

BOARD-PATTERN PRACTICE PAPER · CBSE CLASS 12**Calculus — Differentiation, Applications & Integration**

Applied Mathematics · Chapter 3 · Matches current CBSE blueprint · Each question PYQ-sourced where indicated

DATE _____	TOTAL MARKS 30	DURATION 60 min	MARKING As per board	TARGET ≥ 24/30
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GENERAL INSTRUCTIONS

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Section A — Short calculation (2 × 3 = 6 marks)

6 MARKS · 16 MIN

- Q1.** For $f(x) = 2x^3 - 9x^2 + 12x + 1$, find $f'(x)$ and $f''(x)$. [PYQ 2021 Delhi] **[2 marks]**
- Q2.** Evaluate the definite integral \int from 1 to 3 of $(2x + 1) dx$. [PYQ 2022 Outside Delhi] **[2 marks]**
- Q3.** If $C(x) = 3x^2 + 5x + 40$ is the total cost, find the marginal cost when $x = 8$ and interpret it. [PYQ 2024 Delhi] **[2 marks]**

Section B — Application problem (3 × 4 = 12 marks)

12 MARKS · 24 MIN

- Q4.** The total cost of producing x units is $C(x) = 0.005x^3 - 0.02x^2 + 30x + 5000$. Find the marginal cost when $x = 50$ and state its meaning. [PYQ 2023 Delhi] **[3 marks]**
- Q5.** Find the intervals on which $f(x) = x^3 - 6x^2 + 9x + 2$ is increasing and on which it is decreasing. [PYQ 2022 All India] **[3 marks]**
- Q6.** Evaluate \int from 0 to 2 of $4x(x^2 + 1) dx$ by expanding or by substitution. [PYQ 2024 Outside Delhi] **[3 marks]**
- Q7.** The demand function is $p = 40 - x$ and the market price is ₹20. Find the consumer surplus. [PYQ 2023 Outside Delhi] **[3 marks]**

Section C — Long-answer (6 × 2 = 12 marks)

12 MARKS · 20 MIN

- Q8.** A firm's revenue function is $R(x) = 60x - x^2$ and its cost function is $C(x) = x^2 + 20x + 100$ (in ₹, $x =$ number of units). Find the level of output that maximises profit, verify it is a maximum using the second-derivative test, and find the maximum profit. [PYQ 2024 All India] **[6 marks]**
- Q9.** The total cost of producing x units is $C(x) = x^2 + 64x + 100$ (in ₹). Find the output at which the AVERAGE cost per unit is minimum, verify with the second-derivative test, and find the minimum average cost. [PYQ 2023 All India] **[6 marks]**

Marking scheme & model answers — see companion Answer Key PDF · all PYQs traceable to actual CBSE papers · readyforboards.com · +91 70330 05444