to be shipped a week from now (weak has 5 working days)

Job	Α	В	С	D	E	F
Number of day' \$ work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [6]

Dummy

Answer:

(4) (a)

C<sub>3</sub>  $C_1$  $C_2$ 8 7 6 0  $M_1$ 250/140 6\*/1/1/1 140 110 5 4 9 0  $M_2$ 320/20/0 4/1/5\* 300 20 7 5 5 0 280/40/0 5/0/0/0 Мз 40 240 300 260 180 110 0 850 0 240 0 0 <u>2</u> \*2 0 1 1 1 1 1 1 \*2 1

Hence There are m + n - 1 allocations. Hence Optimality test is to be performed.

				Ui	
	8	7	6 140	0	0
	300	20	9	0	-2
	7	5 240	5 40	0	-1
Vi	7	6	6	0	
nce ∆	ij≥0 Solutio	n is optimu	ım.		
		Qty	Min	imum Cost	
1	C <sub>3</sub>	140 x 6 =	=	840	

Sir

		Qty	Minimum Cost
$M_1$	C <sub>3</sub>	140 x 6 =	840
	C <sub>4</sub>	110 x 0 =	0
M <sub>2</sub>	$C_1$	300 x 5 =	1500

Academics Department, The Institute of Cost Accountants of India (Statutory Body under an Act of Parliament) Page 7

<b>T</b> 0000
200
1200
80

(b) (a) Calculation of slack :

Number of days until clue date is 5 days for all jobs

Job	Slack	(days)
А	5 - 2	= 3
В	5 - 4	= 1
С	5 - 7	= (-2)
D	5 - 6	= (-1)
E	5 - 5	= 0
F	5 - 3	= 2

Sequence :

С	D	Е	В	F	A
-2	-1	0	1	2	3

(b) Calculation of Critical ratio:

Critical ratio - Due Date - Date Nov	✓ DD-DN Available Time
Lead Time Remaining	$g = \frac{1}{LTR} = \frac{1}{Operation Time}$
Critical ratio for job A = $5/2$ = 2.5	
Critical ratio for job B = $5/4$ = 1.25	, )
Critical ratio for Job C = $5/7 = 0.71$	
Critical ratio for job $D = 5/6 = 0.83$	
Critical ratio for job $E = 5/5 = 1.0$	
Critical ratio for job $F = 5/3 = 1.67$	

Job having least critical ratio is given the first priority and so on.

Sequence :	С	D	E	В	F	А
Critical Ratio :	0.71	0.83	1.0	1.25	1.67	2.5

5. (a) A project consists of five activities. Activities P and Q run simultaneously. The relationship among the various activities is as follows:

Activity	Immediate successor
Р	R
Q	S

Activity T is the last operation of the project and it is also immediate successor to R and S. Draw the network of the project. [6]

(b) Indian electronics, manufactures TV sets and carries out the picture tube testing for 2000 hours. A sample of 100 tubes was put through this quality test during which two tubes failed. If the average usage of TV by the customer is 4hours/day and if 10,000 TV sets were sold, then in one year how many tubes were expected to fail and what is the mean time between failures for these tubes? [10]

Answer:

(5) (a)



(b) The total test time = (100 tubes) × 2000 hours = 200,000 tube-hours. There are two tubes which have failed and hence the total time is to be adjusted for

the number of hours lost due to the failures during the testing.

The lost hours are computed as =  $2 \times \frac{2000}{2}$  = 2000 hours.

The assumption is made here is that each of the failed tubes have lasted an average of half of the test period.

Therefore, the test shows that there are two failures during (2,00,000 - 2000) = 1,98,000 tube hours of testing.

During 365 days a year (four hours a day) for 10,000 tubes the number of expected failures  $\frac{2}{1.98,000} \times 10,000 \times 365 \times 4 = 147.47 = 148$  tubes approximately.

= 99,000 tubes hours per failure =  $\frac{99,000}{4 \times 365}$  = 67.8 tubes year per failure.

#### SECTION – B

- 6. (a) Choose the correct Answer:
  - (i) Strategic analysis is concerned with stating the position of the organization in terms of:
    - (a) Mission, choice of market segments, product selection, financial targets, external appraisal;
    - (b) Mission, goals, corporate appraisal, position audit and gap analysis.
    - (c) Mission goals, identification of key competitors, SWOT and environmental appraisal;
    - (d) Mission, targeted ROI, manpower planning, position audit;
    - (e) Mission, SWOT, competitive strategies, stakeholders position and institutional goal;
  - (ii) The essential ingredients of Business Process Re- engineering are:
    - (a) Continuous improvements of products, processes and technologies.
    - (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
    - (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
    - (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
    - (e) Identification and selection of layouts most suited for products and processes.
  - (iii) Successful differentiation strategy allows the company to:
    - (a) gain buyer loyalty to its brands

#### [1x6=6]

- (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

### (iv) Directional policy matrix is the same as

- (a) the BCG model
- (b) the 9 cell GE matrix
- (c) the life cycle portfolio analysis
- (d) the PIMS matrix
- (e) the 3x3 competitive positioning matrix
- (v) For an entrepreneur
  - (a) Vision is before the mission
  - (b) Mission is before the vision
  - (c) Both are developed simultaneously
  - (d) Vision or mission are un-important issue
  - (e) Profitability is most crucial

# (vi) Typically profits are highest in which stage of the industry life-cycle?

- (a) Introduction
- (b) Growth
- (c) Maturity
- (d) Decline

# Answer:

- (6) (a) (i) (b) Mission, goals, corporate appraisal, position audit and gap analysis.
  - (ii) (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
  - (iii) (a) gain buyer loyalty to its brands;
  - (iv) (b) the 9 cell GE matrix
  - (v) (a) Vision is before the mission
  - (vi) (b) Growth.

Answer any one question from the following:	[1x12=12]

7. (a) What do you mean by strategy? State its features.[6](b) What do you mean by Portfolio Analysis and do list down its objectives.[6]

#### Answer:

(7) (a) Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.
Strategy can also be defined as knowledge of the apple, the uncertainty of events.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

#### Features of Strategy:

(i) Strategy is important to foresight, the uncertain events of firms/industries .

- (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to deal behavior of customers and competitors.
- (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.
- (b) Portfolio analysis is a term used in describing methods of analyzing a product market portfolio with the following aims:
  - (i) To identify the current strengths and weaknesses of an organisation's products in its markets, and the state of growth or decline in each of these markets.
  - (ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Several matrices have been developed over the years to analyse market share, market growth and market position.

8.	(a) List down various types of organizational structure.	[6]
	(b) Discuss Mc Kinsey's 7-s frame work.	[6]

#### Answer:

#### (8) (a) Organizational Structure

The successful implementation of Strategy requires an effective organization structure. Organizational structure means the framework in which the organization defines how tasks are divided, resources are deployed and departments are co-ordinated.

There are several types of organizational structure:

- (1) Functional Structure
- (2) Geographic Structure
- (3) Matrix Structure
- (4) Hybrid Structure

#### Functional structure:

The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

#### Geographic structure:

Another basic form structural grouping is geographic structure, in which activities and personnel are grouped by specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region.

Organization according to geographic areas or territories is rather common structural form for large-scale enterprise whose strategies need to be tailored to fit the particular needs and features of different.

#### Matrix structure:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

#### Hybrid Organization And supplemental Methods:

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit, Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.

The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

(b) Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



McKinsey's 7-S Framework

The Mckinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.

- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves—its corporate culture.
- Skills: An organisation's dominant capabilities and competencies.
- 9. Write a short note on any of the following three questions:

[4×4=16]

- (a) BPR;
- (b) Marketing Mix;
- (c) Benefits on contingency planning;
- (d) Corporate level management.

#### Answer:

(9) (a) Business process re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.

BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to Davenport (1990) a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub-processes.

Business process re-engineering is also known as business process redesign, business transformation, or business process change management.



The globalization of the economy and the liberalization of the trade markets have formulated new conditions in the market place which are characterized by instability and intensive competition in the business environment. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, international cooperation, technological innovations cause competition to intensify. All these changes impose the need for organizational transformation, where the entire processes, organization climate and organization structure are changed. Hammer and Champy provide the following definitions:

**Re-engineering** is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

**Process** is a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization. "(Davenport 1993).

Each process is composed of related steps or activities that use people, information, and other resources to create value for customers as it is illustrated in the following example.

# Principle of BPR

BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting of business and management processes. Redesign, retooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve.

# (b) Marketing mix

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

"Marketing Mix" refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

# (c) Benefits of Contingency Planning

- (i) It will make the future through their proactive planning and advanced preparation.
- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change,
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes.

# (d) Corporate Level Management

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.