**Unit V - Index Numbers**

**Formulae:**

**p0 -** price of a commodity in the base year.

**p1  -** Price of a commodity in the current year.

**q0 -** quantity of a commodity in the base year.

**q1 –** quantity of a commodity in the current year.

**P –** Price of a commodity.

**V or W –** weight of a commodity.

**I or P –** Price relative or price index number of a commodity.

**Q –** quantity relative or quantity index number of a commodity.

**P = p1  / p0 × 100**

**P01** = price index number of the current year compared with the base year.

**Q01** = quantity index number of the current year compared with the base year.

**I) Simple or Unweighted Aggregative Method:**

**a) When price index number is required, P01 = ∑ p1 / ∑ p0 × 100**

**P01** = price index number of the current year compared with the base year.

**p1  -** Price of a commodity in the current year.

**p0 -** price of a commodity in the base year.

**b) When quantity index number is required, Q01 = ∑ q1 / ∑ q0 × 100**

**Q01** = quantity index number of the current year compared with the base year.

**q1 –** quantity of a commodity in the current year.

**q0 -** quantity of a commodity in the base year.

**II) Simple or Unweighted Averages of Relatives Method:**

**Price Index (P01)**

**i) Using Arithmetic Mean P01 = ∑ P / N**

P = ∑ p1 / ∑ p0 × 100

**P** = price relative or price index number of a commodity.

**N** = Number of the commodities.

**ii) Using Geometric Mean P01 = Antilog ( ∑ log P / N )**

**P = ∑ p1 / ∑ p0 × 100**

**P** = price relative or price index number of a commodity.

**N** = Number of the commodities.

**III) Weighted Aggregatives Method**

**Price Indices ( P01 )**

**i) Laspeyre’s formula :** P01 L = ∑ p1 q0 / ∑ p0 q0 × 100

**ii) Paasche’s formula :** P01p = ∑ p1 q1 / ∑ p0 q1 × 100

**iii) Fisher’s formula :**

P01F = √∑ p1 q0 / ∑ p0 q0 × ∑ p1 q1 / ∑ p0 q1 × 100

= √ P01 L. P01p

**iv) Marshall – Edgeworth formula:**

**P01ME=** ∑ p1 q0 / ∑ p0 q0 + ∑ p1 q1 / ∑ p0 q1 × 100

**v) Bowley’s Formula :**

P01B = ½ (∑ p1 q0 / ∑ p0 q0 + ∑ p1 q1 / ∑ p0 q1 ) × 100

**vi) Kelly formula :** P01K = ∑ p1 q/ ∑ p0 q× 100

**IV. Weighted Averages of Relatives Method.**

**a) Using Arithmetic Mean:**

**Price Indices (P01)**

P01 = ∑WP/ ∑W

P = ∑ p1 / ∑ p0 × 100

W = Weights

P = Price of Aggregative

**b) Using Geometric Mean:**

**P01 = Antilog [ ∑ W log P/ ∑ W]**

P = ∑ p1 / ∑ p0 × 100

W = Weights

P = Price of Aggregative

**V) Tests of Consistency and Adequacy**

**a) Time Reversal Test (T.R. test)**

**P01 × P10 = 1**

**P01 =** √∑ p1 q0 / ∑ p0 q0 × ∑ p1 q1 / ∑ p0 q1

**P10 =** √∑ p0 q1 / ∑ p1 q1 × √ ∑ p0 q0 / ∑ p1 q0

**b) Factor Reversal Test (F.R.test)**

**P01 × Q01 =** ∑ p1 q1 / ∑ p0 q0

**P01 =** √∑ p1 q0 / ∑ p0 q0 × ∑ p1 q1 / ∑ p0 q1

**Q01 = √**∑ p0 q1 / ∑ p0 q0 × ∑ p1 q1 / ∑ p1 q0

**VI) Cost of living Index**

**i) Aggregate Expenditure Method or Weighted Aggregatives Method:**

Cost of living Index Number = √∑ p1 q0 / ∑ p0 q0 × 100

**ii) Aggregate Budget Method or Weighted Averages of Relatives Method:**

Cost of Living Index Number = ∑ WP / ∑W

Cost of Living Index Number = Antilog ( ∑log P / ∑W)