

CUET · ECONOMICS · CLASS XII · CODE 309

The Theory of the Firm under Perfect Competition

CUET unit: Forms of Market and Price Determination

By UniDrill · NCERT-grounded study material

WWW.UNIDRILL.IN

UniDrill

 **Snapshot**

- A perfectly competitive market has four defining features, which make each firm a price-taker.
- On the revenue side (TR, AR, MR) for a price-taking firm, TR is a ray from the origin while $AR = MR = \text{price}$.
- Profit maximisation has three conditions ($p = MC$, MC non-decreasing, $p \geq AVC$ in short run / $p \geq AC$ in long run), with shut-down and break-even points.
- The firm's short-run and long-run supply curves shift with technology, input prices and unit tax.
- Individual firms' supplies aggregate into the market supply curve; price elasticity of supply has a geometric method — CUET regularly tests numericals from this material.

 **Detailed Notes****2.1 Core concepts**

- A perfectly competitive market has four defining features: (1) large number of buyers and sellers, (2) homogeneous product, (3) free entry and exit, and (4) perfect information (NCERT §4.1, p. 53).
- These four features together produce the single most distinguishing characteristic of perfect competition — price-taking behaviour: an individual firm cannot sell anything above the market price and has no incentive to sell below it (NCERT §4.1, p. 54).
- A firm's total revenue is $TR = p \times q$, where p is the market price and q the output sold; when no unit is sold TR is zero (NCERT §4.2, p. 54, Table 4.1).
- Because p is constant for a price-taking firm, the total revenue curve is an upward-sloping straight line through the origin whose slope equals the market price p (NCERT §4.2, p. 55, Fig. 4.1).
- Average revenue $AR = TR / q = p$, so for a price-taking firm the AR curve is a horizontal price line at height p , and this same line is also the firm's perfectly elastic demand curve (NCERT §4.2, p. 55, Fig. 4.2).

- Marginal revenue MR is the change in TR per unit increase in output; algebra and intuition both show that for a perfectly competitive firm $MR = AR = p$ (NCERT §4.2, pp. 55-56).
- A firm is a profit maximiser; profit $\pi = TR - TC$, and profits are maximum at the output q_0 where $MR = MC$, which for a price-taking firm reduces to $p = MC$ (NCERT §4.3 and §4.3.1, p. 56).
- For positive output to maximise profit, three conditions must hold at q_0 : (i) $p = MC$, (ii) MC must be non-decreasing at q_0 , and (iii) $p \geq AVC$ in the short run / $p \geq AC$ in the long run (NCERT §4.3, p. 56).
- Condition 2 rules out downward-sloping segments of the MC curve as profit maxima — at such a point reducing output would raise profit (NCERT §4.3.2, p. 57, Fig. 4.3).
- Condition 3 in the short run: if $p < \min AVC$, the area of rectangle $OpAq_1$ (TR) is less than the area of rectangle $OEBq_1$ (TVC), so the firm's loss exceeds TFC and it does better shutting down and bearing only -TFC (NCERT §4.3.3 Case 1, pp. 57-58, Fig. 4.4).
- Condition 3 in the long run: if $p < \min LRAC$, $TR < TC$, the firm makes a loss, and since a shut-down firm in the long run has zero profit, the firm exits (NCERT §4.3.3 Case 2, p. 58, Fig. 4.5).
- Graphically, at the profit-maximising q_0 (short run) profit equals the area of rectangle $EpAB$ — the gap between price and SAC times output (NCERT §4.3.4, pp. 58-59, Fig. 4.6).
- The short-run supply curve of a firm is the rising part of the SMC curve from and above the minimum AVC, together with zero output for all prices strictly less than minimum AVC (NCERT §4.4.1, pp. 59-60, Fig. 4.8).
- The long-run supply curve of a firm is the rising part of the LRMC curve from and above the minimum LRAC, together with zero output for all prices less than minimum LRAC (NCERT §4.4.2, pp. 60-61, Fig. 4.10).
- The short-run shut-down point is the minimum of AVC where SMC cuts AVC; the long-run shut-down point is the minimum of LRAC (NCERT §4.4.3, p. 61).
- Normal profit is the minimum profit required to keep a firm in business and is part of total cost (an opportunity cost for entrepreneurship); profit over and above normal profit is super-normal profit; the break-even point is the point on the supply curve where the firm earns only normal profit — i.e. where the supply curve cuts LRAC (or SAC in the short run) at its minimum (NCERT §4.4.4, p. 61).
- Technological progress lowers MC at every output, shifts the MC (and hence the supply) curve rightward, so at any given price the firm supplies more (NCERT §4.5.1, p. 62).
- A rise in input prices raises both AC and MC, shifts the supply curve leftward, so at any given price the firm supplies fewer units (NCERT §4.5.2, p. 62).

- A unit tax of Rs t adds Rs t to both LRAC and LRMC at every output, shifting the long-run supply curve leftward (NCERT §4.5.2 box, pp. 62-63, Figs. 4.11 and 4.12).
- The market supply curve is the horizontal summation of individual firms' supply curves at every price; it shifts rightward if the number of firms increases and leftward if it decreases (NCERT §4.6, pp. 63-64, Fig. 4.13).
- Price elasticity of supply $e_S = (\text{percentage change in quantity supplied}) / (\text{percentage change in price}) = (\Delta Q/Q) \times (P/\Delta P)$; it is zero for a vertical supply curve, positive for an upward-sloping curve, and independent of units (NCERT §4.7, pp. 65-66).
- Geometric method: for a straight-line supply curve cutting the price axis (positive part), $e_S > 1$; through the origin, $e_S = 1$; cutting the quantity axis (positive part), $e_S < 1$ (NCERT §4.7 box, p. 66, Fig. 4.14).

2.2 Definitions to memorise

Term	Definition	Page
Perfect competition	A market with many buyers and sellers, homogeneous product, free entry and exit, and perfect information	53
Price-taking firm	A firm that cannot sell anything above the market price and can sell as much as it wants at the market price	54
Total revenue (TR)	Market price multiplied by quantity sold, $TR = p \times q$	54
Average revenue (AR)	Total revenue per unit of output, $AR = TR/q$; equals p for a price-taking firm	55
Marginal revenue (MR)	Increase in total revenue for a unit increase in output; equals p for a price-taking firm	55-56
Profit (π)	Total revenue minus total cost, $\pi = TR - TC$	56
Shut-down point (short run)	Minimum of AVC where SMC cuts AVC; below this price firm produces zero	61
Shut-down point (long run)	Minimum of LRAC; below this price firm exits	61
Normal profit	Minimum profit needed to keep a firm in business; part of total cost; opportunity cost of entrepreneurship	61
Super-normal profit	Profit earned over and above normal profit	61
Break-even point	Point on the supply curve at which the firm earns only normal profit; where the supply curve cuts the minimum of LRAC (or SAC in short run)	61
Supply curve of a firm	Output a firm chooses to produce at each market price, given technology and factor prices	59
		63-64

Term	Definition	Page
Market supply curve	Horizontal summation of individual firms' supply curves at every price	
Price elasticity of supply (e _S)	(% change in quantity supplied) / (% change in price) = $(\Delta Q/Q) \times (P/\Delta P)$	65
Unit tax	A tax imposed per unit of output sold	62

2.3 Diagrams / processes to remember

- Fig. 4.1 (p. 55): Total Revenue curve — straight line through origin with slope equal to price p .
- Fig. 4.2 (p. 55): Price Line — horizontal AR/MR/demand curve at height p ; perfectly elastic.
- Fig. 4.3 (p. 57): MC curve with output points $q_1 \dots q_6$ illustrating why MC must be non-decreasing at the profit-maximising output.
- Fig. 4.4 (p. 57): Short-run case where $p < AVC$; loss = area of rectangle $pEBA$, hence firm produces zero.
- Fig. 4.5 (p. 58): Long-run case where $p < LRAC$; firm exits because shut-down profit (zero) beats negative profit at q_1 .
- Fig. 4.6 (p. 58): Geometric representation of short-run profit maximisation; profit = area of rectangle $EpAB$ at q_0 .
- Fig. 4.7 and 4.8 (pp. 59-60): Derivation and shape of the short-run supply curve — rising part of SMC from minimum AVC upward, plus zero output below.
- Fig. 4.9 and 4.10 (pp. 60-61): Long-run supply curve — rising part of LRMC from minimum LRAC upward, plus zero output below.
- Fig. 4.11 and 4.12 (p. 63): Unit tax of Rs t shifts LRAC and LRMC upward by t ; supply curve S_0 shifts left to S_1 .
- Fig. 4.13 (p. 64): Market supply curve as horizontal summation of S_1 and S_2 ; below p_1 supply is zero, between p_1 and p_2 only firm 1 supplies, above p_2 both firms supply.
- Fig. 4.14 (p. 66): Three straight-line supply curves — (a) cuts price axis, $e_S > 1$; (b) through origin, $e_S = 1$; (c) cuts quantity axis, $e_S < 1$.

2.5 Key formulas

Formula	Meaning	NCERT page
$TR = p \times q$	Total revenue under price-taking firm	55
$AR = TR \div q = p$	Average revenue equals market price	55

Formula	Meaning	NCERT page
$MR = \Delta TR \div \Delta q = p$	Marginal revenue equals price for a competitive firm	55
Profit-max condition: $p = MC$ (MC non-decreasing)	First-order condition for max profit	56
Short-run shut-down rule: produce only if $p \geq \text{min AVC}$	Variable-cost coverage	57
Long-run exit rule: stay only if $p \geq \text{min LRAC}$	Total-cost coverage	58
Short-run supply: rising part of $SMC \geq \text{min AVC}$	Supply curve derivation	59
Long-run supply: rising part of $LRMC \geq \text{min LRAC}$	LR supply derivation	60
Market supply = Σ individual supply (horizontal sum)	Aggregation across firms	64
Unit tax t shifts LRAC and LRMC up by t	Cost-side tax effect	63
$eS = (\% \Delta q^s) \div (\% \Delta p)$	Price elasticity of supply	65
eS test (straight line): cuts price axis $\Rightarrow eS > 1$; through origin $\Rightarrow eS = 1$; cuts q-axis $\Rightarrow eS < 1$	Geometric elasticity rule	66
Break-even: $TR = TC$; profit = 0 (includes normal profit)	Zero economic profit	58

2.4 Common confusions / NTA trap points

- For a perfectly competitive firm $MR = AR = p$, but this equality holds only because the firm is a price-taker; do not assume the same for other market forms.
- $p = MC$ is the profit-maximising condition only when MC is non-decreasing (rising) at that output; an intersection on the falling part of MC is a profit minimum, not a maximum.
- Short-run shut-down condition uses AVC (not AC) — fixed costs are sunk in the short run; in the long run the relevant minimum is LRAC because all costs are variable.
- Normal profit is included in total cost; "zero economic profit" already includes normal profit, so a firm at the break-even point is still in business.
- The market supply curve is obtained by horizontal summation (adding quantities at each price), not vertical summation (which is how individual demands are added for a public good — a frequent NTA trap).
- For a straight-line supply curve, eS depends on which axis it cuts: price axis $\rightarrow eS > 1$, origin $\rightarrow eS = 1$, quantity axis $\rightarrow eS < 1$; the slope alone does not determine elasticity.



UniDrill



Practice MCQs



PYQ Alignment

This chapter is a CUET staple in the "Forms of Market and Price Determination" unit and typically contributes ~10-12 MCQs across a CUET cycle. Past papers from 2023-25 have repeatedly tested the four features of perfect competition, the $AR = MR = p$ result, the three profit-maximisation conditions (especially the AVC vs AC distinction between short run and long run), the shape of the short-run/long-run supply curve, the break-even and shut-down points, the effect of a unit tax on the supply curve, and straightforward numerical applications of price elasticity of supply (both the percentage formula and the geometric method).

UniDrill