

* Daily Wages No. of Workers

100 - 150	02
150 - 200	05
200 - 250	13
250 - 300	17
300 - 350	23
350 - 400	12
400 - 450	05
450 - 500	03

* To find Mean:

C.I	f	CM x	fx
100-150	02	125	250
150-200	05	175	875
200-250	13	225	2925
250-300	17	275	4675
300-350	23	325	7475
350-400	12	375	4500
400-450	05	425	2125
450-500	03	475	1425
	80		24250

$$\text{Mean} = \bar{x} = \frac{\sum fx}{\sum f} = \frac{24250}{80} = 303.125$$

* To find Mode!

C.I.	f
100 - 150	02
150 - 200	05
200 - 250	13
250 - 300	17 = f_0
$l_1 = 300 - 350 = l_2$	23 = f_1
350 - 400	12 = f_2
400 - 450	05
450 - 500	03

$$\text{Mode} = z = l_1 + \left[\frac{(l_2 - l_1) (f_1 - f_0)}{2f_1 - f_0 - f_2} \right]$$

$$= 300 + \left[\frac{(350 - 300) (23 - 17)}{2 \times 23 - 17 - 12} \right]$$

$$= 300 + \left[\frac{50 \times 6}{46 - 29} \right]$$

$$= 300 + \left[\frac{300}{17} \right]$$

$$= 300 + 17.647 = 317.647,,$$

* To find Median :

	C.I.	f	CF
	100-150	02	02
	150-200	05	07
	200-250	13	20
	250-300	17	37 = CF
l_1	300-350 l_2	23 = f	60
	350-400	12	72
	400-450	05	77
	450-500	03	80
		<u>80 = N</u>	

$$\therefore \frac{N}{2} = \frac{80}{2} = 40$$

$$\text{Median} = M = l_1 + \left[\frac{(l_2 - l_1) \left(\frac{N}{2} - CF \right)}{f} \right]$$

$$= 300 + \left[\frac{(350 - 300) (40 - 37)}{23} \right]$$

$$= 300 + \left[\frac{50 \times 03}{23} \right]$$

$$= 300 + 6.522 = 306.522$$

* To find first and third quartile (ie) Q_1 and Q_3 :-

C.I.	f	cf
100-150	02	02
150-200	05	07 = cf
$l_1 = 200 - 250 = l_2$	13 = f	20
250-300	17	37 = cf
$l_1 = 300 - 350 = l_2$	23 = f	60
350-400	12	72
400-450	05	77
450-500	03	80
	<u>80 = N</u>	

$$\frac{N}{4} = \frac{80}{4} = 20 \quad \text{and} \quad \frac{3N}{4} = \frac{3 \times 80}{4} = 60$$

$$Q_1 = l_1 + \left[\frac{(l_2 - l_1) \left(\frac{N}{4} - cf \right)}{f} \right]$$

$$= 200 + \left[\frac{(250 - 200) (20 - 07)}{13} \right]$$

$$= 200 + \left[\frac{50 \times 13}{13} \right]$$

$$= 200 + 50 = 250$$

$$Q_3 = l_1 + \left[\frac{(l_2 - l_1) \left(\frac{3N}{4} - cf \right)}{f} \right]$$

$$= 300 + \left[\frac{(350 - 300) (60 - 37)}{23} \right]$$

$$= 300 + \left[\frac{50 \times 23}{23} \right]$$

$$= 300 + 50$$

$$= 350$$

To find ^{35th} percentile and ^{6th} Decile (ie) P_{35} and D_6 :

C.I.	f	cf
100-150	02	02
150-200	05	07
200-250	13	20 = cf
$l_1 = 250 - 300 = l_2$	17 = f	37 = cf
$l_1 = 300 - 350 = l_2$	23 = f	60
350-400	12	72
400-450	05	77
450-500	03	80
	<u>80 = N</u>	

$$\frac{35N}{100} = \frac{35 \times 80}{100} = 28 \quad \text{and} \quad \frac{6N}{10} = \frac{6 \times 80}{10} = 48$$

$$\begin{aligned}
 P_{35} &= l_1 + \left[\frac{(l_2 - l_1) \left(\frac{35N}{100} - cf \right)}{f} \right] \\
 &= 250 + \left[\frac{(300 - 250) (28 - 20)}{17} \right] \\
 &= 250 + \left[\frac{50 \times 8}{17} \right] \\
 &= 250 + 23.529 = 273.529
 \end{aligned}$$

$$\begin{aligned}
 D_6 &= l_1 + \left[\frac{(l_2 - l_1) \left(\frac{6N}{10} - cf \right)}{f} \right] \\
 &= 300 + \left[\frac{(350 - 300) (48 - 37)}{23} \right] \\
 &= 300 + \left[\frac{50 \times 11}{23} \right] \\
 &= 300 + 23.913 = 323.913
 \end{aligned}$$

* To find mean deviation from mean:

C.I.	f	CM x	fx	$ x - \bar{x} $	$f x - \bar{x} $
100-150	02	125	250	178.125	356.25
150-200	05	175	875	128.125	640.625
200-250	13	225	2925	78.125	1015.625
250-300	17	275	4675	28.125	478.125
300-350	23	325	7475	21.875	503.125
350-400	12	375	4500	71.875	862.5
400-450	05	425	2125	121.875	609.375
450-500	03	475	1425	171.875	515.625
	<u>80</u>		<u>24250</u>		<u>4981.25</u>

$$\text{Mean} = \bar{x} = \frac{\sum fx}{\sum f} = \frac{24250}{80} = 303.125$$

$$\text{Mean deviation from mean} = \frac{\sum f|x - \bar{x}|}{\sum f} = \frac{4981.25}{80} = 62.266$$

* To find 10-90 Percentile Range!

C.I.	f	cf
100-150	02	02
150-200	05	07 = cf
$l_1 = 200 - 250 = l_2$	13 = f	20
250-300	17	37
300-350	23	60 = cf
$l_1 = 350 - 400 = l_2$	12 = f	72
400-450	05	77
450-500	03	80
	80 = N	

$$\frac{10N}{100} = \frac{10 \times 80}{100} = 8$$

$$\text{and } \frac{90N}{100} = \frac{90 \times 80}{100} = 72$$

$$P_{10} = l_1 + \left[\frac{(l_2 - l_1) \left(\frac{10N}{100} - cf \right)}{f} \right]$$

$$P_{90} = l_1 + \left[\frac{(l_2 - l_1) \left(\frac{90N}{100} - cf \right)}{f} \right]$$

$$= 200 + \left[\frac{(250 - 200)(8 - 7)}{13} \right]$$

$$= 350 + \left[\frac{(400 - 350)(72 - 60)}{12} \right]$$

$$= 200 + \left[\frac{50 \times 1}{13} \right]$$

$$= 350 + \left[\frac{50 \times 12}{12} \right]$$

$$= 200 + 3.846$$

$$= 350 + 50$$

$$= 203.846$$

$$= 400$$

$$10-90 \text{ percentile range} = P_{90} - P_{10}$$

$$= 400 - 203.846$$

$$= 196.154$$

* To Find Standard Deviation:

C.I.	f	CM (x)	fx	fx ²
100-150	02	125	250	31250
150-200	05	175	875	153125
200-250	13	225	2925	658125
250-300	17	275	4675	1285625
300-350	23	325	7475	2429375
350-400	12	375	4500	1687500
400-450	05	425	2125	903125
450-500	03	475	1425	676875
	<u>80</u>		<u>24250</u>	<u>7825000</u>

$$\begin{aligned}
 SD &= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2} \\
 &= \sqrt{\frac{7825000}{80} - \left(\frac{24250}{80}\right)^2} \\
 &= \sqrt{97812.5 - (303.125)^2} \\
 &= \sqrt{5927.734375} \\
 &= 76.99
 \end{aligned}$$