9. Index Numbers

Activities

1) Given the following table

Group	p_0	q_0	p_1	p_0q_0	p_1q_0
A	23	4	25		100
B	15	5	20	75	
C	5	9	8		72
D	12	5	18	60	
E	8	6	13		78
Total	-	-	-	320	440

∴ Cost of Living index using Aggregative Expenditure method is

$$CLI = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$$

$$= \frac{440}{320} \times 100 = 137.5$$

2) Given the following table

Commodity	p_0	q_0	p_1	q_1	q_0q_1	$\sqrt{q_0q_1}$	$p_0\sqrt{q_0q_1}$	$p_1\sqrt{q_0q_1}$
I	10	4	20	9	36	6	60	120
II	40	5	30	5	25	5	200	150
III	30	1	50	4	4	2	60	100
IV	50	05	60	2	1	1	50	60
Total	-	-	-	-	-	-	370	430

Walsch's Price Index Number is

$$P_{01(w)} = \frac{\Sigma p_1\sqrt{q_0q_1}}{\Sigma p_0\sqrt{q_0q_1}} \times 100$$

$$= \frac{430}{370} \times 100 = 116.22$$

3) Given the following table

Commodity	p_0	q_0	p_1	q_1	p_0q_0	p_1q_0	p_0q_1	p_1q_1
A	1	10	2	5	10	20	5	10
B	1	5	x	2	5	$5x$	2	$2x$
Total	-	-	-	7	15	$20+5x$	7	$10+2x$

since $P_{01}(L) = P_{01}(P)$

$\therefore \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}$

$\therefore \frac{20 + 5x}{15} = \frac{10 + 2x}{7}$

$\therefore 140 + 35x = 150 + 30x$

$\therefore 5x = 10$

$\therefore x = 2$

4) Given the following table

Group	I	W	I. W.
A	320	20	
B	140	15	2100
C	270	18	
D	160	22	3520
E	210	25	
Total	–	100	22130

Cost of Living index $= \frac{\Sigma I.W.}{\Sigma W}$

$= \frac{22130}{100} = 221.3$

B. Solve the Following

Q.1 Find x if the price index number by simple aggregate method is 125.

Commodity	P	Q	R	S	T
Base Year Price (in ₹)	8	12	16	22	18
Current Year Price (in ₹)	12	18	x	28	22

Commodity	Base Year Price (₹)	Current Year Price (₹)
P	8	12
Q	12	18
R	16	X
S	22	28
T	18	22
Total	$\Sigma P_0 = 76$	$\Sigma P_1 = 80 + X$

Price Index Number, $P_{01} = \frac{\Sigma P_1}{\Sigma P_0} \times 100$

$\therefore 125 = \frac{80+X}{76} \times 100$

$\therefore X = 15$

Q.2 Calculate Laspeyre's, Paasche's, Dorbish-Bowley's and Marshall-Edgeworth's Price Index Number.

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	8	20	11	5
B	7	10	12	10
C	3	30	5	20
D	2	50	4	15

Commodity	Base Year		Current Year		P_0q_0	P_1q_0	P_0q_1	P_1q_1
	P_0	q_0	P_1	q_1				
A	8	20	11	5	160	220	40	55
B	7	10	12	10	70	120	70	120
C	3	30	5	20	90	150	60	100
D	2	50	4	15	100	200	30	60
Total	-	-	-	-	420	690	200	335

(i) Laspeyre's Price Index Number :

$P_{01}(L) = \frac{\Sigma P_1q_0}{\Sigma P_0q_0} \times 100 = \frac{690}{420} \times 100 = 164.29$

(ii) Paasche's Price Index Number :

$P_{01}(P) = \frac{\Sigma P_1q_1}{\Sigma P_0q_1} \times 100 = \frac{335}{200} \times 100 = 167.5$

(iii) Dorbish - Bowley's Price Index Number :

$P_{01}(D-B) = \frac{P_{01}(L) + P_{01}(P)}{2} = \frac{164.29 + 167.5}{2}$

$P_{01}(D-B) = 165.90$

(iv) Marshall - Edgeworth's Price Index Number:

$$P_{01}(M-E) = \frac{\Sigma P_1 q_0 + \Sigma P_1 q_1}{\Sigma P_0 q_0 + \Sigma P_0 q_1} \times 100$$

$$= \frac{690 + 335}{420 + 200} \times 100 = \frac{1025}{620} \times 100$$

$$P_{01}(M-E) = 165.32$$

Q.3 Calculate the cost of living Index Number.

Group	Base year		Current year
	Price	Quantity	Price
Food	40	5	20
Clothing	30	10	35
Fuel and Lighting	20	17	10
House Rent	60	22	10
Miscellaneous	70	25	08

Group	Base Year		Current Year	P_1q_0	P_0q_0
	P_0	q_0	P_1		
Food	40	5	20	100	200
Clothing	30	10	35	350	300
Fuel & Lighting	20	17	10	170	340
House Rent	60	22	10	220	1320
Miscellaneous	70	25	08	200	1750
Total	-	-	-	1040	3910

Cost of Living Index Number $= \frac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times 100$

$= \frac{1040}{3910} \times 100$

$= 26.598$

Sign of Teacher :