ii) Ratio to trend method.

question.

Year	Q_1	Q_2	Q_3	Q_4
1987	30	40	36	34
88	34	52	50	44
89	40	58	54	48
90	54	76	68	62
91	80	92	86	82.

→ calculate.

Yearly Total = $Q_1+Q_2+Q_3+Q_4$
140
180
200
260
340

Quaterly Avg
= 140/4 = 35
= 180/4 = 45
= 200/4 = 50
= 260/4 = 65
= 340/4 = 85.

Now your Q is

Year	y	x
1987	35	-2
1988	45	-1
1989	50	0
1990	65	1
1991	80	2

— table 1

Nothing's too far

now for table I calculate

$Y_t = a + bt$ where

$\Sigma Y = na + b\Sigma x$

$\Sigma xy = a\Sigma x + b\Sigma x^2$

$\therefore 280 = 15)a + 0 \Rightarrow a = 56$

$\therefore 120 = (56)(0) + b \times 10 \Rightarrow b = 12$

$\therefore \boxed{Y_t = 56 + 12t}$

$\therefore \boxed{\hat{Y} = 56 + 12t}$ → trend equation

32 (+12)
44 (+12)
56 (+12)
68 (+12)
80

→ trend values

these represent expected quaterly avg of each year.

$b = 12$ = yearly increment

$\therefore$ quaterly increment $= \frac{12}{4} = 3$

(31) Calculate quaterly trend values

Year	Q_1	Q_2	Q_3	Q_4
1987	27·5	30·5	33·5	36·5
1988	39·5	42·5	45·5	48·5
1989	51·5	54·5	57·5	60·5
1990	63·5	66·5	69·5	72·5
1991	75·5	78·5	81·5	84·5

since quaterly increment = 3

$\Rightarrow Q_2 = Q_1 + 3$

$\Rightarrow Q_3 = Q_2 + 3$

$\Rightarrow Q_4 = Q_3 + 3$.

(32) Calculate values as % of quaterly trend values.

Year	Q_1	Q_2	Q_3	Q_4
	$30/27.5 \times 100$	$40/30.5 \times 100$	$36/33.5 \times 100$	$34/36.5 \times 100$
	86·1	122·4	109·9	90·7
	77·7	106·4	93·9	79·3
	85	114·3	97·8	85·5
	106	117·1	105·5	97
Total	463·9	591·3	514·6	445·6
avg	$\frac{463.9}{5}$	$\frac{591.3}{5}$	$\frac{514.6}{5}$	$\frac{445.6}{5}$
	= 92·78	= 118·26	= 102·92	= 89·12.

Nothing's too far

(53) General avg $= \frac{\frac{463.9}{5} + \frac{591.3}{5} + \frac{514.6}{5} + \frac{445.6}{5}}{4}$

$= 100.77$

∴ Now represent quatery values as % = seasonal indices

	Q_1	Q_2	Q_3	Q_4
seasonal indices (S.I.)	$\frac{92.78}{100.77} \times 100$	$\frac{118.26}{100.77} \times 100$	$\frac{102.92}{100.77} \times 100$	$\frac{89.12}{100.77} \times 100$