



OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed: 3 Hours

Full Marks: 100

The figures in the margin on the right side indicate full marks.

SECTION – A (Compulsory)

1. Choose the correct option:

[15 x 2 = 30]

- (i) Which of the following best describes operations management?
- a) Planning, organizing and supervising the production of goods and services
 - b) Marketing the products to customers
 - c) Financial management of the organization
 - d) Human resource management
- (ii) Just – in- time (JIT) is a philosophy that emphasizes _____.
- a) Holding large amounts of inventory
 - b) Reducing waste and improving quality
 - c) Increasing the lead time
 - d) Enhancing marketing efforts
- (iii) Which of the following is a technique used in operations management to assess performance?
- a) SWOT analysis
 - b) PERT/CPM
 - c) Market segmentation
 - d) Financial ratio analysis
- (iv) Which layout is most suitable for a factory producing a single product in large volumes?
- a) Process layout
 - b) Product layout
 - c) Fixed-position layout
 - d) Cellular layout
- (v) Total Quality Management (TQM) focuses on:
- a) Continuous improvement
 - b) Reducing production costs
 - c) Increasing the number of products
 - d) Expanding market share
- (vi) Which of the following is a principle of lean manufacturing?
- a) Maximizing inventory levels
 - b) Reducing wastes
 - c) Increasing lead times
 - d) Focusing on mass production



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- (vii) In operations management, the term 'lead time' refers to:
- Total time taken to complete a production process
 - The time between the initiation and completion of a production process
 - Time taken to market a product
 - Time taken to recruit new employees
- (viii) A steel plant has a design capacity of 70000 tons of steel per day. Effective capacity of 56000 tons of steel per day and an actual output of 47000 tons of steel per day. What is the efficiency of the plant?
- 84%
 - 73%
 - 67%
 - 80%
- (ix) Weekly demand = 100 units, Review cycle = 5 weeks
Safety stock = 25 units. Calculate the inventory turnover for the item.
- 23.8
 - 24.8
 - 18.90
 - 30.24
- (x) Porter's five forces model is used to analyze:
- Internal organizational strengths and weakness
 - Competitive forces within an industry
 - Market segmentation
 - Product life cycles
- (xi) In strategic management, what is the purpose of a mission statement?
- To outline the specific actions, the organization will take
 - To describe the company's reason for existence and core purpose
 - To provide detailed financial goals
 - To list the products and services offered by the company
- (xii) Which type of strategy focuses on gaining a competitive advantage by being the lowest cost producer?
- Differentiation strategy
 - Cost leadership strategy
 - Focus strategy
 - Diversification strategy
- (xiii) Which of the following is a strategic tool used to prioritize a company's products or services to allocate resources effectively?
- SWOT analysis
 - BCG matrix
 - PEST analysis



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d) Porter’s five forces

(xiv) Which type of strategy focuses on serving a specific market niche or segment?

- a) Cost leadership strategy
- b) Differentiation strategy
- c) Focus strategy
- d) Diversification strategy

(xv) Which of the following is not a component of strategic management?

- a) strategy formulation
- b) strategy implementation
- c) strategy evaluation
- d) strategy decentralization

Answer:

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
a	b	b	b	a	b	b	a	c	b	b	b	b	c	d

SECTION – B

(Answer any five questions out of seven questions given. Each question carries 14 marks.)

[5 x 14 = 70]

2. (a) Describe the objectives and functions served by Material Requirement Planning (MRP). [7]
- (b) Explain the process of product design and the factors affecting it. [7]

Answer:

(a) MRP Objectives:

1. Inventory reduction: MRP determines how many components are required, when they are required in order to meet the master schedule. It helps to procure the materials/components as and when needed and thus avoid excessive build up of inventory.
2. Reduction in the manufacturing and delivery lead times: MRP identifies materials and component quantities, timings when they are needed, availabilities and procurements and actions required to meet delivery deadlines. MRP helps to avoid delays in production and priorities production activities by putting due dates on customer job orders.
3. Realistic delivery commitments: By using MRP, production can give marketing timely information about likely delivery times to prospective customers.
4. Increased efficiency: MRP provides a close coordination among various work centres and hence helps to achieve an uninterrupted flow of materials through the



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production line. This increases the efficiency of production system.

Functions served by MRP:

1. Order planning and control: When to release orders and for what quantities of materials.
2. Priority planning and control: How the expected date of availability is compared to the need date for each component.
3. Provision of a basis for planning capacity requirements and developing a broad business plans.

(b) Product Design Process:

1. Market Research:- Conduct a detail market research to understand industry trends, customer needs, and competitor offerings. This involves surveys, interviews, and analyzing existing products to identify gaps and opportunities.
2. Conceptual Sketch:- Develop conceptual sketches based on research insights. These sketches will serve as an initial visual representations of ideas, helping to explore various design possibilities and directions.
3. Design Evaluation:- Evaluate the sketches made against user needs, feasibility, and market viability. This stage includes gathering feedback from stakeholders and potential users to refine concepts.
4. Rendering Effect Diagram:- Create rendering effect diagrams to visualize how the product will look in different circumstances. This will help in understanding the aestheticness and how different elements will interact visually.
5. Form Effect Diagram: -Develop form effect diagrams to examine the product's physical attributes and how user – friendly it is. This helps ensure the design is functional and comfortable for users.
6. Initial Form Model:- Build an initial form model, which can be a low-fidelity prototype. This model will allow a hands-on evaluation and further exploration of design ideas.
7. Improvement Design:- Gather feedback on the initial model and make necessary improvements. This process focuses on refining the design based on user interaction and expert input.
8. Manufacturing Documents:- Prepare a detailed manufacturing document that outlines specifications, materials, and production processes. This documentation is vital for ensuring that the product can be manufactured efficiently.
9. Handmade Model:- Create a handmade model to test the design in a physical form. This model will provide a insight into material choices, scale, and usability before moving to final production.
10. Color Management:- Develop a color management strategy to select and test colors that will enhance the product's visibility. Considerations include brand alignment, user preferences, and psychological impacts of colors.
11. Adjustment Document:- Document any adjustments made during the design process. This will include changes based on testing feedback and design evaluations, that ensures a clear record of decisions.
12. Product Graph:- Create a product graph that outlines the product's features, specifications, and performance metrics. This visual representation helps in comparing the product against the competitors.



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- 13. Modelling:- Refine the model further, incorporating the feedback received and finalizing details. This may include advanced prototyping techniques to create a realistic representation of the final product.
- 14. Final Product Design:- Conclude with the final product design, integrating all the elements from research, testing, and refinement. This version should be ready for production, addressing all user needs and market requirements.

Factors affecting the Product Design:

- 1. True understanding of the stated and unstated needs and requirements of the end customers. Sometimes it is difficult to get an idea of the unstated or latent needs. Modern day designers most often rely on social media analytics for discovering the latent needs.
 - 2. User-friendliness of the products attracts people from various demographic backgrounds.
 - 3. Striking a balance among form, function/features and cost. In other words, an appropriate balance between economies of scale and economies of scope is required.
 - 4. Quality of raw materials or basic ingredients
 - 5. Selection/design of the processes and layouts
 - 6. The quality and conditions of the machines/instruments used in the design process
 - 7. Capability and maturity of the processes
 - 8. Skilled resource persons
 - 9. Effect on the existing products
 - 10. Presentation (e.g., packaging) of the products.
3. (a) Demonstrate the importance of routine maintenance in industrial settings. Discuss the key components of an effective routine maintenance program and how they contribute to operational reliability and cost-efficiency. [7]

(b) An investigation into the use of cars in 5 towns has resulted in the following data:
Population in town

Population in town (in lakhs)	(X)	5	7	9	14	15
No. of cars	(Y)	9500	7,600	8,700	10,000	12,300

Illustrate a linear regression of Y on X and estimate the number of scooters to be found in a town with a population of 29 lakhs. [7]

Answer:

- (a) Routine maintenance is vital in industrial settings to ensure equipment reliability, minimize downtime, and optimize operational efficiency. It involves scheduled inspections, servicing, and minor repairs performed on a regular basis to prevent equipment failures and maintain peak performance levels.

Importance of Routine Maintenance:

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Routine maintenance plays a crucial role in industrial environments for several reasons:

1. Preventive Maintenance:
 - Prevents unexpected breakdowns by addressing potential issues before they escalate.
 - Enhances equipment reliability and prolongs operational lifespan.
 - Reduces the likelihood of costly emergency repairs and associated downtime.
2. Operational Reliability:
 - Ensures consistent and reliable equipment performance.
 - Minimizes disruptions to production schedules and maintains throughput.
 - Enhances product quality and customer satisfaction by reducing defects.
3. Cost-Efficiency:
 - Lowers overall maintenance costs by identifying and addressing minor issues early.
 - Optimizes spare parts inventory and reduces the need for expensive replacements.
 - Improves resource utilization and extends the useful life of machinery and equipment.

Components of an Effective Routine Maintenance Program:

An effective routine maintenance program includes the following key components:

1. Maintenance Schedule:
 - Establishes a regular timetable for inspections, lubrication, adjustments, and minor repairs.
 - Aligns maintenance activities with production schedules to minimize downtime.
2. Checklists and Procedures:
 - Defines standardized checklists and procedures for each maintenance task.
 - Ensures consistency and completeness in maintenance activities.
3. Skill Development:
 - Trains maintenance personnel on equipment-specific maintenance procedures and safety protocols.
 - Develops technical expertise to diagnose and resolve issues promptly.
4. Condition Monitoring:
 - Implements condition monitoring techniques (e.g., vibration analysis, thermal imaging) to assess equipment health.
 - Enables predictive maintenance by identifying early signs of wear or potential failures.
5. Documentation and Reporting:
 - Maintains accurate records of maintenance activities, including inspections, repairs, and parts replaced.
 - Analyzes historical data to identify trends, optimize maintenance intervals, and improve asset reliability.

Example:

An example of the effectiveness of routine maintenance can be seen in a manufacturing plant that conducts weekly inspections and lubrication of its conveyor systems. By adhering to a structured maintenance schedule and promptly addressing minor issues, the plant minimizes the risk of conveyor failures during production runs. This proactive approach ensures continuous operation, reduces unplanned downtime, and enhances overall productivity.



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In conclusion, routine maintenance is essential in industrial settings to ensure equipment reliability, operational continuity, and cost-efficiency. By implementing a well-designed routine maintenance program that includes preventive measures, standardized procedures, and condition monitoring techniques, organizations can optimize their maintenance efforts and achieve sustainable operational performance.

(b) Computation of trend value:

Population (in lakhs) X	No. of scooters demanded Y	Squares of population X ²	Product of population and No. of scooters demanded XY
5	9,500	25	47,500
7	7,600	49	53,200
9	8,700	81	78,300
14	10,000	196	1,40,000
15	12,300	225	1,84,500
$\Sigma X = 50$	$\Sigma Y = 48,100$	$\Sigma X^2 = 576$	$\Sigma XY = 5,03,500$

Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b we will have to solve the following two equations

$$\Sigma Y = na + b\Sigma X \quad \dots (i)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \quad \dots(ii)$$

By putting the values, we get

$$48,100 = 5a + 50b \quad \dots (iii)$$

$$5,03,500 = 50a + 576b \quad \dots (iv)$$

By multiplying equation no. (iii) by 10 putting as equation (v) we get,

$$4,81,000 = 50a + 500b \quad \dots (v)$$

By subtracting equation (v) from equation (iv), we get

$$22,500 = 76b$$

$$\text{Or, } b = 296$$

By substituting the value of b in equation no. (iii), we get

$$48,100 = 5a + 5b$$

$$48,100 = 5a + 50 \times 296$$

$$5a = 48,100 - 14,800$$

$$5a = 33,300$$

$$a = 6,660$$



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Now putting the values of a and b the required regression equation of Y on X, is

$$Y = a + bX$$

$$\text{or, } Y = 6660 + 296 X$$

When $X = 29$ lakhs then $Y = 6660 + 296 (29)$

$$\text{Or, } Y = 6660 + 8584$$

$$\text{Or, } Y = 15,244$$

Hence, the expected demand of cars for a town with a population of 29 lakhs will be 15,244 scooters.

4. (a) The following table contains information regarding jobs that are to be scheduled through one machine.

Job	Processing time (days)	Due date (days hence)
A	11	16
B	10	15
C	2	12
D	4	20
E	12	30
F	6	10
G	3	5

Align these jobs by (i) FCFS, (ii) SPT, (iii) LS, (iv) CR (v) LCFS and (vi) LPT and also calculate the average time delay. [7]

- (b) An automobile production line turns out about 100 cars a day, but deviations occur owing to many causes. The production is more accurately described by the probability distribution given below:

Production/Day	Prob.	Production/Day	Prob.
95	0.08	101	0.04
96	0.06	102	0.09
97	0.07	103	0.17
98	0.05	104	0.05
99	0.15	105	0.04
100	0.20		
		Total	1.00

Finished cars are transported across the bay, at the end of each day, by ferry. If the ferry has space for only 100 cars, calculate the average number of cars waiting to be shipped, and the average number of empty space on the boat. Use following Random Numbers to simulate the data provided above – 14, 56, 45, 98, 32, 47, 63, 12, 20, 18, 77, 65, 30, 08,90. [7]



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Answer:

- (a) i) Scheduling the jobs on First Come First Served (FCFS) basis will result in the following schedule:

Job sequence	Processing time (days)	Due date (day hence)	Start date	Finish date	delay
A	11	16	0	11	0
B	10	15	11	21	6
C	2	12	21	23	11
D	4	20	23	27	7
E	12	30	27	39	9
F	6	10	39	45	35
G	3	5	45	48	43

Start date of Job A = 0, Finish Date of Job A = 0 + processing time

Start date of subsequent job = Finish date of preceding job.

Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (11 + 21 + 23 + 27 + 39 + 45 + 48) = 214days

From the above table it is clear that Job A is completed in time. Jobs B, C, D, E, F, G are delayed and average delay time is

$$\frac{(0 + 6 + 11 + 7 + 9 + 35 + 43)}{7} = 15.86 \text{ days}$$

- ii) Shortest Processing Time (SPT) method schedules jobs according to their operations time running the one with the shortest operations time first. The result is shown below:

Job sequence	Processing time (days)	Due date (day hence)	Job scheduled first	Start date	Finish date	delay
A	11	16	C	0	2	0
B	10	15	G	2	5	0
C	2	12	D	5	9	0
D	4	20	F	9	15	5
E	12	30	B	15	25	10
F	6	10	A	25	36	20
G	3	5	E	36	48	18

Job C is having the least processing time (2) followed by G(3),D(4),F(6),B(10),A(11) and E(12)

Start date of Job C = 0, Finish Date of Job C = 0 + processing time

Start date of subsequent job = Finish date of preceding job.



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Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (2 + 5 + 9 + 15 + 25 + 36 + 48) = 140days

From the above table it is clear that Jobs C, G and D are completed in time. Jobs F, B, A, E are delayed and average delay time is

$$\frac{(0 + 0 + 0 + 5 + 10 + 20 + 18)}{7} = 7.57 \text{ days}$$

iii) Least slack (LS) method schedules job on slack time basis with job with least slack time scheduled first.

Slack Time Remaining of a job = (Due date- Today's Date) – Processing time

The result under this method is shown below

Job sequence	Processing times(days)	Due date (day hence)	Slack time remaining	Job schedule first	Start date	Finish date	delays
A	11	16	5	G	0	3	0
B	10	15	5	F	3	9	0
C	2	12	10	B	9	19	4
D	4	20	16	A	19	30	14
E	12	30	18	C	30	32	20
F	6	10	4	D	32	36	16
G	3	5	2	E	36	48	18

Job G is having the least slack time remaining (2) followed by F(4),B(5),A(5),C(10),D(16) and E(18)

Start date of Job G = 0, Finish Date of Job G = 0 + processing time

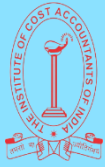
Start date of subsequent job = Finish date of preceding job.

Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (3 + 9 + 19 + 30 + 32 + 36 + 48) = 177days

Slack time remaining for Job A and B are equal. We have chosen B first than A, as B has less processing time than that required by A. If A is chosen first then Average delay time will come



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around 10.42 days

From the above table it is clear that Jobs G, F are completed in time. Jobs B, A, C, D, E are delayed and average delay time is:

$$\frac{(0 + 0 + 4 + 14 + 20 + 16 + 18)}{7} = 10.29 \text{ days}$$

iv) Critical Ratio (CR) schedules job with least critical ratio first.

$$\text{Critical Ratio of a job} = \frac{\text{Due Date} - \text{Today's Date}}{\text{Remaining Processing time}}$$

Under this method the result is given below:

Job sequence	Processing time (days)	Due date (day hence)	Critical ratio	Job scheduled first	Start date	Finish date	delay
A	11	16	1.45	A	0	11	0
B	10	15	1.50	B	11	21	6
C	2	12	6.00	G	21	24	19
D	4	20	5.00	F	24	30	20
E	12	30	2.50	E	30	42	12
F	6	10	1.67	D	42	46	26
G	3	5	1.67	C	46	48	36

Job A is having the least CR (1.45) followed by B(1.50),G(1.67),F(1.67),E(2.5),D(5) and C(6)

Start date of Job A = 0, Finish Date of Job A = 0 + processing time

Start date of subsequent job = Finish date of preceding job.

Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (11 + 21 + 24 + 30 + 42 + 46 + 48) = 222days

CR for Job F and G are equal. We have chosen G first than F, as G has less processing time than that required by F. If F is chosen first then Average delay time will come around 17.43 days

From the above table it is clear that Job A is completed in time. Jobs B,G, F, E, D and C are delayed and average delay time is

$$\frac{(0 + 6 + 19 + 20 + 12 + 26 + 36)}{7} = 17 \text{ days}$$

v) Last Come First Served (LCFS) schedules jobs on last come first served basis assuming jobs arrive in alphabetic order i.e. A came first and G came last. The result is given below:



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Job sequence	Processing time (days)	Due date (day hence)	Job scheduled first	Start date	Finish date	delay
A	11	16	G	0	3	0
B	10	15	F	3	9	0
C	2	12	E	9	21	0
D	4	20	D	21	25	5
E	12	30	C	25	27	15
F	6	10	B	27	37	22
G	3	5	A	37	48	32

Start date of Job G = 0, Finish Date of Job G = 0 + processing time

Start date of subsequent job = Finish date of preceding job.

Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (3 + 9 + 21 + 25 + 27 + 37 + 48) = 170days

From the above table it is clear that Jobs G, F & E are completed in time. Jobs D, C, B, A are delayed and average delay time is

$$\frac{(0 + 0 + 0 + 5 + 15 + 22 + 32)}{7} = 10.57 \text{ days}$$

vi) Longest Process Time (LPT) schedules jobs with job having longest processing time scheduled first. The result is as follows:

Job sequence	Processing time (days)	Due date (day hence)	Job scheduled first	Start date	Finish date	delay
A	11	16	E	0	12	0
B	10	15	A	12	23	7
C	2	12	B	23	33	18
D	4	20	F	33	39	29
E	12	30	D	39	43	23
F	6	10	G	43	46	41
G	3	5	C	46	48	36

Start date of Job E = 0, Finish Date of Job E = 0 + processing time

Start date of subsequent job = Finish date of preceding job.

Finish date of subsequent job = Start date + Processing time.

Delay of a job = Finish date – Due date.

Flow time = (12 + 23 + 33 + 39 + 43 + 46 + 48) = 244days

From the above table it is clear that Job E is completed in time. Jobs A, B, F, D, G and C are delayed and average delay time is:



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$$\frac{(0 + 7 + 18 + 29 + 23 + 41 + 36)}{7} = 22 \text{ days}$$

(b) Simulation data of an automobile production line

Production/ day	probability	Cumulative probability	Random no. range
95	0.08	0.08	00-07
96	0.06	0.14	08-13
97	0.07	0.21	14-20
98	0.05	0.26	21-25
99	0.15	0.41	26-40
100	0.20	0.61	41-60
101	0.04	0.65	61-64
102	0.09	0.74	65-73
103	0.17	0.91	74-90
104	0.05	0.96	91-95
105	0.04	1.00	96-99
	1.00		

Day	Random no.	Production	No. of cars waiting to be shipped	No. of empty space on the boat
1	14	97	-	3
2	56	100	-	-
3	45	100	-	-
4	98	105	5	-
5	32	99	-	1
6	47	100	-	-
7	63	101	1	-
8	12	96	-	4
9	20	97	-	3
10	18	97	-	3
11	77	103	3	-
12	65	102	2	-
13	30	99	-	1
14	8	96	-	4
15	90	103	3	-
	total		14	19

No. of cars waiting to be shipped = $14/15 = 0.933$ per day.

No. of empty space in the boat = $19/15 = 1.266$ per day.



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5. (a) A firm is using a machine whose purchase price is ₹37,000. The installation charges is ₹ 5,200 and the machine has a scrap value of only ₹5,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance Cost ₹	970	1,060	1,400	2,100	2,900	3,700	4,100	4,700	7,500

Calculate after how many years the machine should be replaced on economic considerations, assuming that the machine replacement can be done only at the year end. [7]

- (b) Prepare a network diagram from the data given below and find: [7]

- Total duration of the project
- Critical Path
- EST, EFT, LST, LFT
- Total float of each activity

Activity	A	B	C	D	E	F	G	H	I	J
Duration	15	15	3	5	8	12	1	14	3	14
Predecessor Activity	-	-	B	A,C	A	B	D	D	F,G	E,H,I

Answer:

- (a) Cost of machine, C = ₹37,000 + ₹5,200 = ₹42,200

Scrap value, S = ₹5,500

Year	Maintenance cost (₹)	Cumulative maintenance (₹)	Cost of machine – scrap value (₹)	Total cost (₹)	Actual cost (₹)
1	970	970	36700	37670	37670
2	1060	2030	36700	38730	19365
3	1400	3430	36700	40130	13376
4	2100	5530	36700	42230	10557
5	2900	8430	36700	45130	9026
6	3700	12130	36700	48830	8138
7	4100	16230	36700	52930	7561
8	4700	20930	36700	57630	7203
9	7500	28430	36700	65130	7236

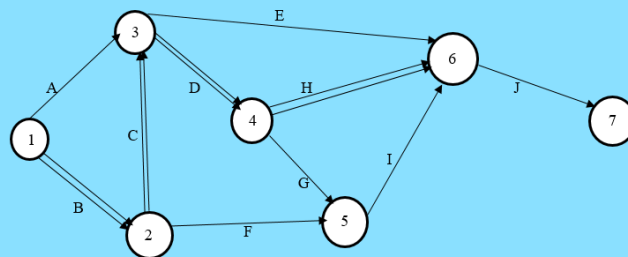
Lowest average cost is ₹7,203 approx., which corresponds to n = 8 in above table. Thus machine needs to be replaced every 8th year.

- (b)



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Activity (i-j)	Time (tij)	Earliest Start (ESTij)	Earliest Finish (EFTij = ESTij + tij)	Latest Start (LSTij = LFTij-tij)	Latest Finish (LFTij)	Total Float (TFij = LSTij - ESTij = LFTij - EFTij)
A(1-3)	15	0	15	3	18	15
B (1-2)	15	0	15	0	15	0
C(2-3)	3	15	18	15	18	0
D (3-4)	5	18	23	18	23	0
E (3-6)	8	18	26	29	37	11
F(2-5)	12	15	27	10	22	5
G (4-5)	1	23	24	21	22	2
H (4-6)	14	23	37	23	37	0
I (5-6)	3	27	30	34	37	7
J (6-7)	14	37	51	37	51	0



Critical Path 1-2-3-4-6-7

Critical Activity: B -C -D -H-J.

6. (a) Explain the objectives of strategic management. [7]
- (b) Describe the emerging trends in digital and social marketing strategies with examples. [7]



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Answer:

(a) The objectives of strategic management are:

- To identify opportunities and adapt resources to exploit the opportunities created.
- To create opportunities by stretching the resources and competences of the organisation and capitalise them.
- To help managers to understand the key relationships among actions, context, and performance by providing the conceptual frameworks.
- To help an organisation enjoy competitive advantage.
- To sustain and improve the competitive position by the deployment and acquisition of appropriate resources and by monitoring and responding to environmental changes.
- To monitor and remain responsive to the demands of key stakeholders.
- To identify the critical success factors and meet the needs and wants of the customers.
- To avoid failure by focusing on the building blocks of competitive advantage (superior efficiency, superior quality, superior innovation and superior responsiveness to customers), instituting continuous improvement and learning, tracking the best industrial practices and using benchmarking.
- To overcome inertia and accept the changes in the ever-changing environment to remain competitive and at times to survive.
- To develop a creative and innovative attitude and to think strategically.

(b)

- Artificial Intelligence:

Artificial intelligence (AI) is intelligence exhibited by machines and systems, with machines imitating functions which are mostly related with human cognition.

Example:- Razorpay:-

Razorpay is a payment solution in India that helps companies with its suite of products to receive, process, and disburse payments. It gives you access to all payment modes, including JioMoney, Mobikwik, Airtel Money, FreeCharge, Ola Money, and PayZapp, including credit card, debit card, net banking, UPI, and common wallets.

- Blockchain: Blockchain is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible or intangible. Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved.

Example:- Tea Board of India to use blockchain

Blockchain technology will record all the details pertaining to procurement, manufacturing and delivery of the end product. The Tea Board of India is also looking into the digitisation of the tea trade. Blockchain will enable customers to trace the origin of tea back to the plantation and record any cases of adulteration if any.

- Robotic Process Automation: Robotic Process Automation (RPA) is a form of business process automation that allows anyone to define a set of instructions for a robot or 'bot' to perform. RPA bots are capable of mimicking most human-computer interactions to



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carry out a ton of error-free tasks, at high volume and speed. Robotic process automation is not a physical or mechanical robot. RPA is the process by which a software bot uses a combination of automation, computer vision, and machine learning to automate repetitive, high-volume tasks that are rule-based and trigger-driven. Robotic process automation tools are best suited for processes with repeatable, predictable interactions with IT applications. These processes typically lack the scale or value to warrant automation via IT transformation.

- Internet of Things: The internet of things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

Example:-

- Smart Lighting

This is another one of the Internet of Things examples that have gradually been coming into common usage. Bulbs and batteries connected to Wifi can be turned on and off remotely

- Smart Parking

The use of IoT in such facilities for counting the number of cars that have driven into the facility and the number that have driven out. Specific devices can also give you the exact location where you have parked your car so you are not lost.

- Machine learning and analytics: With advances in machine learning and analytics, along with access to varied and vast amounts of data stored in the cloud, businesses can gather insights faster and more easily. The emergence of these allied technologies continues to push the boundaries of IoT and the data produced by IoT also feeds these technologies.
- Cloud computing platforms: The increase in the availability of cloud platforms enables both businesses and consumers to access the infrastructure they need to scale up without actually having to manage it all.

7. (a) **The PESTEL framework categorises environmental influences into six main types: political, economic, social, technological, environmental and legal. Politics highlights the role of governments. Discuss.** [7]

- (b) **Discuss the Porter's Five Forces Framework.** [7]

Answer:

- (a) The PESTEL framework categorises environmental influences into six main types: political, economic, social, technological, environmental and legal. Politics highlights the role of governments.

- Political processes shape a society's laws, which constrain the operations of organisations and managers and thus create both opportunities and threats. Political instability creates adverse conditions for the businesses to function. Investors rarely want to invest in countries where there is political turmoil and this in turn can be detrimental to the businesses in those regions. On



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the other hand, political stability and favourable government attitude towards businesses can create a lot of opportunities and is considered to be a favourable business environment.

- Macroeconomic forces affect the general health and well-being of a nation or the regional economy of an organisation which in turn affect companies' and industries' ability to earn an adequate rate of return. The four most important macroeconomic forces are the growth rate of the economy, interest rates, currency exchange rates, and inflation (or deflation) rates.
 - Economic growth tends to ease competitive pressures within an industry as it leads to an expansion in customer expenditures. This gives companies the opportunity to expand their operations and earn higher profits. On the other hand economic decline (a recession) increases competitive pressures as leads to a reduction in customer expenditures.
 - Interest rates can determine the demand for a company's products. Interest rates are important whenever customers routinely borrow money to finance their purchase of these products. Interest rates are also important because they influence a company's cost of capital, and therefore its ability to raise funds and invest in new assets. The lower the interest rates the lower the cost of capital for companies and more opportunities for investment.
 - Currency exchange rates define the comparative value of different national currencies. Movement in
 - currency exchange rates has a direct impact on the competitiveness of a company's product.
 - Price inflation can destabilise the economy, producing slower economic growth, higher interest rates, and volatile currency movements. If inflation continues to increase, investment planning will become hazardous. The key characteristic of inflation is that it makes the future less predictable. Price deflation also has a destabilizing effect on economic activity. If prices fall, the real price of fixed payments goes up. This is damaging for companies and individuals with a high level of debt who must make regular fixed payments on that debt.
- Social influences include changing cultures and demographics. Demographic forces are outcomes of changes in the characteristics of a population, such as age, gender, ethnic origin, race, sexual orientation, and social class. Like the other forces in the general environment, demographic forces present managers with opportunities and threats and can have major implications for organisations.
- Technological influences refer to innovations such as artificial intelligence, internet, nano-technology, or the rise of new composite materials.
- Environmental stands specifically for 'green' issues, such as pollution and waste. The environmental factors have now become extremely important for organisations as countries across the globe are increasingly concerned with the environmental changes and are striving towards clean, green and renewable sources of energy. The disposal of e-waste and global warming are also very important causes of concern. Organisations need to be more environment friendly.
- Finally, legal embraces legislative constraints or changes, such as health and safety legislation or restrictions on company mergers and acquisitions.



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(b)

- Risk of Entry by Potential Competitors:

Potential competitors are companies that are not currently competing in an industry, but have the capability to do so if they choose. A high risk of entry by potential competitors represents a threat to the profitability of established companies. The greater the costs potential competitors must bear to enter an industry, the greater the barriers to entry, and the weaker this competitive force. High entry barriers may keep potential competitors out of an industry even when industry profits are high.

- Rivalry Among Established Companies:

The second competitive force is the intensity of rivalry among established companies within an industry. Rivalry refers to the competitive struggle between companies within an industry to gain market share from each other. The competitive struggle can be fought using price, product design, advertising and promotional spending, direct-selling efforts, and after-sales service and support. Four factors have a major impact on the intensity of rivalry among established companies within an industry: (1) industry competitive structure, (2) demand conditions, (3) cost conditions, and (4) the height of exit barriers in the industry.

- The Bargaining Power of Buyers:

The third competitive force is the bargaining power of buyers. An industry's buyers may be the individual customers who consume its products (end-users) or the companies that distribute an industry's products to end-users, such as retailers and wholesalers. The bargaining power of buyers refers to the ability of buyers to bargain down prices charged by companies in the industry, or to raise the costs of companies in the industry by demanding better product quality and service. By lowering prices and raising costs, powerful buyers can squeeze profits out of an industry. Powerful buyers, therefore, should be viewed as a threat.

- The Bargaining Power of Suppliers:

The fourth competitive force is the bargaining power of suppliers—the organisations that provide inputs into the industry, such as materials, services, and labour (which may be individuals, organisations such as labour unions, or companies that supply contract labour). The bargaining power of suppliers refers to the ability of suppliers to raise input prices, or to raise the costs of the industry in other ways for e.g., by providing poor-quality inputs or poor service. Powerful suppliers squeeze profits out of an industry by raising the costs of companies in the industry. Thus, powerful suppliers are a threat.

- The final force in Porter's model is the threat of substitute products:

the products of different businesses or industries that can satisfy similar customer needs. The existence of close substitutes is a strong competitive threat because this limits the price that companies in one industry can charge for their product, which also limits industry profitability. If the price of coffee rises too much relative to that of tea or soft drinks, coffee drinkers may switch to those substitutes.

If an industry's products have few close substitutes (making substitutes a weak competitive force), then companies in the industry have the opportunity to raise prices and earn additional profits.



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8. (a) Discuss the formulation of strategy with respect to the functional areas namely production, supply chain and marketing. [7]

(b) Discuss the types of general control systems. [7]

Answer:

(a)

1. Production system:

The production system is concerned with the capacity, location, layout, product or service design, work systems, degree of automation, extent of vertical integration and such factors.

- Plans and policies related to production system are significant as they deal with vital issues affecting the capability of the organisation to achieve its objectives.
- Strategy implementation would have to take into account the production system factors. It should be noted that any decision on production system factors would have a long lasting influence on the operations capability of an organisation and its ability to implement strategies and achieve objectives.
- Production strategy determines how and where a product or service manufactured, the level of vertical integration in the production processes, the deployment of physical resources, and relationships with suppliers.
- It should also deal with the optimum level of technology that the firm should use in its operations processes.
- A firm's production strategy is often affected by a product's life cycle. As the sales of the product increase, there will be an increase in the production volume ranging from lot sizes as low as one in a job shop through connected line batch flow to lot sizes as high as 100000 or more per year for flexible manufacturing systems and dedicated transfer lines.
- According to the concept, the product becomes standardised in to a commodity over time in conjunction with increasing demand. Flexibility thus gives way to efficiency.
- Increasing competitive intensity in many industries has forced companies to switch from traditional mass production using dedicated transfer lines to a continuous improvement production strategy.
- A mass production system was an excellent method to produce large number of low cost, standard goods and services.

2. Supply Chain Strategy

- The term supply chain management refers to the task of managing the flow of inputs and components from suppliers into the company's production processes to minimize inventory holding and maximize inventory turnover.
- The contribution of materials management (logistics) to boosting the efficiency of a company can be just as dramatic as the contribution of production and marketing.
- Materials management encompasses the activities necessary to get inputs and



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components to a production facility (including the costs of purchasing inputs), through the production process, and out through a distribution system to the end-user. Because there are so many sources of cost in this process, the potential for reducing costs through more efficient materials management strategies is enormous. For a typical manufacturing company, materials and transportation costs account for 50 to 70% of its revenues, so even a small reduction in these costs can have a substantial impact on profitability.

- In a typical competitive market, reducing materials costs by 3% is usually much easier than increasing sales revenues by 30%.
- The major cost saving comes from increasing inventory turnover, which reduces inventory holding costs, such as warehousing and storage costs, and the company's need for working capital
- Wal-Mart can replenish the stock in its stores at least twice a week; many stores receive daily deliveries if they are needed through efficient logistics. The typical competitor replenishes its stock every 2 weeks, so it must carry a much higher inventory, which requires more working capital per dollar of sales. Compared to its competitors, Wal-Mart can maintain the same service levels with a lower investment in inventory, a major source of its lower cost structure. Thus, faster inventory turnover has helped Wal-Mart achieve an efficiency-based competitive advantage in the retailing industry.
- More generally, in terms of the profitability model developed, JIT inventory systems reduce the need for working capital (because there is less inventory to finance) and the need for fixed capital to finance storage space (because there is less to store), which reduces capital needs, increases capital turnover, and, by extension, boosts the return on invested capital.

3. Marketing Strategy

- The marketing strategy that a company adopts can have a major impact on efficiency and cost structure.
- Marketing strategy refers to the position that a company takes with regard to market segmentation, pricing, promotion, advertising, product design, and distribution.
- Some of the steps leading to greater efficiency are fairly obvious. For example, moving down the experience curve to achieve a lower cost structure can be facilitated by aggressive pricing, promotions and advertising all of which are the task of the marketing function.
- Other aspects of marketing strategy have a less obvious but no less important impact on efficiency. One important aspect is the relationship of customer defection rates, cost structure, and unit costs.
- Customer defections (or 'churn rates') are the percentage of a company's customers who defect every year to competitors.
- Defection rates are determined by customer loyalty, which in turn is a function of the ability of a company to satisfy its customers.
- Because acquiring a new customer often entails one-time fixed costs, there is a direct



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relationship between defection rates and costs. For example, when a wireless service company signs up a new subscriber, it has to bear the administrative costs of opening up a new account and the cost of a subsidy that it pays to the manufacturer of the handset the new subscriber decides to use.

- There are also the costs of advertising and promotions designed to attract new subscribers.
- The longer a company retains a customer, the greater the volume of customer generated unit sales that can be set against these fixed costs, and the lower the average unit cost of each sale.
- Thus, lowering customer defection rates allows a company to achieve a lower cost structure
- Because of the relatively high fixed costs of acquiring new customers, serving customers who stay with the company only for a short time before switching to competitors often leads to a loss on the investment made to acquire those customers.
- The longer a customer stays with the company, the more the fixed costs of acquiring that customer can be distributed over repeat purchases, boosting the profit per customer.
- Thus, there is a positive relationship between the length of time that a customer stays with a company and profit per customer.
- If a company can reduce customer defection rates, it can make a much better return on its investment in acquiring customers, and thereby boost its profitability.
- Another economic benefit of long-time customer loyalty is the free advertising that customers provide for a company.
- Loyal customers can dramatically increase the volume of business through referrals.

(b)

1. Personal Control:

- Personal control is the desire to shape and influence the behaviour of a person in a face-to-face interaction in the pursuit of a company's goals.
- The most obvious kind of personal control is direct supervision from a manager farther up in the hierarchy.
- The personal approach is useful because managers can question subordinates about problems or new issues they are facing to get a better understanding of the situation and to ensure that subordinates are performing their work effectively and that they are not hiding any information that could cause additional problems later.

2. Output Control:

- Output control specifies what is to be accomplished by focusing on the end result.
- It is a system in which strategic managers estimate or forecast appropriate performance goals for each division, department, and employee, and then measure actual performance relative to these goals.



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- It is important to understand that these controls are appropriate when specific output measures have been agreed upon.
- Often a company's reward and incentive system is linked to performance on these goals, so output control also provides an incentive structure for motivating employees at all levels in the organization.
- Functional managers establish goals that individual employees are expected to achieve to allow the function to meet its goals. Sales personnel, for example, can be given specific goals (related to functional goals) that they are required to achieve. Functions and individuals are then evaluated based on whether or not they are achieving their goals; in sales, compensation is commonly anchored by achievement.
- The achievement of goals is a sign that the company's strategy is working and meeting the organization's wider objectives.
- The inappropriate use of output control can promote conflict among divisions.
- In general, setting across-the-board output targets, such as ROIC targets for divisions, can lead to destructive results if divisions single-mindedly try to maximize divisional ROIC at the expense of corporate ROIC.
- Moreover, to reach output targets, divisions may start to distort the numbers and engage in strategic manipulation of the figures to make their divisions look good—which increases bureaucratic costs.

3. Behaviour Control:

Behaviour control is control achieved through the establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions, and individuals. The intent of behaviour controls is not to specify the goals but to standardize the way or means of reaching them. Rules standardize behaviour and make outcomes predictable. If employees follow the rules, then actions are performed and decisions are handled the same way time and time again. The result is predictability and accuracy, the aim of all control systems. The primary kinds of behaviour controls are operating budgets, standardization, and rules and procedures.

4. Strategic controls:

There are four types of strategic controls:

- Premise Control: Strategy is built around several assumptions or predictions, which are called planning premises.
 - Premise control checks systemically and continuously whether the assumptions on which the strategy is based are still valid.
 - If a vital premise is no longer valid, the strategy may have to change. The sooner these invalid assumptions are detected and rejected, the better are the chances of changing the strategy.
 - The premise control is concerned with two types of factors namely environmental factor and industry factors.



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- A firm's performance is affected by changes in environmental factors like the rate of inflation, government regulations, social changes etc. Although the firm has little of no control over environmental factors, these factors have considerable influence over the success of the strategy because strategies are generally based on key assumptions about them.
- Industry factors also affect the performance of a company. Competitors, suppliers, buyers, substitutes, new entrants, etc. are some of the industry factors about which assumptions are made.
- If any of these assumptions go wrong, strategy may have to be changed.
- **Strategic Surveillance:** Strategic surveillance is a broad-based vigilance activity in all daily operations both inside and outside the organization. With such vigilance, the events that are likely to threaten the course of a firm's strategy can be tracked. Business journals, trade conferences, conversations observations etc. are some of the information sources for strategic surveillance
- **Special Alert Control:** Sudden, unexpected events can drastically alter the course of the firm's strategy. Such events trigger an immediate and intense reconsideration of the firm's strategy. Generally, firms develop contingency plans along with crisis teams to respond to such sudden, unexpected events.
- **Implementation Control:** Strategy implementation takes place as a series of steps, programmes, investments and moves that occur over an extended period. Resources are allocated, essential people are put in place, special programmes are undertaken and functional areas initiate strategy related activities.
 - Implementation control is aimed at assessing whether the plans, programmes and policies are actually guiding the organisation towards the predetermined objectives or not.
 - Implementation control assesses whether the overall strategy should be changed in the light of the results of specific units and individuals involved in implementation of the strategy.
 - Two important methods to achieve implementation control are monitoring strategic thrusts and milestone review.
 - Monitoring Strategic Thrusts are small critical projects that need to be done if the overall strategy is to be accomplished. They are critical success factors in the success of strategy.
 - Milestones are critical events that should be reached during strategy implementation. These milestones may be fixed on the basis of critical events, major resource allocation and time frames. Network controls like PERT/CPM for project implementation are examples of milestone reviews.
 - After doing a milestone review, managers often undertake a full scale reassessment of the strategy to decide whether to continue or refocus the firm's strategy.
 - Implementation control is also done through operational control systems like budgets, schedules, key success factors etc.