Module 10 · Simulation P16 · 10.0

SM pp. 576–588 (exercise 589–596). **A 7-mark simulation half in 5 of 6 papers** (not in Jun'26 — due back) + MCQs. Module 10 per paper: **J26-2 · D25-7 · J25-7 · D24-9 · J24-9 · D23-9**.

Paper	Simulation half
Dec'23	travel agency: 10 clients, waiting, P(officer idle)
Jun'24	same distributions, 12 clients, vouchers for waits over 10 minutes
Dec'24	bakery: 10 days' profit with penalties for unsold / unmet
Jun'25	average profit from price, variable cost, volume (5 trials)
Dec'25	laptop service centre: 7 days, laptops held over

1 · Probability → cumulative → ranges
start at 00: 0.20 → 00–19, next 0.40 → 20–59 …

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2 · Read each random number
into its range → the value

↓

3 · Simulation table
queue: arrival, start, end, wait, idle; stock: demand, sold, unsold, penalty

↓

4 · Answer the ask
average, count, probability = idle ÷ total time

PROBLEMS BOX · SIMULATION (RECOMPUTED BY SCRIPT m10_patterns.py)

WORKED PATTERNS · SM ILLUSTRATIONS 2 AND 5

- Illus. 2: ranges 00-03, 04-25, 26-41, 42-83, 84-93, 94-99; ten weeks' demand total 120 → average **12** ('00 kg). [SM 581]
- Illus. 5 (queue, opens 8.00): first patient enters at 8.07 (doctor idle 7); total waiting **129** minutes, average 12.9; doctor idle **115** of 366 minutes = **0.314**. [SM 586]

DEC'23 Q6(b) TRAVEL AGENCY (OUR WORKING)

Intervals 1, 8, 8, 15, 15, 8, 25, 8, 8, 15 (arrivals at 1, 9, 17, 32 … 111 minutes after 10.00); service 14, 14, 14, 10, 6, 6, 14, 10, 14, 4. Clients 2–6 and 8–10 wait (6, 12, 11, 6, 4, 6, 8, 7 = **60 minutes**); officer idle 1 + 15 = **16** of 122 minutes → **P(idle) = 0.131**.

Jun'24 Q6(b) (12 clients, line 1 / line 2): waits over 10 minutes — clients 3 (12) and 4 (11) → **2 vouchers = ₹30**. Part (i) "how you would simulate" = step 1–3 above in words.

OUR WORKINGS · STOCK AND PROFIT TYPES

- **D24 bakery** (ranges 00-09 → 97, 10-24 → 98, 25-44 → 99, 45-79 → 100, 80-94 → 102, 95-99 → 103): demand 97, 103, 100, 103, 102, 97, 100, 98, 98, 98; profit a day = 18 × sold − 1,400 − 3 × unsold − 1 × unmet (97 → 337) → **₹3,740** for 10 days.
- **J25 Pikon**: trials (price, VC, units): (5, 2, 5,000) +11,000 · (3, 2, 3,000) −1,000 · (4, 1, 2,000) +2,000 · (3, 2, 2,000) −2,000 · (4, 2, 2,000) 0 → **average ₹2,000**.
- **D25 laptops** (one held at the start): arrivals 11, 10, 10, 9, 12, 9, 10; capacity 10, 10, 11, 10, 11, 12, 10 → held 2, 2, 1, 0, 1, 0, 0 → **6 ÷ 7 = 0.857 a day**.

PRACTISE THESE

D25 Q7(a), D24, J25, J24, D23 Q6(b) · MQP Q7(a), postal Q9(a) · SM Illus. 1–6 (SM 580–588), exercise MCQs (SM 590–592) · MCQs D23 Q1(ix), J24 Q1(xiv) (steps), D24 Q1(xv) (analogue simulation), J26 Q1(vii) · **ICMAI Practice Workbook Ch7 illus. 1–10** · MCQ bank Q116–Q124, Q205, Q249, Q281.

Traps: write the range table first (it carries marks); keep the 00-start convention all through; use the random numbers in the given order and line; state when the clock starts.