Economics

Formula Sheet

1. **Price Elasticity of Demand**

$$PED = \frac{\% \ change \ in \ quantity \ demanded}{\% \ change \ in \ price}$$

2. **Cross Elasticity of Demand**

$$XED = \frac{\% \ change \ in \ quantity \ demanded \ for \ Good \ X}{\% \ change \ in \ price \ of \ Good \ Y}$$

Where:

Positive XED => products are substitutes
Negative XED => products are complements or jointly demanded.

3. **Income Elasticity of Demand**

$$YED = \frac{\% \ change \ in \ quantity \ demanded}{\% \ change \ in \ income}$$

Where:

Positive YED => Normal Goods
Negative YED => Inferior Goods

4. **Price Elasticity of Supply**

$$PES = \frac{\% \ change \ in \ quantity \ supplied}{\% \ change \ in \ price}$$

5. **Slope of Indifference Curve** (for Good X and Good Y)

$$Slope_{IC} = \frac{MU_x}{MU_y}$$

Where:

MU_x = Marginal Utility of Good X

MU_y = Marginal Utility of Good Y

6. **Budget Line** (for Good X and Good Y)

$$I = Q_x P_x + Q_y P_y$$

$$Q_y = \frac{I}{P_y}$$

$$Q_x = \frac{I}{P_x}$$

Where:

Q_x = Quantity of Good X P_x = Price of Good X   I = Income

Q_y = Quantity of Good Y P_y = Price of Good Y

Rate of Exchange between Y and X = Slope of Budget Line

$$Slope_{BL} = \frac{\Delta Q_y}{\Delta Q_x}$$

$$= \frac{\frac{I}{P_y}}{\frac{I}{P_x}}$$

$$= \frac{I}{P_y} \times \frac{P_x}{I}$$

$$= \frac{P_x}{P_y}$$

7. **Consumer Equilibrium or Equimarginal Principle**

   Consumer Equilibrium is attained at the point where Indifference Curve (IC) is tangent to the Budget Line (BL).

$$\rightarrow Slope\ of\ IC = Slope\ of\ BL$$

$$\rightarrow \frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

$$\rightarrow \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

8. **Average Product (AP)**

$$AP = \frac{Total\ Product}{No.\ of\ labour\ units}$$

9. **Marginal Product (MP)**

$$MP = \frac{Change\ in\ Total\ Product}{Change\ in\ No.\ of\ labour\ units}$$

10. **Average Fixed Cost (AFC)**

$$Average\ Fixed\ Cost\ (AFC) = \frac{Fixed\ Cost}{Total\ Product}$$

11. **Average Variable Cost (AVC)**

$$Average\ Variable\ Cost\ (AVC) = \frac{Variable\ Cost}{Total\ Product}$$

12. **Total Cost (TC)**

$$Total\ Cost = Fixed\ Cost + Variable\ Cost$$

When Output is Zero *Total Cost = Fixed Cost*

13. Marginal Cost (MC)

$$MC = \frac{Change\ in\ TC}{Change\ in\ TP}$$

Where TC = Total Cost   TP = Total Product

14. Average Cost (AC)

$$Average\ Cost = \frac{Total\ Cost}{Total\ Product}$$

15. Total Revenue (TR)

$$TR = Price \times Quantity$$

16. Average Revenue (AR)

$$AR = \frac{Total\ Revenue}{Total\ Product}$$

17. Marginal Revenue (MR)

$$MR = \frac{Change\ in\ TR}{Change\ in\ TP}$$

18. Profit

$$Profit = TR - TC$$

19. Marginal Revenue Product of Labour (MRPL)

A firm will continue to hire labour up to the point where:

$$MR = MC$$

(This is also profit maximizing output level)

$$MRPL = \frac{Change\ in\ TR}{Change\ in\ Labour\ Units}$$

$$MPL = \frac{Change\ in\ TP}{Change\ in\ Labour\ Units}$$

20. Social Benefits and Social Costs

$$Social\ Benefits = Private\ Benefits + External\ Benefits$$

$$Social\ Costs = Private\ Costs + External\ Costs$$

21. Terms of Trade

$$Terms\ of\ Trade\ Index = \frac{Index\ of\ Export\ Prices}{Index\ of\ Import\ Prices} \times 100$$

22. Consumer Price Index (CPI)

$$CPI_{year1} = \sum_{i=1}^{n} \frac{W_{i1}P_{i1}}{W_{i0}P_{io}} \times 100$$

Where:

W = Weight associated to commodity in household expenditure

P = Price of commodity

N = Total number of commodities in the basket of goods and services index

23. National Income

Gross Domestic Product (GDP) = Total Output produced in an economy within a year

Gross National Product (GNP) = GDP + Net Property Income from Abroad (NPIA)

$Net\ Property\ Income\ from\ Abroad$

$= Income\ earned\ on\ assets\ owned\ abroad\ by\ local\ entrepreneurs$

$- Income\ earned\ by\ foreigners\ on\ assets\ owned\ in\ local\ economy.$

Net National Product (NNP) = GNP – Capital Consumption

Net Domestic Product (NDP) = GDP – Capital Consumption

24. Real GDP

$$Real\ GDP = money\ GDP \times \frac{price\ index\ in\ base\ year}{price\ index\ in\ current\ year}$$

25. GDP Deflator

$$GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP} \times 100$$

26. Aggregate Expenditure (AE) or National Income (Y)

$$AE = Y = C + G + I + (X - M)$$

Where:

C = Consumption	G = Government Spending	I = Investment
X = Exports	M = Imports	(X – M) = Net Exports

27. Consumption

$$Average\ Propensity\ to\ Consume\ (apc) = \frac{Consumption\ (C)}{Income\ (Y)}$$

$$Average\ Propensity\ to\ Save\ (aps) = \frac{Saving\ (S)}{Income\ (Y)} \quad OR$$

$$aps = 1 - apc$$

$$Marginal\ Propensity\ to\ Consume\ (mpc) = \frac{Change\ in\ Consumption}{Change\ in\ Income} = \frac{\Delta C}{\Delta Y}$$

$$Marginal\ Propensity\ to\ Save\ (mps) = \frac{Change\ in\ Saving}{Change\ in\ Income} = \frac{\Delta S}{\Delta Y} \quad OR$$

$$mps = 1 - mpc$$

28. Multiplier

$$Multiplier = \frac{change\ in\ income}{change\ in\ injection} = \frac{\Delta Y}{\Delta J} \quad OR$$

$$Multiplier = \frac{1}{marginal\ propensity\ to\ withdraw}$$

Multiplier in Two-Sector economy (household & firms) $= \frac{1}{mps}$

Multiplier in Three-Sector economy (2-sector+ government) $= \frac{1}{mps+mrt}$

Where mrt = marginal rate of taxation

Multiplier in Four-Sector economy (3-sector+ Trade) $\frac{1}{mps+mrt+mpm}$

Where: mpm = marginal propensity to import

29. Credit Multiplier

$$Credit\ Multiplier = \frac{Total\ value\ of\ new\ deposits\ created}{Value\ of\ change\ in\ liquid\ assets}$$

$$OR$$

$$Credit$$

$$Multiplier = \frac{100}{Liquidity\ Ratio}$$

30. Total Labour Force

Labour force = Total number of employed people + Total number of unemployed people

31. Adult Population

Adult Population = Total labour force + Number of people not in labour force.

32. Labour Force Participation Rate

$$Labour\ Force\ Participation\ Rate = \frac{Total\ Labour\ Force}{Adult\ Population} \times 100$$

33. Unemployment Rate:

$$Unemployment\ Rate = \frac{Number\ of\ Unemployed\ People}{Total\ Labour\ Force} \times 100$$

34. Real Exchange Rate

$$Real\ Exchange\ Rate = Nominal\ Exchange\ Rate \times \frac{Domestic\ Price}{Price\ in\ Foreign\ Market}$$

35. Monetary Equation (Quantity Theory of Money)

$$\frac{M}{P} = \frac{Y}{V}$$

Nominal GDP = PY

Where:

M = Money Supply   Y = Real GDP

P = Price Level   V = Velocity of Money