CLASS XI | CBSE | 2025-26

INTRODUCTORY

# MICROECONOMICS

CHAPTER 8

## Concepts of Cost


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# Chapter Overview

**What You Will Learn:**

1. Meaning of Cost — Explicit cost, Implicit cost, Opportunity cost
2. Short-run costs — TFC, TVC, TC and their behaviour
3. Per-unit costs — AFC, AVC, AC (ATC) — shapes and reasons
4. Marginal Cost (MC) — meaning and relationship with AC
5. Cost curves — why U-shaped, why AFC falls
6. Step-by-step numericals on all cost concepts

**Real-Life Connection:**

Every business — from a chai stall to Reliance Industries — faces costs. A student running a coaching class pays rent (fixed cost) and buys chalk/markers (variable cost). Understanding cost helps businesses decide how much to produce to earn maximum profit.

**Exam Importance:**

Cost curve diagrams (U-shaped AC, rectangular hyperbola AFC) = 4–6 marks every year. MC–AC relationship is the most tested concept. Numericals on finding TC, AC, MC appear in almost every board exam.

# 1. TYPES OF COST — MEANING

## Explicit Cost vs Implicit Cost

| Basis | Explicit Cost | Implicit Cost |
|---|---|---|
| Meaning | Actual money payments made to hired factors of production (outsiders). | Imputed value of self-owned, self-employed resources used in production. |
| Payment | Actual cash outflow — money IS paid. | No actual cash payment — cost is estimated. |
| Example | Wages paid to workers, rent paid for shop, electricity bills, raw material purchases. | Owner using own building (foregone rent), owner managing business (foregone salary), own capital (foregone interest). |
| Also called | Accounting cost / Out-of-pocket cost | Imputed cost / Opportunity cost of own resources |
| Recorded in accounts? | Yes — always recorded | No — not recorded in accounting books |

**DEFINITION: Opportunity Cost**

***Opportunity Cost is the value of the next best alternative forgone. In business, if a factory owner uses his own building, the opportunity cost = rent he could have earned by renting it out.***

**EXAMPLE: Easy Example — Owner vs Hired Manager**

*Ram owns a shop. He manages it himself instead of hiring a manager (who would cost Rs. 20,000/month). Ram also uses his own building worth Rs. 15,000/month rent. Explicit Costs = wages of staff + electricity + stock purchased. Implicit Costs = Rs. 20,000 (foregone salary) + Rs. 15,000 (foregone rent) = Rs. 35,000. Total Economic Cost = Explicit + Implicit costs.*

**MEMORY TRICK**

TRICK: Explicit = "EX" = External payment (actual money going OUT). Implicit = "IM" = Internal (own resources — no cash flows out). Total Economic Cost = Explicit + Implicit. Normal Profit = Implicit cost of entrepreneurship.

# 2. SHORT-RUN COST CONCEPTS

## Fixed Cost vs Variable Cost

| Basis | Total Fixed Cost (TFC) | Total Variable Cost (TVC) |
|---|---|---|
| Meaning | Total cost of all FIXED inputs. Does not change with output. | Total cost of all VARIABLE inputs. Changes directly with output. |
| Behaviour | CONSTANT at all output levels — even if output = 0. | Zero when output = 0; rises as output increases. |
| Examples | Rent, insurance premium, loan interest, machinery depreciation. | Raw materials, daily wages, electricity for production, fuel. |
| Also called | Overhead cost / Unavoidable cost | Prime cost / Direct cost / Avoidable cost |
| Diagram shape | Horizontal straight line (parallel to X-axis) | Rises from origin; S-shaped (first concave then convex) |
| Can it be zero? | No — even if output = 0, TFC must be paid. | Yes — when output = 0, TVC = 0. |

**DEFINITION: Total Cost (TC)**

***Total Cost is the SUM of Total Fixed Cost and Total Variable Cost at any given level of output. TC = TFC + TVC***

**TC = TFC + TVC**

Since TFC is constant, TC rises by the same amount as TVC rises at each level of output.

**EXAMPLE: Coaching Class Example**

*Smit Sir runs a coaching class. He pays: Fixed Costs: Rent = Rs. 5,000/month | Salary of permanent teacher = Rs. 8,000 | Electricity (fixed) = Rs. 2,000 → TFC = Rs. 15,000 Variable Costs: Whiteboard markers, handouts, extra electricity per student → These INCREASE as more students join. If 0 students join — TFC = Rs. 15,000 must still be paid. TVC = 0. If 50 students join — TVC rises. TC = TFC + TVC.*

## 3. PER-UNIT (AVERAGE) COSTS

| Cost Concept | Full Form | Definition | Formula | Shape of Curve |
|---|---|---|---|---|
| AFC | Average Fixed Cost | Fixed cost per unit of output. | AFC = TFC ÷ Output (Q) | Rectangular Hyperbola — ALWAYS falling, never zero. |
| AVC | Average Variable Cost | Variable cost per unit of output. | AVC = TVC ÷ Q | U-shaped — falls then rises. |
| AC (ATC) | Average Total Cost (Average Cost) | Total cost per unit. Also = AFC + AVC. | AC = TC ÷ Q = AFC + AVC | U-shaped — falls then rises; minimum is to the right of AVC minimum. |
| MC | Marginal Cost | Additional cost from producing one more unit. | MC = TC■ – TC(■■■) = ∆TC ÷ ∆Q | U-shaped — cuts AVC and AC at their minimum points from below. |

### Complete Cost Schedule — Numerical Table:

| Q | TFC | TVC | TC | AFC | AVC | AC | MC |
|---|---|---|---|---|---|---|---|
| 0 | 60 | 0 | 60 | — | — | — | — |
| 1 | 60 | 20 | 80 | 60.0 | 20.0 | 80.0 | 20 |
| 2 | 60 | 36 | 96 | 30.0 | 18.0 | 48.0 | 16 |
| 3 | 60 | 48 | 108 | 20.0 | 16.0 | 36.0 | 12 |
| 4 | 60 | 56 | 116 | 15.0 | 14.0 | 29.0 | 8 |
| 5 | 60 | 70 | 130 | 12.0 | 14.0 | 26.0 | 14 |
| 6 | 60 | 90 | 150 | 10.0 | 15.0 | 25.0 | 20 |
| 7 | 60 | 119 | 179 | 8.6 | 17.0 | 25.6 | 29 |
| 8 | 60 | 156 | 216 | 7.5 | 19.5 | 27.0 | 37 |

**Observations from the Cost Table:**

1. TFC = Rs. 60 at ALL output levels — it never changes.
2. TVC = 0 at Q=0, then rises with output.
3. AFC constantly falls (60→30→20→15→12→10→8.6→7.5).
4. AVC first falls (20→18→16→14) then rises (14→15→17→19.5) — U-shaped.
5. AC first falls (80→48→36→29→26→25) then rises (25→25.6→27) — U-shaped.
6. MC first falls (20→16→12→8) then rises (8→14→20→29→37) — U-shaped.
7. MC = AVC at AVC minimum (Q=4/5, AVC=14 and MC=14/8 crossing). MC crosses AC at AC minimum (~Q=6, AC=25).

# 4. WHY ARE AC, AVC AND MC CURVES U-SHAPED?

## Falling Portion (Left side of U):

**Why AC / AVC / MC fall initially:**

(a) Increasing Returns: Initially, adding variable factors (workers) to fixed factors improves efficiency — Law of Variable Proportions Phase 1.

(b) Spreading Fixed Costs: As output rises, TFC is spread over more units → AFC falls rapidly, pulling AC down.

(c) Specialisation: Workers specialise → productivity rises → cost per unit falls.

(d) Better utilisation of fixed factor (machinery, plant).

## Rising Portion (Right side of U):

**Why AC / AVC / MC rise eventually:**

(a) Diminishing Returns: As more variable factor is added to the fixed factor, MP of each worker falls — Law of Variable Proportions Phase 2 and 3.

(b) More resources needed per unit → variable cost rises faster than output.

(c) Overcrowding: Too many workers on fixed machinery → inefficiency → higher cost per unit.

## Why is AFC Curve a Rectangular Hyperbola?

AFC = TFC ÷ Q. TFC is a CONSTANT (fixed number).

As Q increases: AFC = constant ÷ bigger number → AFC keeps FALLING.

But AFC can NEVER reach zero (because TFC ≠ 0 and Q is finite).

**Result: AFC curve is a rectangular hyperbola — always falling, always above X-axis, never touching it.**

Product (AFC × Q) = TFC = constant at all points → classic rectangular hyperbola property.

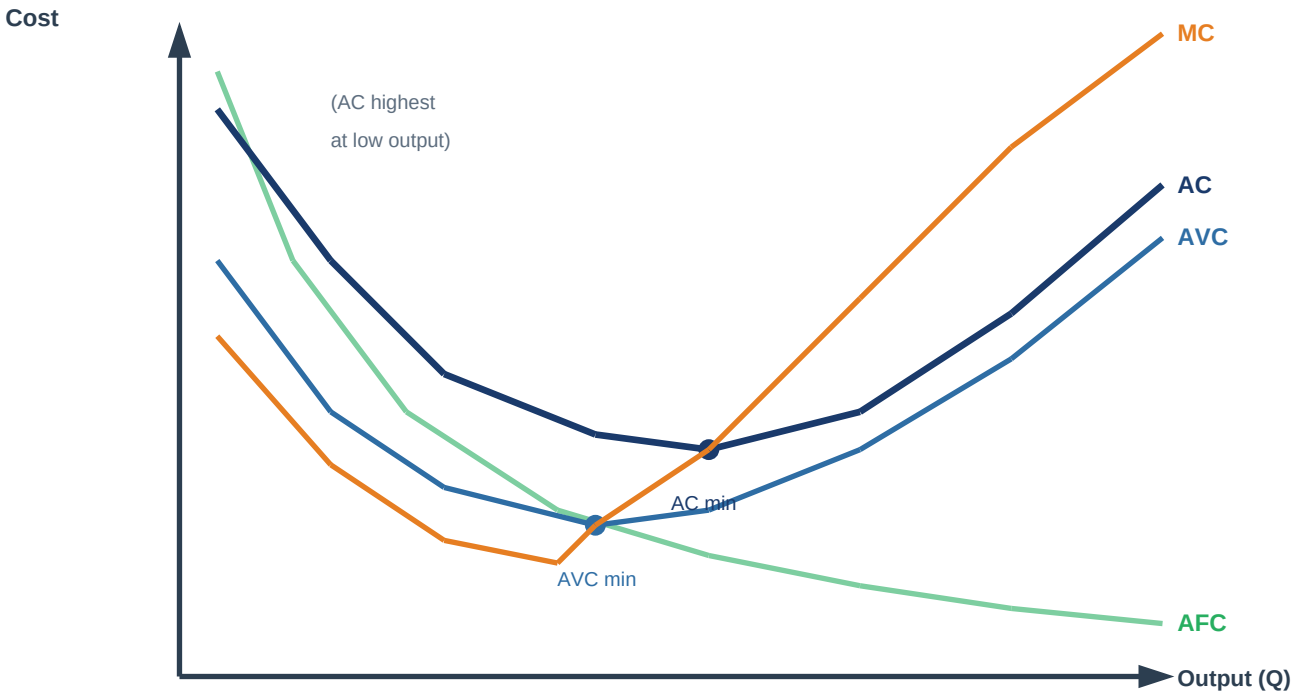
## 5. RELATIONSHIP BETWEEN MC AND AC — MOST IMPORTANT

| Condition | What Happens to AC | Reason | Example |
|---|---|---|---|
| When MC < AC | AC is FALLING (decreasing) | Each new unit costs less than average → pulls average down. | If class average = 70 and new student scores 60, average falls. |
| When MC = AC | AC is at its MINIMUM (neither rising nor falling) | New unit costs exactly the same as current average → average unchanged. | New student scores exactly 70 = class average. |
| When MC > AC | AC is RISING (increasing) | Each new unit costs more than average → pulls average up. | New student scores 90 > class average of 70 → average rises. |

**KEY EXAM FACTS about MC and AC:**

1. MC curve cuts AC curve at AC's MINIMUM POINT — always from below.
2. MC curve cuts AVC curve at AVC's MINIMUM POINT — always from below.
3. The vertical distance between AC and AVC = AFC (always declining).
4. MC is independent of TFC — changes in TFC do NOT affect MC (since MC = change in TC = change in TVC only).
5. When output = 0, TC = TFC (all cost is fixed). At Q=0, there is no MC.

### Cost Curves Diagram:



**How to Draw and Explain This Diagram in Exam:**

X-axis = Output (Q) | Y-axis = Cost (Rs.)

AFC: Start from top-left, falls continuously — never touches X-axis. Label "AFC" at right end.

AVC: U-shaped. Starts high, falls to minimum, then rises. Always stays BELOW AC.

AC: U-shaped. Starts above AVC, falls to minimum (to the right of AVC minimum), then rises.

MC: U-shaped. Steeper than AC/AVC. Passes through MINIMUM points of AVC and AC from below.

Vertical distance between AC and AVC at any point = AFC (this gap narrows as Q rises).

**COMMON MISTAKE**

COMMON MISTAKES: 1. Students draw MC above AC always — WRONG. MC is below AC when AC is falling. 2. Students say AFC becomes zero — WRONG. AFC approaches zero but NEVER touches zero. 3. Students forget that MC cuts AC/AVC at their MINIMUM points — not anywhere else. 4. Students confuse TFC being constant with AFC being constant — AFC is NOT constant.

## 6. IMPORTANT RELATIONSHIPS — QUICK REFERENCE

| Relationship | Statement | Exam Importance |
|---|---|---|
| TC = TFC + TVC | Total Cost = Fixed + Variable costs at every output level. | Very High — formula asked directly |
| AC = TC / Q = AFC + AVC | Average Cost = Average Fixed Cost + Average Variable Cost | Very High — formula and calculation |
| MC = TC■ – TC(■■■) | Marginal Cost = change in Total Cost for one more unit. | Very High — numericals |
| MC = TVC■ – TVC(■■■) | MC depends only on variable costs — TFC does NOT affect MC. | High — conceptual question |
| MC < AC → AC falls | When marginal is below average, average is pulled down. | Very High — diagram explanation |
| MC = AC → AC minimum | MC curve passes through the lowest point of AC curve. | Very High — diagram labelling |
| MC > AC → AC rises | When marginal exceeds average, average is pulled up. | Very High — diagram explanation |
| AC – AVC = AFC | The vertical gap between AC and AVC curves = AFC (always falling). | High — diagram interpretation |

**MEMORY TRICK**

COST RELATIONSHIPS TRICK: "When MC is BELOW average, average FALLS. When MC is ABOVE average, average RISES." Think of class marks: If a new student scores BELOW class average → class average falls. If new student scores ABOVE class average → class average rises. TFC = constant always. AFC = always falling. AVC, AC, MC = U-shaped. MC cuts AVC and AC at their MINIMUM points from BELOW.

# EXAM-ORIENTED QUESTIONS

## 1-Mark Questions (MCQ / Very Short Answer)

**Q1. Define Marginal Cost.**

Ans. MC is the addition to Total Cost from producing one more unit of output. MC = TC■ – TC(■■■).

**Q2. Why does AFC always fall as output increases?**

Ans. TFC is constant. As output (Q) rises, AFC = TFC/Q → same fixed cost divided by more units → AFC keeps falling.

**Q3. What is the shape of the AFC curve? Why?**

Ans. Rectangular hyperbola. AFC = TFC/Q, where TFC is constant → AFC × Q = TFC = constant, which is the property of a rectangular hyperbola.

**Q4. At what point does MC cut the AC curve?**

Ans. MC cuts AC at AC's MINIMUM point — from below. This is because when MC = AC, AC is neither rising nor falling (it is at its lowest).

**Q5. Can MC be negative?**

Ans. No. MC = change in TC. TC can never decrease when more output is produced (production always requires some resource). MC can be zero at most, but not negative.

**Q6. What happens to TFC when output increases from 0?**

Ans. TFC remains CONSTANT — it does not change with output at all.

**Q7. State the relationship between AC and AVC.**

Ans. AC = AVC + AFC. AC is always greater than AVC. The difference (AC – AVC) = AFC, which keeps decreasing as output increases.

**Q8. Is MC affected by TFC?**

Ans. No. MC = change in TVC (since TFC is constant, change in TFC = 0). MC is completely independent of TFC.

## 3-Mark Questions

**Q1. Distinguish between Fixed Cost and Variable Cost with examples. (3 marks)**

**Answer Format: Definition → Difference → Examples → Conclusion**

**Fixed Cost:** Costs that remain constant regardless of output level. Example: Rent, insurance, loan interest.

**Variable Cost:** Costs that change directly with output. Zero when output is zero. Example: Raw materials, daily wages, fuel.

**Key Difference:** Fixed costs cannot be avoided even if the firm stops production. Variable costs are incurred only when production takes place.

**Q2. Explain why the AC curve is U-shaped. (3 marks)**

**Falling part of U:** Initially, as output rises, fixed costs spread over more units (AFC falls) and increasing returns set in → cost per unit falls.

**Rising part of U:** Beyond a point, Law of Diminishing Returns sets in → MP falls → more resources needed per unit → AVC rises faster than AFC falls → AC rises.

**Conclusion:** The U-shape reflects the combined effect of falling fixed costs per unit and eventually rising variable costs per unit.

## 4-Mark Numerical

### Q1. From the following data, calculate TVC, AFC, AVC, AC, and MC:

| Output (Q) | TFC | TC |
|---|---|---|
| 1 | 100 | 160 |
| 2 | 100 | 210 |
| 3 | 100 | 250 |
| 4 | 100 | 310 |
| 5 | 100 | 390 |

**Solution (Step by Step):**

Step 1 → TVC = TC – TFC: 60, 110, 150, 210, 290

Step 2 → AFC = TFC/Q: 100, 50, 33.3, 25, 20

Step 3 → AVC = TVC/Q: 60, 55, 50, 52.5, 58

Step 4 → AC = TC/Q (or AFC+AVC): 160, 105, 83.3, 77.5, 78

Step 5 → MC = TC■ – TC(■■■): 60 (160–100*), 50, 40, 60, 80 (*assume TC at Q=0 = TFC = 100)

Observation: AVC falls from Q=1 to Q=3 (60→55→50), then rises → U-shaped. AC minimum at Q=4 (77.5).

## 6-Mark Questions

### Q1. Explain with diagram the behaviour of TC, TVC, and TFC. (6 marks)

**Introduction:** In short run, costs are of two types — fixed and variable.

**TFC:** Remains constant at all output levels. Even at Q=0, TFC must be paid (rent, insurance). In diagram — horizontal straight line above X-axis.

**TVC:** Zero at Q=0. Rises as output increases — first slowly (increasing returns phase), then faster (diminishing returns phase). S-shaped curve starting from origin.

**TC:** TC = TFC + TVC. At Q=0, TC = TFC. As output rises, TC rises by the same amount as TVC. TC curve is parallel to TVC curve — vertical distance between them = TFC (constant).

**Diagram:** Draw X-axis (output), Y-axis (cost). Draw TFC as horizontal line at height representing fixed cost. Draw TVC starting from origin, rising in S-shape. Draw TC starting from TFC level (same height as TFC at Q=0) and rising parallel to TVC.

**Conclusion:** TC rises due to rise in TVC only; TFC is constant. The vertical gap between TC and TVC is always equal to TFC.

## Case Study Based Question:

**Q. Ramesh runs a small factory producing 100 units per day. His monthly fixed costs (rent + salary + insurance) = Rs. 30,000. Variable cost per unit = Rs. 50. He produces 500 units in a month.**

**(a) Find TFC, TVC, TC. (b) Find AFC, AVC, AC. (c) If he now produces 600 units, find new TC and AC. (d) What happens to AFC when output rises from 500 to 600?**

(a) TFC = Rs. 30,000 | TVC = 500 × 50 = Rs. 25,000 | TC = 30,000 + 25,000 = Rs. 55,000

(b) AFC = 30,000/500 = Rs. 60 | AVC = 25,000/500 = Rs. 50 | AC = 55,000/500 = Rs. 110

(c) At 600 units: TVC = 600×50 = 30,000 | TC = 30,000+30,000 = Rs. 60,000 | AC = 60,000/600 = Rs. 100

(d) AFC at 500 units = Rs. 60. AFC at 600 units = 30,000/600 = Rs. 50. AFC FELL from 60 to 50.

Conclusion: As output increases, AFC always falls — same fixed cost spread over more units.

## HOTS (Higher Order Thinking):

**Q. "Change in TFC does not affect MC." Do you agree? Explain with reason and example. (4 marks)**

Ans. **Yes, I agree.** MC = TC■ – TC(■■■) = (TFC■ + TVC■) – (TFC(■■■) + TVC(■■■)). Since TFC is CONSTANT, TFC■ = TFC(■■■), so they cancel out. Therefore MC = TVC■ – TVC(■■■). MC depends ONLY on the change in TVC — TFC has absolutely no effect on MC. Example: If rent rises from Rs. 5,000 to Rs. 8,000 (TFC rises by Rs. 3,000), this does NOT change the cost of producing one more unit. MC remains unchanged.

# CHAPTER SUMMARY

**KEY DEFINITIONS:**

Explicit Cost: Actual money payments to hired factors. | Implicit Cost: Imputed value of own resources used.

TFC: Fixed cost — constant at all output levels. | TVC: Variable cost — zero at Q=0, rises with output.

TC = TFC + TVC. | AFC = TFC/Q. | AVC = TVC/Q. | AC = TC/Q = AFC + AVC.

MC = TC■ – TC(■■■) = change in TVC. MC is independent of TFC.

**SHAPES OF CURVES:**

TFC → Horizontal line (constant). | TVC → S-shaped (rises from origin). | TC → S-shaped, starts from TFC level.

AFC → Rectangular hyperbola (always falling, never zero).

AVC, AC, MC → U-shaped. MC is steepest.

MC cuts AVC at AVC minimum. MC cuts AC at AC minimum. Both from BELOW.

**FORMULA LIST:**

TC = TFC + TVC | AFC = TFC/Q | AVC = TVC/Q | AC = TC/Q = AFC + AVC

MC = TC■ – TC(■■■) | TVC = TC – TFC | TFC = TC – TVC

TVC = AVC × Q | TC = AC × Q | TFC = AFC × Q

**LAST-MINUTE REVISION BOX:**

TFC = Constant always | AFC = Always falling (hyperbola)

AVC + AFC = AC | AC – AVC = AFC (always falling gap)

MC < AC → AC falls | MC = AC → AC minimum | MC > AC → AC rises

MC is independent of TFC. MC cuts AVC and AC at their minimum points.

U-shaped AC: Falls due to economies of scale + falling AFC; Rises due to diminishing returns.