FYJC - MATHEMATICS & STATISTICS

HIGHLIGHTS

- ✓ *Solution to all questions*
- ✓ *solutions are put in way the student is expected to reproduce in the exam*
- ✓ *taught in the class room the same way as the solution are put up here . That makes the student to easily go through the solution & prepare him/herself when he/she sits back to revise and recall the topic at any given point of time .*
- ✓ *lastly, if student due to some unavoidable reasons , has missed the lecture , will not have to run here and there to update his/her notes .*
- ✓ *however class room lectures are must for easy passage of understanding & learning the minuest details of the given topic*

PAPER - II

INDEX NUMBERS

Compiled & Conducted @ JKSC

INDEX NUMBERS

NOTATION AND TERMINOLOGY USED IN THIS CHAPTER

p_0 : price of commodity in the base year

p_1 : price of commodity in the current year

q_0 : quantity of a commodity consumed during the base year

q_1 : quantity of a commodity consumed during the current year

v_0 : value spent on a commodity during the base year $= p_0.q_0$

v_1 : value spent on a commodity during the current year $= p_1.q_1$

i : price relative $i = (p_1/ p_0) \times 100$

P_{01}: Price Index Number Q_{01} : Quantity Index Number

FORMULAES

Index Numbers Using **SIMPLE AGGREGATE METHOD :**

Price Index Number : $P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$

Quantity Index Number : $Q_{01} = \frac{\Sigma q_1}{\Sigma q_0} \times 100$

Value Index Number : $V_{01} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_0} \times 100$

WEIGHTED AGGREGATE PRICE INDEX NUMBERS:

Weighted Aggregate method : $P_{01} = \frac{\Sigma p_1 w}{\Sigma p_0 w} \times 100$

in most of the cases , quantities are taken as weights

Laspeyre's Index Number : $P_{01}(L) = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$

Paasche's Index Number : $P_{01}(P) = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$

Marshall & Edgeworth Index Number: $P_{01}(ME) = \frac{\Sigma p_1 q_0 + \Sigma p_1 q_1}{\Sigma p_0 q_0 + \Sigma p_0 q_1} \times 100$

(in this method , arithmetic average of base year & current year quantities are taken as weights)

Walsch's Index Number : $P_{01}(W) = \frac{\Sigma p_1 \sqrt{q_0.q_1}}{\Sigma p_0 \sqrt{q_0.q_1}} \times 100$

(in this method , Geometric average of base year & current year quantities are taken as weights)

Fisher's Index Number : $P_{01}(F) = \sqrt{P_{01}(L) \times P_{01}(P)}$

(geometric mean of Laspeyre's & Paasche's Index number)

Dorbish – Bowley Index Number : $P_{01}(DB) = \frac{P_{01}(L) + P_{01}(P)}{2}$

(arithmetic mean of Laspeyre's & Paasche's Index number)

Price Index Number using SIMPLE AGGREGATE METHOD

Q SET – 1

Q1

01.

Commodity	P	Q	R	S	T	
Price in 1995	10	25	14	20	30	Use 1995 as the base year
Price in 2000	32	40	20	45	70	**ans : 209.1**

02.

Commodity	P	Q	R	S	T	
Price in 1998	32	40	54	80	110	Use 1998 as the base year
Price in 2002	110	75	60	125	134	**ans : 159.5**

03.

Commodity	P	Q	R	S	T
Base year price	10	8	12	24	18
Current year price	14	10	x	28	22

Find x if the Price Index Number by Simple Aggregate Method is 125 **ans : x = 16**

04.

Commodity	P	Q	R	S	T
Base year price	20	12	22	23	13
Current year price	30	x	38	51	19

Find x if the Price Index Number by Simple Aggregate Method is 200 **ans : x = 42**

05. Find y if the Price Index Number by Simple Aggregate Method is 120

Commodity	P	Q	R	S
Price in 1997	90	y	90	30
Price in 1998	95	60	110	35

ans : y = 40

Quantity Index number using SIMPLE AGGREGATE METHOD

06. Find Quantity Index Numbers

q_0	170	130	100	195	205
q_1	90	70	75	150	95

ans : Q_{01} = 60

07. Find Quantity Index numbers

Quantity in 1980	100	170	210	90	50
Quantity in 1985	130	200	250	110	150

ans : Q_{01}=135.5

Q2: WEIGHTED AGGREGATE PRICE INDEX NUMBERS **Q SET – 2**

LASPEYRE'S , PAASCHE'S & MARSHALL – EDGEWORTH'S PRICE INDEX NUMBERS

01. for the following data , find the value of x if the Laspeyre's price index number is equal to Paasche's price index number

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	1	10	2	5
B	1	5	x	2

ans : x = 2

02. for the following data , find the value of x if the Laspeyre's price index number is equal to Paasche's price index number

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	3	x	2	5
B	4	6	3	5

ans : x = 6

03. for the following data , find the value of x if the Laspeyre's price index number is equal to Paasche's price index number

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	2	10	2	5
B	2	5	x	2

ans : x = 2

04. if $\Sigma p_0q_0 = 140$, $\Sigma p_0q_1 = 200$, $\Sigma p_1q_0 = 350$, $\Sigma p_1q_1 = 460$. Find Laspeyre's , Paasche's and Marshall – Edgeworth's Price Index numbers

ans : P_{01}(L) = 250 , P_{01}(P) = 230 , P_{01}(M-E) = 238.2

05. if $\Sigma p_0q_0 = 120$, $\Sigma p_0q_1 = 200$, $\Sigma p_1q_1 = 300$ and P_{01}(L) = 150 . Find P_{01}(M-E)

ans : P_{01}(M-E) = 150

06. if $\Sigma p_0q_0 = 180$, $\Sigma p_1q_0 = 200$, $\Sigma p_1q_1 = 280$ & P_{01}(M-E) = 150 . Find P_{01}(P)

ans : P_{01}(P) = 200

07. if $\Sigma p_0q_0 = 220$, $\Sigma p_0q_1 = 380$, $\Sigma p_1q_1 = 350$ & P_{01}(M-E) = 150 . Find P_{01}(L)

ans : P_{01}(P) = 250

08.

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	2	20	10	22
B	4	12	12	10
C	8	10	15	20
D	6	15	9	30

ans : P_{01} (L) =

P_{01} (P) =

09.

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	8	20	11	5
B	7	10	12	10
C	3	30	5	20
D	2	50	4	15

ans : P_{01} (L) = 164.3

P_{01} (P) = 167.5

10. Calculate Fisher's Price Index number

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
P	22	10	25	30
Q	34	12	35	40
R	28	15	25	25
S	26	14	25	10
T	30	11	35	10

Q3. FISHER'S & DROBISH – BOWLEY'S PRICE INDEX NUMBERS

Q SET - 3

01. If $P_{01}(L) = 225$, $P_{01}(P) = 144$, calculate $P_{01}(F)$ and $P_{01}(D\text{-}B)$

ans : P_{01} (F) = 180 ; P_{01} (D-B) = 184.50

02. If $P_{01}(L) = 90$, $P_{01}(P) = 40$, calculate $P_{01}(F)$ and $P_{01}(D\text{-}B)$

ans : P_{01} (F) = 60 ; P_{01} (D-B) = 65

03. Given that the Laspeyre's and Paasche's Price index numbers are 25 and 16 respectively , find the values of Drobish – Bowley's and Fisher's Price Index number .

ans : P_{01} (F) = 20 ; P_{01} (D-B) = 20.5

04. Given that Laspeyre's and Drobish - Bowley's Price index numbers are 150.2 and 152.8 respectively . Find the Paasche's Price Index number

ans : P_{01} (P) = 155.4

05. Given that Laspeyre's and Drobish - Bowley's Price index numbers are 160.32 and 164.18 respectively . Find the Paasche's Price Index number

ans : P_{01} (P) = 168.04

06. If Laspeyre's Price Index number is four times the Paasche's Price Index number then find the relation between Drobish – Bowley's and Fisher's Price Index Numbers .

ans : P_{01} (D-B) = 5/4 P_{01} (F)

Q4: WALSCH'S PRICE INDEX NUMBERS

Q SET - 4

01.

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	10	12	40	3
B	20	2	25	8
C	30	3	50	27
D	60	9	90	36

ans : P_{01} (W) = 161.7

02.

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	4	16	3	9
B	6	16	2	4
C	8	28	7	7

ans : P_{01} (W) = 72.11

03. Find x if the Walsch's Price Index number for the given data is 150

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	5	3	10	3
B	x	4	16	9
C	15	5	23	5
D	20	2	26	8

ans : x = 10

COST OF LIVING INDEX NUMBER (CLI)

Q SET - 5

1.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
I	70	90	100	60	80
w	5	3	2	4	6

ans : CLI = 77

2.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
I	120	100	140	160	150
w	3	6	5	2	4

ans : CLI = 129

3.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
I	78	80	110	60	90
w	5	3	4	2	6

ans : CLI = 86.5

4.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
$I_{(2000)}$	400	300	150	120	100
w	3	3	4	5	2

ans : CLI = 205.88

5.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
I	180	120	160	300	200
w	4	5	3	y	2

Cost of living index = 200 .
Find y

ans : 6

6.

Group	Food	Clothes	Fuel and Lighting	House Rent	Misc.
I	100	125	174	x	90
w	13	12	10	8	7

Cost of living index = 121
Find x

ans : 110

7. Find the cost of Living Index number taking 2001 as base year

Group	Price (2001)	Price (2006)	Weight
A	15	36	60
B	48	96	5
C	30	90	10
D	60	180	15
E	45	90	10

ans : 249

8. Find the Cost of living Index number using FAMILY BUDGET METHOD

Also obtain expenditure of a person in the year 1998 if his expenditure in the year 1995 was Rs 800

Group	Price (1995)	Price (1998)	Weight
Food	8	24	6
Clothing	18	36	12
Fuel & Light	20	40	8
House Rent	15	30	4
Miscellaneous	10	22	10

ans : 220 , 1760

9. Find the Cost of living Index number using FAMILY BUDGET METHOD

Also obtain expenditure of a person in the year 2008 if his expenditure in the year 2007 was Rs 10,000

Group	Price (2007)	Price (2008)	Weight
Food	12	60	25
Clothing	10	45	20
Fuel & Light	20	35	15
House Rent	25	20	30
Miscellaneous	16	48	10

ans : 295.25 , 29,525

REAL INCOME

Q SET - 6

$$\text{REAL INCOME} = \frac{\text{INCOME}}{\text{CLI}} \times 100$$

01. The cost of living Index number for the years 2002 and 2006 are 120 and 220 respectively . A person earns Rs 10800 per month in the year 2002 . What should be his earnings per month in the year 2006 , so as to maintain his former (i.e. of the year 2002) standard of living

ans : 19,800

02. The cost of living Index number for the years 1996 and 1999 are 140 and 200 respectively . A person earns Rs 11,200 per month in the year 1996 . What should be his earnings per month in the year 1999 , so as to maintain his former (i.e. of the year 1996) standard of living

ans : 16,000

03. The cost of living Index number for the years 2001 and 2003 are 150 and 210 respectively . A person earns Rs 13,500 per month in the year 2001 . What should be his earnings per month in the year 2003 , so as to maintain his former (i.e. of the year 2001) standard of living

ans : 18,900

SOLUTION SET

SOLUTION TO Q SET – 1

INDEX NOS USING SIMPLE AGGREGATE METHOD

Q1

03.

Commodity	P	Q	R	S	T	
Price in 1995	10	25	14	20	30	Use 1995 as the base year
Price in 2000	32	40	20	45	70	

SOLN : $\Sigma p_0 = 99$, $\Sigma p_1 = 207$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$$

$$= \frac{207}{99} \times 100 = 209.1$$

04.

Commodity	P	Q	R	S	T	
Price in 1998	32	40	54	80	110	Use 1998 as the base year
Price in 2002	110	75	60	125	134	

SOLN : $\Sigma p_0 = 336$, $\Sigma p_1 = 504$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$$

$$= \frac{504}{316} \times 100$$

$$= 159.5$$

LOG CALC

2.7024
−2.4997
AL(0.2027)
1.595

03.

Commodity	P	Q	R	S	T
Base year price	10	8	12	24	18
Current year price	14	10	x	28	22

Find x if the Price Index Number by Simple Aggregate Method is 125

SOLN : $\Sigma p_0 = 72$, $\Sigma p_1 = 74 + x$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$$

$$125 = \frac{74 + x}{72} \times 100$$

$$\overset{5}{\cancel{125}} \times 72 \;/\; \cancel{100}_{\,4} = 74 + x$$

$$90 = 74 + x$$

$$x = 16$$

04.

Commodity	P	Q	R	S	T
Base year price	20	12	22	23	13
Current year price	30	x	38	51	19

Find x if the Price Index Number by Simple Aggregate Method is 200

SOLN : $\Sigma p_0 = 90$, $\Sigma p_1 = 138 + x$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$$

$$200 = \frac{138+x}{90} \times 100$$

$$\frac{^{2}\cancel{200} \times 90}{\cancel{100}} = 138 + x$$

$$180 = 138 + x$$

$$x = 42$$

05. Find y if the Price Index Number by Simple Aggregate Method is 120

Commodity	P	Q	R	S
Price in 1997	90	y	90	30
Price in 1998	95	60	110	35

SOLN : $\Sigma p_0 = 210+y$, $\Sigma p_1 = 300$

$$P_{01} = \frac{\Sigma p_1}{\Sigma p_0} \times 100$$

$$120 = \frac{300}{210+y} \times 100$$

$$210 + y = \frac{300 \times 100}{120}$$

$$210 + y = 250$$

$$y = 40$$

06. Find Quantity Index Numbers

q_0	170	130	100	195	205
q_1	90	70	75	150	95

SOLN : $\Sigma q_0 = 800$, $\Sigma q_1 = 480$

$$Q_{01} = \frac{\Sigma q_1}{\Sigma q_0} \times 100$$

$$= \frac{480}{600} \times 100 = 80$$

07. Find Quantity Index numbers

Quantity in 1980	100	170	210	90	50
Quantity in 1985	130	200	250	110	150

ans : Q_{01}=135.5

SOLN : $\Sigma q_0 = 620$, $\Sigma q_1 = 840$

$$Q_{01} = \frac{\Sigma q_1}{\Sigma q_0} \times 100$$

$$= \frac{840}{620} \times 100 = 135.5$$

LASPEYRE'S & PAASCHE'S PRICE INDEX NOS

SOLUTION TO Q SET - 2

01.

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	1	10	2	5
B	1	5	x	2

find x if given that Laspeyre's price index no. is equal to Paasche's price indec number

p_0	q_0	p_1	q_1	p_1q_0	p_1q_1	p_0q_0	p_0q_1
1	10	2	5	20	10	10	5
1	5	x	2	5x	2x	5	2
				20 + 5x	10 + 2x	15	7

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

$$\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \cancel{100} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times \cancel{100}$$

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

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

$$5x = 10 \qquad \mathbf{x = 2}$$

02.

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	3	x	2	5
B	4	6	3	5

find x if given that Laspeyre's price index no. is equal to Paasche's price indec number

p_0	q_0	p_1	q_1	p_1q_0	p_1q_1	p_0q_0	p_0q_1
3	x	2	5	2x	10	3x	15
4	6	3	5	18	15	24	20
				2x + 18	25	3x+24	35

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

$$\frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times \cancel{100} = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times \cancel{100}$$

$$\frac{2x + 18}{3x + 24} = \frac{\cancel{25}\ 5}{\cancel{35}\ 7}$$

$14x + 126 = 15x + 120 \quad \therefore \mathbf{x = 6}$

03.

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1 .
A	2	10	2	5
B	2	5	x	2

find x if given that Laspeyre's price index no. is equal to Paasche's price indec number

p_0	q_0	p_1	q_1	p_1q_0	p_1q_1	p_0q_0	p_0q_1
2	10	2	5	20	10	20	10
2	5	x	2	5x	2x	10	4
				20 + 5x	10 + 2x	30	14

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

$$\frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times \cancel{100} = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times \cancel{100}$$

$$\frac{20 + 5x}{\cancel{30}\ 15} = \frac{10 + 2x}{\cancel{14}\ 7}$$

$140 + 35x = 150 + 30x$

$5x = 10 \qquad \mathbf{x = 2}$

MARSHALL - EDGEWORTH'S PRICE INDEX NO.

04.

$\Sigma p_0q_0 = 140$, $\Sigma p_0q_1 = 200$, $\Sigma p_1q_0 = 350$, $\Sigma p_1q_1 = 460$. Find Laspeyre's , Paasche's and Marshall – Edgeworth's Price Index numbers

$$\mathbf{P_{01}(L)} = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$$

$$= \frac{350}{140} \times 100$$

$$= \frac{5}{2} \times 100$$

$$= 250$$

$$\mathbf{P_{01}(P)} = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times 100$$

$$= \frac{460}{200} \times 100$$

$$= 230$$

$$\mathbf{P_{01}(ME)} = \frac{\Sigma p_1q_0 + \Sigma p_1q_1}{\Sigma p_0q_0 + \Sigma p_0q_1} \times 100$$

$$= \frac{350 + 460}{140 + 200} \times 100$$

$$= \frac{810}{340} \times 100$$

$$= \frac{81}{34} \times 100$$

$$= 238.2$$

05.

if $\Sigma p_0q_0 = 120$, $\Sigma p_0q_1 = 200$, $\Sigma p_1q_1 = 300$ and $P_{01}(L) = 150$. Find $P_{01}(M\text{-}E)$

$$\mathbf{P_{01}(L)} = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$$

$$150 = \frac{\Sigma p_1q_0}{120} \times 100$$

$$\Sigma p_1q_0 = \frac{150 \times 120}{100}$$

$$\Sigma p_1q_0 = 180$$

$$\mathbf{P_{01}(ME)} = \frac{\Sigma p_1q_0 + \Sigma p_1q_1}{\Sigma p_0q_0 + \Sigma p_0q_1} \times 100$$

$$= \frac{180 + 300}{120 + 200} \times 100$$

$$= \frac{480}{320} \times 100$$

$$= \frac{3}{2} \times 100$$

$$= 150$$

06.

if $\Sigma p_0q_0 = 180$, $\Sigma p_1q_0 = 200$, $\Sigma p_1q_1 = 280$ & $P_{01}(M\text{-}E) = 150$. Find $P_{01}(P)$

$$\mathbf{P_{01}(ME)} = \frac{\Sigma p_1q_0 + \Sigma p_1q_1}{\Sigma p_0q_0 + \Sigma p_0q_1} \times 100$$

$$150 = \frac{200 + 280}{180 + \Sigma p_0q_1} \times 100$$

$$180 + \Sigma p_0q_1 = \frac{480 \times 100}{150}$$

$$180 + \Sigma p_0q_1 = 320$$

$$\Sigma p_0q_1 = 140$$

$$\mathbf{P_{01}(P)} = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times 100$$

$$= \frac{280}{140} \times 100$$

$$= 200$$

07. if $\Sigma p_0q_0 = 220$, $\Sigma p_0q_1 = 380$, $\Sigma p_1q_1 = 350$ & $P_{01}(M\text{-}E) = 150$. Find $P_{01}(L)$

$$P_{01}(ME) = \frac{\Sigma p_1q_0 + \Sigma p_1q_1}{\Sigma p_0q_0 + \Sigma p_0q_1} \times 100$$

$$150 = \frac{\Sigma p_1q_0 + 350}{220 + 380} \times 100$$

$$150 = \frac{\Sigma p_1q_0 + 350}{600} \times 100$$

$$\Sigma p_1q_0 + 350 = 900$$

$$\Sigma p_1q_0 = 550$$

$$P_{01}(L) = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$$

$$= \frac{550}{220} \times 100$$

$$= \frac{5}{2} \times 100$$

$$= 250$$

08.

p_0	q_0	p_1	q_1	p_1q_0	p_1q_1	p_0q_0	p_0q_1
2	20	10	22	200	220	40	44
4	12	12	10	144	120	48	40
8	10	15	20	150	300	80	160
6	15	9	30	135	270	90	180
				629	910	258	424
				Σp_1q_0	Σp_1q_1	Σp_0q_0	Σp_0q_1

$$P_{01}(L) = \frac{\Sigma p_1q_0}{\Sigma p_0q_0} \times 100$$

$$= \frac{629}{258} \times 100$$

$$= 243.9$$

LOG CALC

2.7987
−2.4116
AL(0.3871)
2.439

$$P_{01}(P) = \frac{\Sigma p_1q_1}{\Sigma p_0q_1} \times 100$$

$$= \frac{910}{424} \times 100$$

$$= 214.6$$

LOG CALC

2.9590
−2.6274
AL(0.3316)
2.146

09.

p_0	q_0	p_1	q_1	p_1q_0	p_1q_1	p_0q_0	p_0q_1
8	20	11	5	220	55	160	40
7	10	12	10	120	120	70	70
3	30	5	20	150	100	90	60
2	50	4	15	200	60	100	30
				690	335	420	200
				Σp_1q_0	Σp_1q_1	Σp_0q_0	Σp_0q_1

$$P_{01(L)} = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$$

$$= \frac{690}{420} \times 100$$

$$= 164.3$$

SOLUTION TO Q SET - 3

01. If $P_{01}(L) = 225$, $P_{01}(P) = 144$, calculate $P_{01}(F)$ and $P_{01}(D\text{-}B)$

$P_{01}(L) = 225$, $P_{01}(P) = 144$

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

$$= \frac{225 + 144}{2}$$

$$= \frac{369}{2} = 184.5$$

$$P_{01(F)} = \sqrt{P_{01(L)} \times P_{01(P)}}$$

$$= \sqrt{225 \times 144}$$

$$= 15 \times 12 = 180$$

02. If $P_{01}(L) = 90$, $P_{01}(P) = 40$, calculate $P_{01}(F)$ and $P_{01}(D\text{-}B)$

If $P_{01}(L) = 90$, $P_{01}(P) = 40$

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

$$= \frac{90 + 40}{2}$$

$$= \frac{130}{2} = 65$$

$$P_{01(F)} = \sqrt{P_{01(L)} \times P_{01(P)}}$$

$$= \sqrt{90 \times 40}$$

$$= \sqrt{3600} = 60$$

$$P_{01(P)} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$$

$$= \frac{335}{200} \times 100$$

$$= 167.5$$

FISHER'S & DROBISH BOWLEY'S PRICE INDEX NOS.

03. Given that the Laspeyre's and Paasche's Price index numbers are 25 and 16 respectively , find the values of Drobish – Bowley's and Fisher's Price Index number

If $P_{01}(L) = 25$, $P_{01}(P) = 16$

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

$$= \frac{25 + 16}{2}$$

$$= \frac{41}{2} = 20.5$$

$$P_{01(F)} = \sqrt{P_{01(L)} \times P_{01(P)}}$$

$$= \sqrt{25 \times 16}$$

$$= 5 \times 4 = 20$$

04.

Given that Laspeyre's and Drobish - Bowley's Price index numbers are 150.2 and 152.8 respectively . Find the Paasche's Price Index number

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

$$152.8 = \frac{150.2 + P_{01(P)}}{2}$$

$$305.6 = 150.2 + P_{01(P)}$$

$$P_{01(P)} = 305.6 - 150.2$$

$$= 155.4$$

05.

Given that Laspeyre's and Drobish - Bowley's Price index numbers are 160.32 and 164.18 respectively . Find the Paasche's Price Index number

If $P_{01}(L) = 160.32$, $P_{01}(D-B) = 164.18$

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

$$164.18 = \frac{160.32 + P_{01(P)}}{2}$$

$$328.36 = 160.32 + P_{01(P)}$$

$$P_{01(P)} = 328.36 - 160.32$$

$$= 168.04$$

06.

If Laspeyre's Price Index number is four times the Paasche's Price Index number then find the relation between Drobish – Bowley's and Fisher's Price Index Numbers

$P_{01}(L) = 4\, P_{01(P)}$

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

$$= \frac{4P_{01(P)} + P_{01(P)}}{2}$$

$$= \frac{5P_{01(P)}}{2}$$

$$P_{01(F)} = \sqrt{P_{01(L)} \times P_{01(P)}}$$

$$= \sqrt{4P_{01(P)} \times P_{01(P)}}$$

$$= 2P_{01(P)}$$

$$\frac{P_{01(D-B)}}{P_{01(F)}} = \frac{\frac{5P_{01(P)}}{2}}{2P_{01(P)}}$$

$$\frac{P_{01(D-B)}}{P_{01(F)}} = \frac{5}{4}$$

$$P_{01(D-B)} = \frac{5}{4} P_{01(F)}$$

WALSCH PRICE INDEX NO.

SOLUTION TO Q SET - 4

01.

p_o	q_o	p_1	q_1	$\sqrt{q_0q_1}$	$p_1.\sqrt{q_oq_1}$	$p_o\sqrt{q_0q_1}$
10	12	40	3	6	240	60
20	2	25	8	4	100	80
30	3	50	27	9	450	270
60	9	90	36	18	1620	1080
					2410	1490

$$P_{01(W)} = \frac{\Sigma p_1.\sqrt{q_oq_1}}{\Sigma p_o\sqrt{q_0q_1}} \times 100 = \frac{2410}{1490} \times 100 = 161.7$$

02.

p_o	q_o	p_1	q_1	$\sqrt{q_0q_1}$	$p_1.\sqrt{q_oq_1}$	$p_o\sqrt{q_0q_1}$
4	16	3	9	12	36	48
6	16	2	4	8	16	48
8	28	7	7	14	98	112
					150	208

$$P_{01(W)} = \frac{\Sigma p_1.\sqrt{q_oq_1}}{\Sigma p_o\sqrt{q_0q_1}} \times 100 = \frac{150}{208} \times 100 = 72.11$$

03. GIVEN : $P_{01(W)} = 150$

p_o	q_o	p_1	q_1	$\sqrt{q_0q_1}$	$p_1.\sqrt{q_oq_1}$	$p_o\sqrt{q_0q_1}$
5	3	10	3	3	30	15
x	4	16	9	6	96	6x
15	5	23	5	5	115	75
20	2	26	8	4	104	80
					345	170 + 6x

$$P_{01(W)} = \frac{\Sigma p_1.\sqrt{q_oq_1}}{\Sigma p_o\sqrt{q_0q_1}} \times 100$$

$$150 = \frac{345}{170 + 6x} \times 100$$

$$170 + 6x = \frac{345}{150} \times 100$$

$$170 + 6x = 230$$

$$6x = 60 \quad \therefore x = 10$$

SOLUTION TO Q SET - 5

01.

Group	I	w	IW
Food	70	5	350
Clothes	90	3	270
Fuel & Light	100	2	200
House Rent	60	4	240
Misc.	80	6	480
		20	1540

$$\textbf{CLI} = \frac{\sum IW}{\sum W} = \frac{1540}{20} = 77$$

02.

Group	I	w	IW
Food	120	3	360
Clothes	100	6	600
Fuel & Light	140	5	700
House Rent	160	2	320
Misc.	150	4	600
		20	2580

$$\textbf{CLI} = \frac{\sum IW}{\sum W} = \frac{2580}{20} = 129$$

03.

Group	I	w	IW
Food	78	5	390
Clothes	80	3	240
Fuel & Light	110	4	440
House Rent	60	2	120
Misc.	90	6	540
		20	1730

$$\textbf{CLI} = \frac{\sum IW}{\sum W} = \frac{1730}{20} = 86.5$$

04.

Group	I	w	IW
Food	400	3	1200
Clothes	300	3	900
Fuel & Light	150	4	600
House Rent	120	5	600
Misc.	100	2	200
		17	3500

$$\textbf{CLI} = \frac{\sum IW}{\sum W} = \frac{3500}{17} = 205.88$$

COST OF LIVING INDEX NUMBER (CLI)

05.

Group	I	w	IW
Food	180	4	720
Clothes	120	5	600
Fuel & Light	160	3	480
House Rent	300	y	300y
Misc.	200	2	400
		14+y	2200+300y

$$\textbf{CLI} = \frac{\sum IW}{\sum W}$$

$$200 = \frac{2200 + 300y}{14 + y}$$

$$2800 + 200y = 2200 + 300y$$

$$600 = 100y \qquad \therefore y = 6$$

06.

Group	I	w	IW
Food	100	13	1300
Clothes	125	12	1500
Fuel & Light	174	10	1740
House Rent	x	8	8x
Misc.	90	7	630
		50	5170 + 8x

$$\textbf{CLI} = \frac{\sum IW}{\sum W}$$

$$121 = \frac{5170 + 8x}{50}$$

$$6050 = 5170 + 8x$$

$$880 = 8x$$

$$\therefore x = 110$$

07. Find the cost of Living Index number taking 2001 as base year

Group	p_0	p_1	w	$I = \frac{p_1}{P_0} \times 100$	Iw
A	15	36	60	$\frac{36}{15} \times 100 = 240$	14400
B	48	96	5	$\frac{96}{48} \times 100 = 200$	1000
C	30	90	10	$\frac{90}{30} \times 100 = 300$	3000
D	60	180	15	$\frac{180}{60} \times 100 = 300$	4500
E	45	90	10	$\frac{90}{45} \times 100 = 200$	2000
			$\Sigma w = 100$		$\Sigma Iw = 24900$

$$CLI = \frac{\Sigma Iw}{\Sigma w} = \frac{24900}{100} = 249$$

08. Find the cost of Living Index number

Group	p_0	p_1	w	$I = \frac{p_1}{P_0} \times 100$	Iw
Food	8	24	6	$\frac{24}{8} \times 100 = 300$	1800
Clothing	18	36	12	$\frac{36}{18} \times 100 = 200$	2400
Fuel & Light	20	40	8	$\frac{40}{20} \times 100 = 200$	1600
House Rent	15	30	4	$\frac{30}{15} \times 100 = 200$	800
Misc	10	22	10	$\frac{22}{10} \times 100 = 220$	2200
			$\Sigma w = 40$		$\Sigma Iw = 8800$

$$CLI = \frac{\Sigma Iw}{\Sigma w} = \frac{8800}{40} = 220$$

In 1995 ; CLI = 100 ; Expenditure = 800/-

In 1998 ; CLI = 220 ; Expenditure = $\frac{800 \times 220}{100}$ = 1760/-

09. Find the cost of Living Index number

Group	p_0	p_1	w	$I = \frac{p_1}{P_0} \times 100$	Iw
Food	12	60	25	$\frac{60}{12} \times 100 = 500$	12500
Clothing	10	45	20	$\frac{45}{10} \times 100 = 450$	9000
Fuel & Light	20	35	15	$\frac{35}{20} \times 100 = 175$	2625
House Rent	25	20	30	$\frac{20}{25} \times 100 = 80$	2400
Misc	16	48	10	$\frac{48}{16} \times 100 = 300$	3000
			$\Sigma w = 100$		$\Sigma Iw = 29525$

$$CLI = \frac{\Sigma Iw}{\Sigma w} = \frac{29525}{100} = 295.25$$

In 2007 ; CLI = 100 ; Expenditure = 10,000/-

In 2008 ; CLI = 295.25 ; Expenditure = $\frac{295.25 \times 10000}{100}$ = 29,525/-

SOLUTION TO Q SET - 6

REAL INCOME

01.

The cost of living Index number for the years 2002 and 2006 are 120 and 220 respectively . A person earns Rs 10800 per month in the year 2002 . What should be his earnings per month in the year 2006 , so as to maintain his former (i.e. of the year 2002) standard of living

Year	2002	2006
CLI	120	220
Income	□10800	?

2002

$$\text{Real income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$= \frac{10800}{120} \times 100$$

$$= \square\ 9000$$

2006

$$\text{Real Income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$9000 = \frac{\text{Income}}{220} \times 100$$

$$\text{Income} = \frac{9000 \times 220}{100}$$

$$= \square\ 19,800$$

02.

The cost of living Index number for the years 1996 and 1999 are 140 and 200 respectively . A person earns Rs 11,200 per month in the year 1996 . What should be his earnings per month in the year 1999 , so as to maintain his former (i.e. of the year 1996) standard of living

Year	1996	1999
CLI	140	200
Income	□11200	?

1996

$$\text{Real income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$= \frac{11200}{140} \times 100$$

$$= \square\ 8000$$

1999

$$\text{Real Income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$8000 = \frac{\text{Income}}{200} \times 100$$

$$\text{Income} = \frac{8000 \times 200}{100}$$

$$= \square\ 16{,}000$$

03.

The cost of living Index number for the years 2001 and 2003 are 150 and 210 respectively . A person earns Rs 13,500 per month in the year 2001 . What should be his earnings per month in the year 2003 , so as to maintain his former (i.e. of the year 2001) standard of living

Year	2001	2003
CLI	150	210
Income	□13500	?

2001

$$\text{Real income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$= \frac{13500}{150} \times 100$$

$$= \square\ 9000$$

2003

$$\text{Real Income} = \frac{\text{Income}}{\text{CLI}} \times 100$$

$$9000 = \frac{\text{Income}}{210} \times 100$$

$$\text{Income} = \frac{9000 \times 210}{100}$$

$$= \square\ 18{,}900$$