

**Paper - 9 : Operations Management and
Strategic Management**

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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 – A : Operations Management

PART – I

Answer Question No. 1 which compulsory

1. (a) Choose the correct alternatives: [1×10=10]
- (i) Which process is used when higher volumes of more standardised goods or services are needed ?
 - (a) Batch process
 - (b) Continuous process
 - (c) Repetitive process
 - (d) Job shop process
 - (ii) Which of the following is / are the method for solving Assignment problem?
 - (a) Complete Enumeration method
 - (b) Hungarian method
 - (c) Simplex method
 - (d) All of the above
 - (iii) The purpose of application of linear programming in industrial problems is
 - (a) to determine a plan for production and procurement in the time period under consideration
 - (b) to determine an optimal solution of the problem under the given constraints
 - (c) to determine the cost effective solution of the problem under scarce resources
 - (d) to determine a plan for time based solution to the problem for increasing productivity
 - (iv) What is the way to achieve competitive advantage in the market place from the following?
 - (a) Line Balancing
 - (b) JIT manufacturing
 - (c) Cellular manufacturing
 - (d) Batch production
 - (v) The multiple shift operation can be enhanced by adopting _____.
 - (a) Firm's Capacity utilisation
 - (b) Demand for firm's product
 - (c) Firm's labour turnover
 - (d) Firm's channel conflict

- (vi) What is the feasible solution in a linear programming model?
- The basic solution to the general L.P. problem
 - Any solution that also satisfies the non-negative restrictions of the general L.P. problem
 - A solution which optimize (maximize or minimize) the objective function of a general L. P. problem
 - A basic solution to the system of equation if one or more of the basic variables become equal to zero.
- (vii) _____ is the basis for decisions regarding capacity planning, facilities (or plant) layout, equipment and design of work systems.
- Process Design
 - Process Planning
 - Process Strategy
 - Process Selection
- (viii) Which one of the following is not a Sequencing rule for single facility?
- DSRO
 - LFT
 - SSRO
 - MDD
- (ix) What is the main reason for product design ?
- To offer new products to sustain in the market
 - To offer new products to fulfill changing preferences of customers
 - To offer new products to remain competitive in the market
 - To offer new products to cope with changing regulations in the market
- (x) What does Utilisation of Resources means in Operations Management?
- Obtaining maximum effect from resources
 - Minimizing loss of resources,
 - Minimising under utilization or waste of resources
 - All the above

(b) Match items in column A with that in column B

[1×6=6]

Column A	Column B
(a) Improved Matrix	(i) Line Balancing
(b) Repetitive Focus	(ii) Process Strategy
(c) MRP II	(iii) Layout
(d) Degenerate	(iv) Manufacturing Resource Planning
(e) Bottleneck	(v) Job allocation
(f) Cycle time	(vi) Linear Programming

(c) State whether the following statements are True/False.

1×6=6

- The product's life cycle has many points of similarity with the life cycle of human.
- The objective function and the constraint set - these are the two basic parts of the linear programming problem.
- Working out the output per machine - hour is the most widely used index of productivity .

4. The productivity is measured by how much input is required to achieve a given output.
5. One of the disadvantages of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
6. Preventive maintenance provides greater safety to the workers.

Answer:

1. (a) (i) (c) Repetitive process
 (ii) (d) All of the above
 (iii) (a) to determine a plan for production and procurement in the time period under consideration
 (iv) (b) JIT manufacturing
 (v) (a) Firm's Capacity utilization
 (vi) (b) Any solution that also satisfies the non-negative restrictions of the general L.P. problem
 (vii) (b) Process Planning
 (viii) (b) LFT
 (ix) (c) To offer new products to remain competitive in the market
 (x) (d) All the above

(b)

Column A	Column B
(a) Improved Matrix	(v) Job allocation
(b) Repetitive Focus	(ii) Process Strategy
(c) MRP II	(iv) Manufacturing Resource Planning
(d) Degenerate	(vi) Linear Programming
(e) Bottleneck	(iii) Layout
(f) Cycle time	(I) Line Balancing

(c)

1. (T)
2. (T)
3. (F)
4. (T)
5. (T)
6. (T)

PART - II

Answer any three questions from Q. No. 2 to 5. Each the question carries 16 marks

(3x16=48)

2. (a) What is 'Capacity Planning'? Describe the types of Capacity Planning.

(b) A department works on 8 hours shift, 250 days a year and has the usage data of a machine, as given below:

Product	Demand in units p.a.	Standard Processing Time in hours per unit
A	300	4.0
B	400	6.0
C	500	3.0

Determine the number of machines required.

[8+8=16]

Answer:

2. (a) **Capacity Planning:**

The effective management of capacity is the most important responsibility of production and operations management. The objective of capacity management i.e., planning and control of capacity, is to match the level of operations to the level of demand.

Capacity planning is concerned with finding answers to the basic questions regarding capacity such as:

- (i) What kind of capacity is needed?
- (ii) How much capacity is needed?
- (iii) When this capacity is needed?

Capacity planning is to be carried out keeping in mind future growth and expansion plans, market trends, sales forecasting, etc. Capacity is the rate of productive capability of a facility. Capacity is usually expressed as volume of output per period of time.

Capacity planning is required for the following:

- Sufficient capacity is required to meet the customers demand in time,
- Capacity affects the cost efficiency of operations,
- Capacity affects the scheduling system,
- Capacity creation requires an investment,
- Capacity planning is the first step when an organisation decides to produce more or new products.

Capacity planning is mainly of two types:

- (i) **Long-term capacity plans** which are concerned with investments in new facilities and equipments. These plans cover a time horizon of more than two years.
- (ii) **Short-term capacity plans** which takes into account work-force size, overtime budgets, inventories etc.

Capacity refers to the maximum load an operating unit can handle. The operating unit might be a plant, a department, a machine, a store or a worker. Capacity of a plant is the maximum rate of output (goods or services) the plant can produce.

- (b) Calculate the processing time needed in hours to produce product A, B and C in the quantities demanded using the standard time data.

Product	Demand in units (p.a.)	Standard processing time per unit (Hrs.)	Processing time needed (Hrs.)
A	300	4.0	300 x 4 = 1200 Hrs.
B	400	6.0	400 x 6 = 2400 Hrs.
C	500	3.0	500 x 3 = 1500 Hrs.
			Total = 5100 Hrs

Annual production capacity of one machine in standard hours = 8×250
= 2000 hours per year

Number of machines required = Work load per year / Production capacity per machine
= $5100 / 2000$
= 2.55 machines
= 3 machines.

3. (a) Explain Process Design & Selection.

- (b) The AL service station has a central store where service mechanics arrive to take spare parts for the jobs they work upon. The mechanics wait in queue if necessary and are served on a first come first served basis. The store is manned by one attendant who can attend 10 mechanics in an hour on an average. The arrival rate of the mechanics averages 6 per hour. Assuming that the pattern of mechanics' arrivals is Poisson distribution and the servicing time is exponentially distributed, determine W_s , W_q & L_q , where the symbols vary their usual meaning. [6+10=16]

Answer:

3. (a) 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 equipment's 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) The average arrival time $\lambda = 6$, and the service time $\mu = 10$

$$S_o = \frac{\lambda}{\mu} = \frac{6}{10} = 0.6$$

$$S_o W_s = W_q + \frac{1}{\mu} = \frac{L_s}{\lambda} = \frac{1}{\mu - \lambda} = \frac{1}{10 - 6} = 0.25 \text{ hour}$$

$$W_q = \frac{L_q}{\lambda} = \frac{\lambda}{\mu(\mu - \lambda)} = \frac{6}{10(10 - 6)} = 0.15 \text{ hour}$$

$$L_q = \frac{\lambda^2}{\mu(\mu - \lambda)} = \frac{36}{10(10 - 6)} = 0.90$$

4. (a) A captain of a Women's cricket team has to allot first five batting positions to five different batsmen.

The average runs scored by each batsman at these positions are as follows:

Position of Batting						
Women Batsmen		1st	2nd	3rd	4th	5th
	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum.

- (b) Wanda's SUV Car Services is an automatic, five-minute operation with a single bay. On a typical Saturday morning, SUVs arrive at a mean rate of eight per hour, with arrivals tending to follow a Poisson distribution. Find

(i) The average number of SUVs in line.

(ii) The average time SUVs spend in line and service.

[10+6=16]

Answer:

4. (a) This is a problem of Maximisation. To solve it using Assignment technique it has to be converted to a Minimisation problem by forming a Relative Loss Matrix.

Women Batsmen	Position of Batting				
	1st	2nd	3rd	4th	5th
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

Relative Loss Matrix*

Women Batsmen	Position of Batting				
	1st	2nd	3rd	4th	5th
A	20	20	25	35	10
B	18	30	44	35	33
C	10	12	20	0	10
D	40	41	40	42	35
E	2	0	1	5	7

- * This matrix is formed by subtracting all the elements of the given matrix from the highest element (60) of it.

Row Operation Matrix

Women Batsmen	Position of Batting				
	1st	2nd	3rd	4th	5th
A	10	10	15	25	0
B	0	12	26	17	15
C	10	12	20	0	10
D	5	6	5	7	0
E	2	0	1	5	7

Column Operation Matrix

Women Batsmen \ Position of Batting	1st	2nd	3rd	4th	5th
	1st	2nd	3rd	4th	5th
A	10	10	14	25	0
B	0	12	25	17	15
C	10	12	19	0	10
D	5	6	4	7	0
E	2	0	0	5	7

Minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 \neq Order of the matrix (5). So the solution is non optimal.

Improved Matrix

Women Batsmen	Position of Batting				
	1st	2nd	3rd	4th	5th
A	10	6	10	25	0
B	0	8	21	17	15
C	10	8	15	0	10
D	5	2	0	7	0
E	6	0	0	9	11

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 5 = Order of the matrix.

So the solution is optimal.

Optimal Assignment

Women Batsmen	Position of Batting	Average runs scored
A	5th	50
B	1st	42
C	4th	60
D	3rd	20
E	2nd	60
Total =		232

Expected maximum total runs = 232

(b) Arrive Rate = $\lambda = 8$ cars per hour

Service Rate = $\mu = 1$ per 5 minutes, or 12 per hour

$$\text{Av. No. of cars waiting in line} = L_q = \frac{\lambda^2}{2\mu(\mu - \lambda)} = \frac{8^2}{2(12)(12 - 8)} = 0.667 \text{ car}$$

$$\text{Av. time SUVs spend in line and service} = W_s = \frac{L_q}{\lambda} = \frac{1}{\mu} = \frac{0.667}{8} = \frac{1}{12} = 0.167 \text{ hours, or 10 minutes.}$$

5. (a) What are the reasons behind preferring Gantt Charts?

(b) A Public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of Rs. 2,800. For a cost of Rs. 1,500 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Enumerate the suitable policy for the firm. [6+10=16]

Answer:

5. (a) Gantt charts are preferred for various reasons, which are as follows:

- Very simple to understand by everyone e.g. foreman, engineers, managers, and top management.
- Provide useful information in a format that is simple to develop and interpret.
- It is a good tool for planning as well as monitoring the progress of the work. It helps schedulers to evaluate the progress of a project at various levels.
- Helps in loading the work center in relation to the available capacity.
- It provides the user with a quick, visual indication of the actual status of each order and its anticipated or planned status.
- The scheduler could easily incorporate changes in timing, machine loads, and current status.
- Some common changes make Gantt charts fairly flexible to apply. It indicates the need for reassessing the resources incase the load at one work station becomes too much. Workforce could be temporarily adjusted to meet the high demand of the heavily loaded workstation by shifting the manpower from a relatively less loaded work center. Even multi-purpose equipment's are shifted from less loaded work centers to heavily loaded work centers.
- Gantt charts suit the requirements of a wide range of media from ruled paper to mechanical devices and computer system.

- (b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns (x)	Frequency in months (f)	Probability $p = f / \sum f$	Expected no. of breakdowns (px)
0	2	0.083	0.000
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
			Total 1.710

Expected Breakdown cost per month; Expected cost = $1.710 \times ₹ 2,800 = ₹ 4,788$.

Preventive maintenance cost per month: -	
Average cost of one breakdown/month	= ₹ 2,800
Maintenance contract cost/month	= ₹ 1,500
Total	= ₹ 4,300

Thus, preventive maintenance policy is suitable for the firm.

Section – B : Strategic Management
PART – I
Answer Question No. 6 which is compulsory

6. Choose the correct answer from the given alternatives: [1×6=6]
- (i) Which of the following is correct in case of Mckinsey's 7-s framework ?
- Structure, strategy, software, skills, styles, staff and supervision
 - Structure, strategy, systems, skills, styles, syndication and shared values
 - Structure, strategy, systems, skill, steering power, styles and shared values.
 - Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
- (ii) A strategic business unit (SBU) is defined as a division of an organization, which helps in :
- The marketing operation
 - Managers to have better control over the resources
 - The choice of technology
 - The allocation of scarce resources
- (iii) In low return industries, a competition's intensity is _____.
- Low
 - Non – existent
 - High
 - Not important

- (iv) Ansoff proposed that for filling the corporate planning gap, one should adopt four strategies, which are:
- (a) Market penetration, product differentiation, market identification and diversification
 - (b) Market penetration, product development, market identification and diversification
 - (c) Market penetration, product development, market development and diversification
 - (d) Market identification, product development, positioning and diversification
- (v) In case of an actress in Bollywood, her beautiful face would a/an
- (a) Asset
 - (b) Strategic asset
 - (c) Core competency
 - (d) Capability
- (vi) Which of the following is same as Corporate Vision?
- (a) Corporate dream
 - (b) Corporate mission
 - (c) Corporate goal
 - (d) Corporate strategy

Answer:

6. (i) (d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
(ii) (b) Managers to have better control over the resources
(iii) (c) High
(iv) (c) Market penetration, product development, market development and diversification
(v) (b) Strategic asset
(vi) (a) Corporate dream

PART - II

Answer any two questions from Q. No. 7 to 9. Each questions carries 12 Marks

7. (a) Enumerate the relationship between 'Strategy' & 'Competitive Advantage'. [2x12=24]
- (b) What do you understand by 'Strategic Management'? State the reasons why Strategic Management is important? [6+6=12]

Answer:

7. (a) A company achieves competitive advantage when it provides buyers with superior value compared to rival sellers or offers the same value at a lower cost to the firm.

The advantage is sustainable if it persists despite the best efforts of competitors to match or surpass this advantage. A company's strategy is its action plan for outperforming its competitors and achieving superior profitability. In effect, it represents a managerial commitment to an integrated array of considered choices about how to compete. These include choices about:

- (i) How to attract and please customers?
- (ii) How to compete against rivals?
- (iii) How to position the company in the market place?
- (iv) How best to respond to changing economic and market conditions?
- (v) How to capitalize on attractive opportunities to grow the business?
- (vi) How to achieve the company's performance targets?

(b) Strategic Management:

Strategic management according to Alfred D. Chandler is "determination of the basic long-term goals and objectives of an enterprise and adoption of course of action and allocation of resources necessary to carry out these goals."

Strategic Management include understanding the strategic position of an organisation, strategic choices for the future and turning strategy into action.

The strategic position is concerned with the impact on strategy of the external environment, internal resources and competences, and the expectations and influence of stakeholders.

Strategic management is a continuous process that appraises the business and industries in which the organization is involved; appraises it's competitors; and fixes goals to meet all- the present and future competitor's and then reassesses each strategy.

Importance of Strategic Management:

- (i) Discover organisation strengths and weaknesses
- (ii) Identify the available opportunities and possible threats
- (iii) Discover the objectives and goals in line with organisations strengths and available opportunities
- (iv) Implement changes to overcome weaknesses and manage the threats.
- (v) Provide vision/mission or direction to future of organisations
- (vi) Build a dynamic and strong organisation
- (vii) Help to achieve growing and stable organisation.

8. (a) What is meant by 'A strategic vision'?

(b) Describe the advantages of having a Vision?

[6+6=12]

Answer:

8. (a) A strategic vision:

A strategic vision describes management's aspirations for the future and delineates the company's strategic course and long term direction. Well conceived visions are Distinctive and specific to a particular organisation; they avoid generic, feel-good statements.

A number of organisations have summed up their visions in a brief phrase for e.g.

- ❖ Nike: 'To bring innovation and inspiration to ever athlete in the world.'
- ❖ Scotland Yard: 'to make London the safest major city in the world'

Strategic vision specifies primarily three elements:

1. Forming a mission statement that defines what business the company presently is in? And "who we are and where we are now?"
2. Using this mission statement as base to define long term path by indicating choices about "Where we are going?"
3. Finally, communicating above strategic vision in clear and committed term.

Strategic Vision has important purposes, such as:

1. Clearly provide the direction that company wants to follow
2. Identify the need of changing from existing direction or products, if stated in vision statement.
3. Create passionate environment in the organisation to steer the company with great excitement in selected direction.
4. Create creativity in every member of company to prepare company for future.
5. Promote entrepreneurship.

(b) The benefits of having a Vision:

According to Parikh and Neubauer (1993), a well construed vision can provide the following benefits:

- Good visions are inspiring and exhilarating.
- Vision represents a discontinuity, a step function and a jump ahead so that the company knows what it is to be.
- Good vision helps in the creation of a common identity and a shared sense of purpose.
- Good visions are competitive, original and unique. They make sense in the market place as they are practical.
- Good visions foster risk taking and experimentation.
- Good visions foster long term thinking
- Good visions represent integrity: they are truly genuine and can be used to the benefit of the people.

9. Write short notes on any three of the following:

[4x3=12]

- (a) Business Process Re-engineering
- (b) Environmental Analysis
- (c) Market Penetration Strategy
- (d) Boston Matrix

Answer:

(a) Business Process Re-engineering:

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 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) Environmental factors - both internal environment and external environment - are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

(c)

		Products	
		Existing	New
Markets	Existing	Market penetration	Product development
	New	Market development	Diversification <ul style="list-style-type: none">➤ Related➤ unrelated

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.

- (d) The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.