INTRODUCTION TO ECONOMICS

Module 5

FIZZA AFTAB

Reference Book : Economics by Paul A. Samuelson

Cost Analysis

Module 5   Lesson1

Module Overview

- Describe the **production process** in the short run.
- **Calculate** fixed costs, variable costs, marginal costs, total costs, average fixed costs, average variable costs, and average total costs.
- **Distinguish the various cost curves** and describe the relationships among them.
- **Numerical :** Cost Function

Production Process: Short run

The analysis of supply is more complicated than the analysis of demand. In the supply process, people first offer their factors of production to the market. Then the factors are transformed by firms, such as GM or IBM, into goods that consumers want. **Production is the name given to that *transformation of factors* into goods and services.**

Input → Process → Output

Amazon.com has transformed the way books are sold, bought, and even read. Prior to Amazon, books were primarily sold through independent bookstores with limited inventories in small retail locations. There were exceptions, of course; Borders and Barnes & Noble offered larger stores in urban areas. Online delivery and purchase of books has indeed overtaken the more traditional business models. How has Amazon changed the book selling industry? How has it managed to crush its competition? *A major reason for the giant retailer's success is its production model and cost structure, which has enabled Amazon to undercut the prices of its competitors.*

Fixed costs

expenditures that do not change regardless of the level of production (output), at least not in the short term. *For example*, rent of building, salaries of employees, depreciation
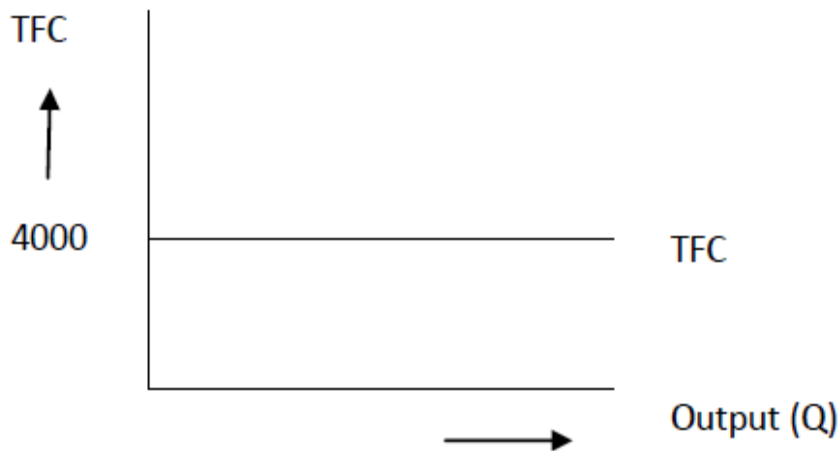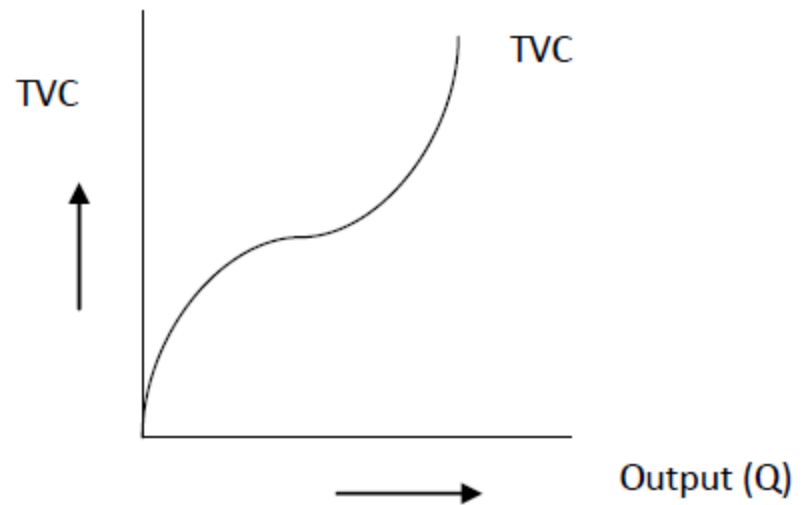
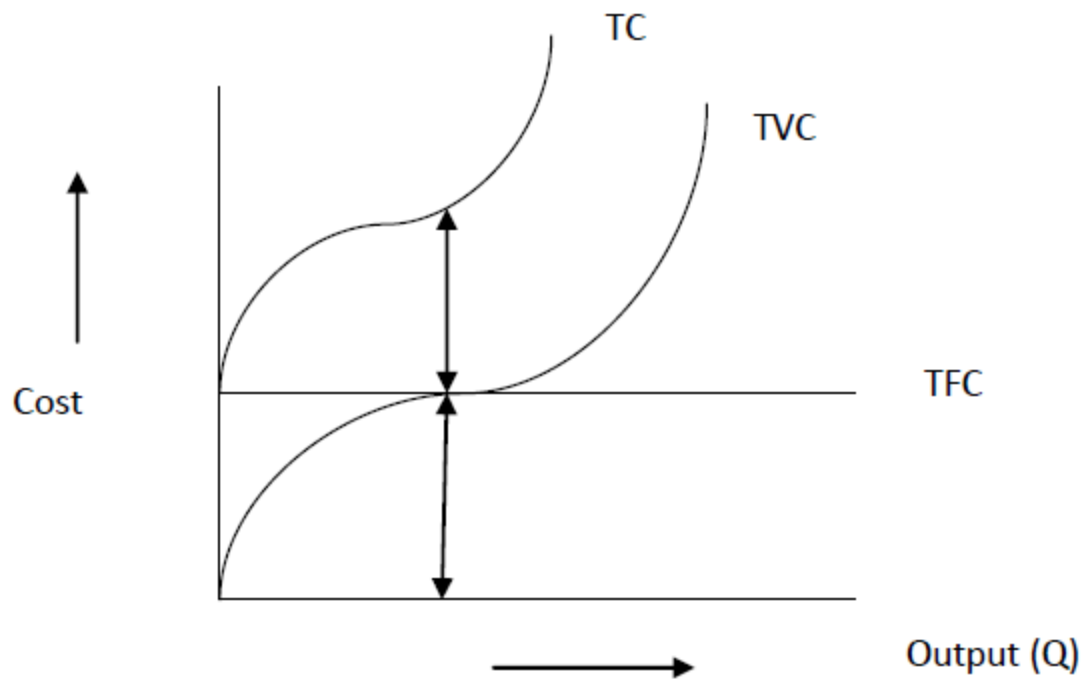| OUTPUT	Total Fixed Cost
0	4000
1	4000
2	4000
3	4000

TFC

4000

TFC

Output (Q)

Variable costs

expenditures that depend upon the level of production (output)- the more you produce, the greater the variable cost. *For example,* raw material, salaries of temporary employees

OUTPUT	Total Variable Cost
0	0
1	10
2	18
3	25
4	30

TVC

TVC

Output (Q)

Total Cost

TC= TFC+TVC

Average Total Cost (ATC), Average Fixed Cost (AFC), Average Variable Cost (AVC), Marginal Cost (MC):

ATC = TC/Q
AFC= TFC/Q
AVC= TVC/Q

Marginal Cost: how much cost is incurred in order to produce one additional unit of output.
MC= ΔTC/ΔQ

Law of Diminishing Marginal Productivity

The law of diminishing marginal productivity states that as more and more of a variable input is added to an existing fixed input, after some point the additional output one gets from the additional input will fall.

Services Concern: Hair Salon

TFC: rs. 160 (rent +equipment)
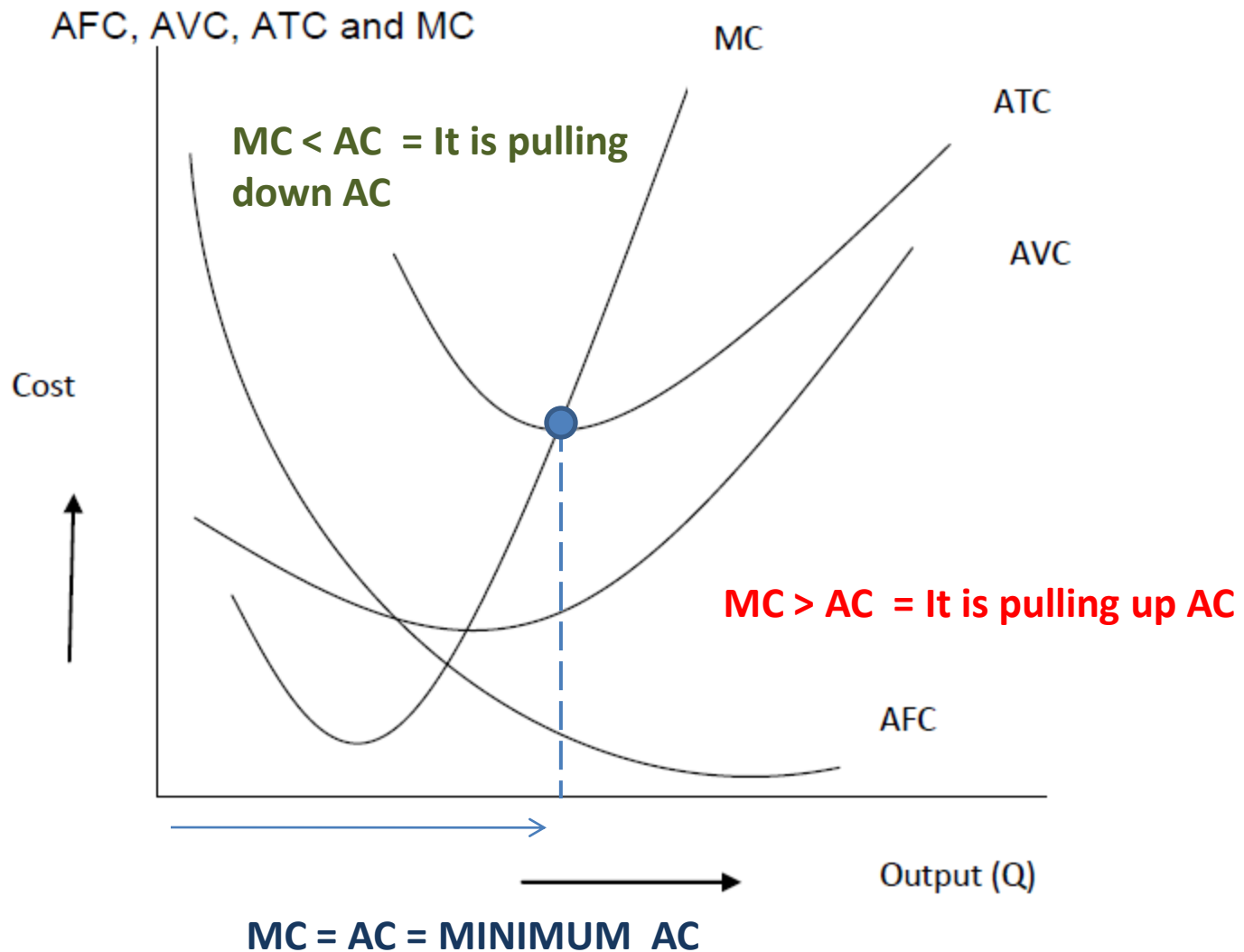
TVC: Direct labour @rs.80

1. Complete the table:

Direct Labor	Q	TFC	TVC	TC =TFC+TVC	ATC=TC/Q	AVC=TVC/Q	AFC=TFC/Q	MC= $TC_n - TC_{n-1} / Q_n - Q_{n-1}$
0	0	160	0	160	-------	----	----	------
1	16	160	80					
2	40	160	160					
3	60	160	240					
4	72	160	320					
5	80	160	400					

Example:

Labor	Output (Q)	TFC	TVC	TC	MC	ATC	AVC	AFC
0	0	160	0	160	----	-----	----	------
1	16	160	80	240	5.0	15.0	5.0	10.0
2	40	160	160	320	3.3	8.0	4.0	4.0
3	60	160	240	400	4.0	6.6	4.0	2.7
4	72	160	320	480	6.6	6.6	4.4	2.2
5	80	160	400	560	10.0	7.0	5.0	2.0

Note: You have to draw graph according to the previous table values.

AFC, AVC, ATC and MC

MC

ATC

MC < AC = It is pulling down AC

AVC

Cost

MC > AC = It is pulling up AC

AFC

Output (Q)

MC = AC = MINIMUM AC

Cost Function

Imagine you work at a firm whose total cost (TC) function is as follows:

$$TC = aQ^3 - bQ^2 + cQ + A$$

$$TC = 0.1Q^3 - 2Q^2 + 60Q + 200$$

$$TFC = 200$$

$$TVC = 0.1Q^3 - 2Q^2 + 60Q$$

=>Average total cost function can be derived by dividing the total cost function by Q:

ATC= TC/Q = 0.1Q^2 - 2Q + 60 + 200/Q

AVC= TVC/Q = 0.1Q^2 - 2Q + 60

AFC = TFC/Q = 200/Q

=> Marginal cost equals the slope of the total cost curve which in turn equals the first derivative of the total cost function (TC= 0.1Q^3 - 2Q^2 + 60Q + 200**)**

MC= dTC/dQ = (0.1)(3)Q^2 – (2)(2)Q + (1)60 +0

_MC_= dTC/dQ = 0.3Q^2 - 4Q + 60

If we put Q = 5, then find

TC=?
FC =?
VC=?
AC=?
AVC=?
AFC=?
MC=?

thank you