Skillshort

Self-Study Preparation Pack

CMA INTERMEDIATE

Paper 9: Operations Management and Strategic Management (OMSM)

Mock Test 1 – Full Paper with Model Answers

ICMAI Syllabus 2022 pattern: 100 marks · 3 hours · Section A – 15 MCQs × 2 (compulsory) · Section B – any 5 of Q2–Q8 (14 marks each) · Original Skillshort questions, numericals verified in Python

Time: 3 hours | Max marks: 100 | No negative marking | Model answers follow the paper

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This subject pack has 6 parts

1 Chapter-wise notes

2 Important topics & weightage

3 Past papers: trends & links

4 Mock tests + solutions

5 Chapter practice questions

6 Last-week plan & strategy

Prepared by Skillshort for self-study. Original explanations and questions; not an official ICAI/ICMAI/ICSI publication. Items marked VERIFY should be checked against the latest official material.

Section A – Multiple Choice Questions (30 marks)

Q1. Choose the correct option (2 × 15 = 30).

1. A product (line) layout is most suitable for
(a) Job-shop production
(b) Mass production of standard items
(c) Ship building
(d) Research laboratories

2. Last forecast 200 units, actual demand 240 units, α = 0.25. The next forecast by exponential smoothing is
(a) 210 (b) 220
(c) 230 (d) 240

3. Annual demand 7,200 units, ordering cost ₹100 per order, carrying cost ₹4 per unit per year. The EOQ is
(a) 400 units (b) 600 units
(c) 720 units (d) 800 units

4. Three work centres in series have capacities of 300, 250 and 280 units per day. Actual output is 200 units per day. System efficiency is
(a) 66.7% (b) 71.4%
(c) 80% (d) 90%

5. A unit with 50 workers produces 1,500 units a month. Labour productivity per worker per month is
(a) 25 units (b) 30 units
(c) 35 units (d) 300 units

6. The ISO model for quality assurance in design, development, production, installation and servicing is
(a) ISO 9001 (b) ISO 14001
(c) ISO 45001 (d) ISO 27001

7. Production control in which output is planned in blocks of a given size, as in textiles and printing, is
(a) Flow control (b) Order control
(c) Block control (d) Load control

8. For a PERT activity a = 3, m = 6 and b = 15 days. Expected time is
(a) 6 days (b) 7 days
(c) 8 days (d) 8.5 days

9. In an M/M/1 queue λ = 12 per hour and μ = 15 per hour. The average number waiting in the queue (Lq) is
(a) 0.8 (b) 2.4
(c) 3.2 (d) 4.0

10. The work breakdown structure (WBS) is developed in the
(a) Initiation phase (b) Planning phase
(c) Execution phase (d) Closure phase

11. In the BCG matrix, a business with high market growth and low relative market share is a
(a) Star (b) Cash cow
(c) Question mark (d) Dog

12. Which of the following is associated with a blue ocean strategy?

(a) Beat the competition
(b) Exploit existing demand
(c) Make the competition irrelevant
(d) Make the value–cost trade-off

13. In Porter's value chain, collecting, storing and physically distributing the product to buyers is

(a) Inbound logistics
(b) Operations
(c) Outbound logistics
(d) Procurement

14. A voice assistant that only answers spoken queries is an example of

(a) Narrow AI
(b) General AI
(c) Super AI
(d) Human-level AI

15. In SMART objectives, "A" stands for

(a) Accurate
(b) Achievable (attainable)
(c) Aggressive
(d) Annual

Section A – Answer key with reasons

Q	Ans	Explanation / working
1	(b)	Product layout arranges machines in the **sequence of operations** – ideal for high-volume, standardised output.
2	(a)	F = 200 + 0.25 × (240 − 200) = **210**.
3	(b)	√(2 × 7,200 × 100 ÷ 4) = √3,60,000 = **600 units**.
4	(c)	System capacity = the **bottleneck** (250). Efficiency = 200 ÷ 250 = **80%**.
5	(b)	1,500 ÷ 50 = **30 units** per worker.
6	(a)	**ISO 9001** – quality management systems. ISO 14001 is environment, ISO 45001 occupational health and safety, ISO 27001 information security.
7	(c)	**Block control** – common in textiles, book and magazine printing.
8	(b)	(3 + 4 × 6 + 15) ÷ 6 = 42 ÷ 6 = **7 days**.
9	(c)	$L_q = \lambda^2 \div [\mu(\mu - \lambda)] = 144 \div (15 \times 3) =$ **3.2**.
10	(b)	WBS breaks the scope into work packages during **project planning**.
11	(c)	**Question mark** (problem child) – needs cash; invest selectively or divest.
12	(c)	Blue ocean strategy **makes the competition irrelevant** by creating uncontested market space; (a), (b) and (d) describe red oceans.
13	(c)	**Outbound logistics**. Inbound logistics receives and stores inputs; procurement is a support activity.
14	(a)	It performs a single, defined task – **narrow (weak) AI**.
15	(b)	Specific, Measurable, **Achievable**, Relevant, Time-bound.

Section B – Descriptive Questions (70 marks)

Answer any five of Questions 2 to 8 (14 marks each). Working notes form part of the answer.

Q2 (a) (7 marks). Analyse the factors that affect the selection of a facility location.

(b) (7 marks). Distinguish between job, batch, mass and continuous (process) production, with one example of each.

Q3 (a) (7 marks). Explain the six types of production control and state where each is used.

(b) (7 marks). Shree Foods Ltd. records its monthly advertising spend (X, ₹ lakh) and sales (Y, ₹ lakh):

X	2	4	6	8	10
Y	30	38	50	56	66

(i) Fit the regression line of Y on X. (ii) Estimate sales when advertising is ₹12 lakh. (iii) Estimate the advertising needed for sales of ₹75 lakh using the same line.

Q4 (a) (7 marks). Four jobs (J1–J4) are to be given to four contractors (A–D), one job each. Tender amounts (₹ '000):

Contractor	J1	J2	J3	J4
A	18	24	28	32
B	8	13	17	19
C	10	15	19	22
D	24	30	32	28

Assign the jobs to minimise total cost and state the cost.

(b) (7 marks). Daily demand for a perishable item over 100 days:

Demand (units)	20	21	22	23	24
Days	10	20	40	20	10

Using the random numbers 08, 47, 92, 63, 25, 71, 36, 55, 84, 17, simulate demand for 10 days and find the average daily demand. Compare it with the expected demand.

Q5 (a) (7 marks). A plant has 500 sensors. Failure probabilities by week of life: week 1 – 0.05, week 2 – 0.15, week 3 – 0.30, week 4 – 0.35, week 5 – 0.15. Individual replacement costs ₹20 per sensor; group replacement costs ₹6 per sensor. Failures are replaced at the end of the week. Find the best replacement policy.

(b) (7 marks). A project has the following activities (weeks):

Activity	1-2	1-3	2-4	3-4	2-5	4-5
Optimistic	2	3	4	2	5	5
Most likely	4	6	6	5	8	7
Pessimistic	6	15	8	8	11	9

(i) Find the expected time and variance of each activity. (ii) Identify all paths and the critical path. (iii) Find the probability of completing the project within 22 weeks.

Q6 (a) (7 marks). Explain the three levels of strategy in an organisation.

(b) (7 marks). Explain the PESTEL framework with an example of each factor.

Q7 (a) (7 marks). Explain the BCG growth-share matrix and state its limitations.

(b) (7 marks). Describe the primary and support activities of Porter's value chain.

Q8 (a) (7 marks). What is blockchain? Explain its features and two business applications.

(b) (7 marks). Explain the steps in a business process re-engineering (BPR) programme.

Model Answers – Section B

SOLUTION Q2(a) Factors affecting facility location

- **Proximity to markets** – lowers distribution cost and delivery time; vital for perishable goods and services.
- **Availability of raw materials** – heavy or perishable inputs (cement, sugar) pull plants near sources.
- **Labour** – availability, skills, wage levels and labour relations.
- **Transport and infrastructure** – road, rail, port and air links; power and water supply; communication.
- **Government policy** – tax incentives, SEZs, subsidies, industrial licensing, backward-area benefits.
- **Land and construction cost** and scope for expansion.
- **Climate and environment** – pollution norms, waste disposal, community attitude.
- **Ancillary industries and services** – suppliers, banks, repair shops.
- **Competition and agglomeration** – clusters give shared skills and suppliers.

Methods used: factor-rating, locational break-even analysis and the centre-of-gravity method.

SOLUTION Q2(b) Types of production

Basis	Job	Batch	Mass	Continuous (process)
Volume and variety	One-off, high variety	Medium volume, medium variety	High volume, low variety	Very high volume, one product
Equipment	General purpose	General + some special	Special purpose, line	Highly automated, integrated
Layout	Process	Process/cellular	Product	Product (flow)
Workers	Highly skilled	Semi-skilled	Semi-skilled, repetitive	Few, monitoring
Unit cost	Highest	Medium	Low	Lowest
Example	Ship, custom machine	Bakery, medicines	Cars, TVs	Oil refinery, cement, chemicals

SOLUTION Q3(a) Six types of production control

Type	Meaning	Used in
Flow control	Controls the rate of flow of work through a fixed sequence	Continuous and mass production (chemicals, assembly lines)
Block control	Production planned and controlled in blocks of a given quantity	Textiles, book and magazine printing
Order control	Each customer order is planned and followed separately	Job production
Batch control	Batches of similar items are controlled as a unit	Batch production (pharma, garments)
Load control	Controls the load on key/bottleneck machines	Plants where one costly machine decides output
Special project control	Large one-off projects controlled through networks	Construction, ship building (PERT/CPM)

SOLUTION Q3(b) Regression – Shree Foods Ltd.

$\bar{X} = 30 \div 5 = 6$; $\bar{Y} = 240 \div 5 = 48$.

X	Y	x = X − 6	y = Y − 48	xy	x²
2	30	−4	−18	72	16
4	38	−2	−10	20	4
6	50	0	2	0	0
8	56	2	8	16	4
10	66	4	18	72	16
				180	**40**

(i) $b = 180 \div 40 = \mathbf{4.5}$; $a = 48 - 4.5 \times 6 = \mathbf{21}$. **$Y = 21 + 4.5X$**.

(ii) $X = 12$: $Y = 21 + 54 = \mathbf{₹75\ lakh}$.

(iii) For $Y = 75$ using Y on X: $X = (75 - 21) \div 4.5 = \mathbf{₹12\ lakh}$. (Strictly, the X-on-Y line should be used to estimate X; $\Sigma y^2 = 816$, $b(xy) = 180 \div 816 = 0.2206$, $X = 6 + 0.2206 \times 27 = ₹11.96$ lakh.)

SOLUTION Q4(a) Assignment – minimum cost

Row reduction (subtract 18, 8, 10, 24): A 0, 6, 10, 14 · B 0, 5, 9, 11 · C 0, 5, 9, 12 · D 0, 6, 8, 4.

Column reduction (subtract 0, 5, 8, 4): A 0, 1, 2, 10 · B 0, 0, 1, 7 · C 0, 0, 1, 8 · D 0, 1, 0, 0.

Zeros are covered by **3 lines** (column J1, column J2, row D) < 4. Smallest uncovered value = 1: subtract it from uncovered cells and add it at the intersections →

A 0, 1, 1, 9 · B 0, 0, 0, 6 · C 0, 0, 0, 7 · D 1, 2, 0, 0. Now 4 lines are needed → optimal.

Assignment: A has a single zero → **A–J1**; column J4 has a single zero → **D–J4**; then **B–J2, C–J3** (or B–J3, C–J2 – alternative optimum).

Minimum cost = 18 + 13 + 19 + 28 = **₹78 thousand** (alternative 18 + 17 + 15 + 28 = 78).

SOLUTION Q4(b) Monte Carlo simulation

Demand	Probability	Cumulative	Random numbers
20	0.10	0.10	00–09
21	0.20	0.30	10–29
22	0.40	0.70	30–69
23	0.20	0.90	70–89
24	0.10	1.00	90–99

Day	1	2	3	4	5	6	7	8	9	10
Random no.	08	47	92	63	25	71	36	55	84	17
Demand	20	22	24	22	21	23	22	22	23	21

Total = 220; **average = 22 units per day**. Expected demand = 20(0.1) + 21(0.2) + 22(0.4) + 23(0.2) + 24(0.1) = **22 units** – the simulation agrees.

SOLUTION Q5(a) Group vs individual replacement

Failures at the end of each week ($N_t = \Sigma N_{t-k} \times p_k$, $N_o = 500$): N1 = 25; N2 = 500 × 0.15 + 25 × 0.05 = 76.25; N3 = 150 + 3.75 + 3.81 = 157.56; N4 = 201.82; N5 = 140.35.

Mean life = 1(0.05) + 2(0.15) + 3(0.30) + 4(0.35) + 5(0.15) = **3.4 weeks**. Individual policy cost = 500 × 20 ÷ 3.4 = **₹2,941 per week**.

Group at end of week	Cumulative failures	Cost = 500 × 6 + failures × 20	Average per week
1	25.00	3,500	3,500
2	101.25	5,025	**2,512.50**
3	258.81	8,176	2,725.42
4	460.63	12,213	3,053.14

Policy: replace all sensors as a group **every 2 weeks** and replace failures individually in between – ₹2,512.50 a week against ₹2,941 for individual replacement.

SOLUTION Q5(b) PERT – expected times and probability

Activity	a	m	b	$t_e = (a + 4m + b) \div 6$	$\sigma^2 = ((b - a) \div 6)^2$
1-2	2	4	6	4	0.444
1-3	3	6	15	7	4.000
2-4	4	6	8	6	0.444
3-4	2	5	8	5	1.000
2-5	5	8	11	8	1.000
4-5	5	7	9	7	0.444

Paths: 1-2-4-5 = 17 weeks; **1-3-4-5 = 19 weeks (critical)**; 1-2-5 = 12 weeks.

Variance of critical path = 4 + 1 + 0.444 = 5.444; σ = **2.333 weeks**.

Z = (22 − 19) ÷ 2.333 = 1.29

P(T ≤ 22) = P(Z ≤ 1.29) ≈ **0.90 (90%)**.

SOLUTION Q6(a) Levels of strategy

- **Corporate-level strategy** – decided by the board and top management; answers "**in which businesses** should we be?" – growth, stability, retrenchment, diversification, mergers, portfolio management (BCG, GE matrix), allocation of resources across businesses.
- **Business-level (competitive) strategy** – for each strategic business unit; answers "**how do we compete** in this market?" – cost leadership, differentiation, focus; positioning against rivals; customer value proposition.
- **Functional (operational) strategy** – for marketing, production, finance, HR, R&D, IT; answers "**how does each function support** the business strategy?" – e.g. lean production to support cost leadership, premium branding to support differentiation.

The three levels must be **consistent**: corporate decisions set the frame, business strategies compete within it, and functional strategies implement them. Some texts add an **operational** level for day-to-day plans.

SOLUTION Q6(b) PESTEL framework

PESTEL scans the macro environment for opportunities and threats:

Factor	What it covers	Example
Political	Government stability, policy, trade and tax policy	PLI schemes for electronics manufacturing
Economic	Growth, inflation, interest and exchange rates, income	Rising interest rates reduce demand for car loans
Social	Demography, lifestyle, education, health awareness	Demand for health foods and fitness services
Technological	Innovation, automation, digital platforms	UPI changing retail payments
Environmental	Climate change, pollution, sustainability, ESG	EV adoption and carbon-emission norms
Legal	Laws on competition, consumers, employment, data	Digital Personal Data Protection Act affecting apps

PESTEL is the starting point for identifying key drivers of change; it feeds the opportunities and threats in SWOT.

SOLUTION Q7(a) BCG growth-share matrix

The matrix plots each SBU on **market growth rate** (vertical) and **relative market share** (horizontal):

- **Stars** – high growth, high share: leaders that need cash to keep pace; become cash cows when growth slows.
- **Cash cows** – low growth, high share: generate surplus cash to fund other units; strategy – hold/harvest.
- **Question marks** – high growth, low share: need heavy investment; build selectively or divest.
- **Dogs** – low growth, low share: weak cash generators; divest or harvest unless strategic.

Limitations: (1) only two variables – market growth and share – ignore other drivers of profitability; (2) high share does not always mean high profit; (3) defining the "market" is difficult and changes the classification; (4) it ignores synergies between businesses; (5) "dogs" may still be profitable or strategically useful; (6) it is a static snapshot and needs accurate data.

SOLUTION Q7(b) Porter's value chain

Primary activities (directly create and deliver value):

1. **Inbound logistics** – receiving, storing and distributing inputs (warehousing, inventory control).
2. **Operations** – converting inputs into the final product (machining, assembly, packaging).
3. **Outbound logistics** – storing and physically distributing the product to buyers.
4. **Marketing and sales** – advertising, pricing, channels, sales force.
5. **Service** – installation, repair, training, spares – maintaining product value.

Support activities (support all primary activities):

1. **Firm infrastructure** – general management, planning, finance, legal, quality.
2. **Human resource management** – recruitment, training, rewards.
3. **Technology development** – R&D, process automation, IT.
4. **Procurement** – purchasing inputs for all activities.

The **margin** is the difference between the value created and the cost of the activities; the chain shows where cost advantage or differentiation can be built.

SOLUTION Q8(a) Blockchain

Meaning: a blockchain is a **shared, immutable, distributed ledger** that records transactions and tracks assets in a business network. Each block holds a set of transactions and the cryptographic hash of the previous block, so altering a record would require altering every later block on most copies of the ledger.

Features: (1) **decentralisation** – no single owner; copies with all participants; (2) **immutability** – entries cannot be changed, only added; (3) **consensus mechanisms** (proof of work, proof of stake) to validate transactions; (4) **transparency and traceability**; (5) **cryptographic security**; (6) **smart contracts** – self-executing code that triggers when conditions are met; (7) types – public, private, consortium and hybrid.

Applications: supply-chain traceability (tracking food or drugs from farm/factory to shelf); **trade finance** (digital letters of credit, fewer documents); land records, cross-border payments and digital identity.

SOLUTION Q8(b) Steps in BPR

1. **Prepare for re-engineering** – top-management commitment, a clear vision and a BPR team.
2. **Identify the core processes** that matter most to customers and map the existing ("as-is") process.
3. **Analyse the existing process** – find non-value-adding steps, delays, hand-offs and costs; benchmark with best practice.
4. **Design the new ("to-be") process** from a clean slate, using IT enablers and setting stretch targets for cost, quality, service and speed.
5. **Implement** – pilot, restructure jobs and the organisation, train people and manage change.
6. **Monitor and improve** – measure results against targets and refine.

BPR seeks **radical redesign**, not incremental improvement; it needs strong change management to overcome resistance.