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## CHAPTER : STATISTICS

## LEVEL $1 \underline{(1 \text { Mark) }}$

Q1. Find the class mark of the class $10-25$
Ans: $\frac{10+25}{2}=\frac{35}{2}=17.5$
Q2.Find the mean of first five natural numbers.
Ans : $\frac{1+2+3+4+5}{5}=3$
Q3. If the mode of the distribution is $8 \&$ mean is also 8 then find median
Ans: 3 median $=$ mode +2 mean
3 median $=8+2 \times 8=24$

$$
\text { Median }=\frac{24}{3}=8
$$

Q4. Find the modal class of the following distribution

| Class | $0-6$ | $6-12$ | $12-18$ | $18-24$ | $24-30$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| frequency | 7 | 5 | 10 | 12 | 6 |

Ans:Maximum frequency $=12$

Modal class is 18-24.

## LEVEL $2 \underline{(2 \mathrm{Marks})}$

Q5. Convert the following frequency distribution table into a less than type cumulative frequency distribution table :

| Marks | $0-5$ | $5-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| No. of students. | 4 | 7 | 12 | 18 | 6 | 3 |

Ans: . less than type cumulative frequency table is

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| Marks | f | c.f. |
| :--- | :--- | :--- |
| Less than 5 | 4 | 4 |
| Less than 10 | 7 | 11 |
| Less than 15 | 12 | 23 |
| Less than 20 | 18 | 41 |
| Less than 25 | 6 | 47 |
| Less than 30 | 3 | 50 |

Q6. Find the mean of the following data

| X1 | 10 | 15 | 20 | 25 | 30 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| F1 | 5 | 10 | 7 | 8 | 2 |

Ans:

| x 1 | fi | fixi |
| :---: | :---: | :---: |
| 10 | 5 | 50 |
| 15 | 10 | 150 |
| 20 | 7 | 140 |
| 25 | 8 | 200 |
| 30 | 2 | 60 |
|  | $\sum \mathrm{fi}=32$ | $\sum \mathrm{fixi}=600$ |

$$
\begin{gathered}
\text { Mean }=\frac{\sum \mathrm{fixi}}{\sum \mathrm{fi}}=\underline{600}=18.75 \quad 1+1 \text { mark } \\
32
\end{gathered}
$$

Q7. : If mean of the following data is 9, Find the value of K.

| x | 3 | 6 | 12 | 15 | 9 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| y | 4 | K | 1 | 6 | 4 |

Ans:

| $x$ | $y$ | $x y$ |
| :---: | :--- | :---: |
| 3 | 4 | 12 |
| 6 | K | 6 k |
| 12 | 1 | 12 |
| 15 | 6 | 90 |
| 9 | 4 | 36 |
| total | $15+\mathrm{k}$ | $150+6 \mathrm{k}$ |
|  |  |  |

$\bar{x}=\frac{\sum f_{i} x_{i}}{\sum f_{i}}$
$\Rightarrow 9=\frac{150+6 K}{15+K}$
$\Rightarrow 135+9 K=150+6 K$
$\Rightarrow 3 K=15 \Rightarrow K=5$ ل
Q8. Write a frequency distribution table for the following data:

| Marks | Above 0 | Above 10 | Above 20 | Above 30 | Above 40 | Above 50 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. of <br> students | 30 | 28 | 21 | 15 | 10 | 0 |

Ans:

| Marks | No. of students |
| :--- | :--- |
| $0-10$ | 2 |
| $10-20$ | 7 |
| $20-30$ | 6 |
| $30-40$ | 5 |
| $40-50$ | 10 |
| Total | 30 |

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## LEVEL 3 ( $\mathbf{3}$ Marks)

Q 9. The distribution below gives the weights of 30 students of a class. Find the median weight of the students

| Weight in <br> Kg | $40-45$ | $45-50$ | $50-55$ | $55-60$ | $60-65$ | $65-70$ | $70-75$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| No. of <br> students | 2 | 3 | 8 | 6 | 6 | 3 | 2 |

Ans:
Marks
Frequency

## C.F



Q10. Find the mode of the given data

| Family size | $1-3$ | $3-5$ | $5-7$ | $7-9$ | $9-11$ |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| no. of <br> families | 7 | 8 | 2 | 2 | 1 |  |

Ans- model class=3-5, $\quad \mathrm{l}=3, \quad \mathrm{~h}=2$
f $1=8, \quad$ f $0=7, \quad f 2=2$

$$
\text { Mode }=I+\left(f_{1}-f_{0}\right) h /\left(2 f_{1}-f_{0}-f_{2}\right)
$$

Solving mode $=3.286$
Q11: Find x if mean of the following data is 62.8 .

| Class interval | Frequency |
| :--- | :--- |
| $0-20$ | 5 |
| $20-40$ | 8 |
| $40-60$ | x |
| $60-80$ | 12 |
| $80-100$ | 7 |
| $100-120$ | 8 |

Ans:

| C.I. | $\mathbf{x}_{\mathbf{i}}$ | $\mathbf{f i}$ | $\mathbf{f i ~ X ~}_{\mathbf{i}}$ |
| :---: | :---: | :---: | :---: |
| $0-20$ | 10 | 5 | 50 |
| $20-40$ | 30 | 8 | 240 |
| $40-60$ | 50 | x | 50 x |
| $60-80$ | 70 | 12 | 840 |
| $80-100$ | 90 | 7 | 630 |
| $100-120$ | 110 | 8 | 880 |

$$
\left.\begin{array}{l}
\bar{x}=\frac{\sum f_{i} x_{i}}{\sum f_{i}} \\
\sum f_{i}=40+x
\end{array}\right] \quad \begin{aligned}
& \sum f_{i} x_{i}=2640+50 x
\end{aligned}
$$

$$
62.8=(2640+50 x) /(40+x)
$$

$$
62.8(40+x)=2640+50 \mathrm{x}
$$

$$
2512+62.8 x=2640+50 x
$$

$$
62.8 x-50 x=2640-2512
$$

$$
12.8 x=128
$$

$$
X=128 / 12.8=1280 / 128
$$

$$
\mathrm{x}=10
$$

Q12. If the mean of the following distribution is 6 , find the value of $p$

| $X$ | $f$ |
| :---: | :---: |
| 2 | 3 |
| 4 | 2 |
| 6 | 3 |
| 10 | 1 |
| $P+5$ | 2 |

Ans:

| $\mathbf{x}$ | f | fx |
| :--- | :--- | :--- |
| 2 | 3 | 6 |
| 4 | 2 | 8 |
| 6 | 3 | 18 |
| 10 | 1 | 10 |
| P+5 | 2 | $2 \mathrm{p}+10$ |

$\sum \frac{f x}{f}=$ mean
So mean $=\frac{52+2 p}{11}=6$
$2 \mathrm{p}=66-52$
$\mathrm{P}=7$

## LEVEL 4 (4 Marks)

Q13. The median of the following data is 35 and the sum of all the frequencies is 170 .

| Class Interval | Frequencies |
| :--- | :--- |
| $0-10$ | 10 |
| $10-20$ | 20 |
| $20-30$ | $\mathrm{f}_{1}$ |
| $30-40$ | 40 |
| $40-50$ | $\mathrm{f}_{2}$ |
| $50-60$ | 25 |
| $60-70$ | 15 |

Find $f_{1}$ and $f_{2}$, the missing frequencies.
Ans:

$$
\mathrm{f}_{1}+\mathrm{f}_{2}+110=170
$$

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$\mathrm{f}_{1}+\mathrm{f}_{2}=170-110=60$ finding c.f

| $0-10$ | $10-20$ | $20-30$ | $\mathbf{3 0 - 4 0}$ | $40-50$ | $50-60$ | $60-70$ |
| :--- | :---: | :--- | :--- | :--- | :--- | :--- |
| 10 | 30 | $30+\mathrm{f}_{1}$ | $70+\mathrm{f}_{1}$ | $70+\mathrm{f}_{1}+\mathrm{f}_{2}$ | $95+\mathrm{f}_{1}+\mathrm{f}_{2}$ | $110+\mathrm{f}_{1}+\mathrm{f}_{2}$ |

Median class $=30-40$

$$
\begin{aligned}
& 1=30, \mathrm{n}=170, \mathrm{c} \\
& \text { Median }=1+\left(\frac{\frac{n}{2}-c f}{f}\right) \times h
\end{aligned}
$$

$$
35=30+\left[170 / 2-\left(30+\mathrm{f}_{1}\right)\right] \times 10 / 40
$$

$$
35-30=\left[85-\left(30+\mathrm{f}_{1}\right)\right] / 4
$$

$$
5 \times 4=85-30-\mathrm{f}_{1}
$$

$$
20-85+30=-\mathrm{f}_{1}
$$

$$
f_{1}=35
$$

therefore $\mathrm{f}_{2}=60-35=25$
Q14. The median of the following data is 525 . Find the values of $x$ and $y$, if the Total frequency is 100 .

| Class interval | Frequency |
| :--- | :--- |
| $0-100$ | 2 |
| $100-200$ | 5 |
| $200-300$ | X |
| $300-400$ | 12 |
| $400-500$ | 17 |
| $500-600$ | 20 |
| $600-700$ | Y |
| $700-800$ | 9 |
| $800-900$ | 7 |
| $900-1000$ | 4 |

Ans:

| Class interval | Frequency | Cumulative frequency |
| :--- | :--- | :--- |
| $0-100$ | 2 | 2 |
| $100-200$ | 5 | 7 |
| $200-300$ | X | $7+\mathrm{x}$ |
| $300-400$ | 12 | $19+\mathrm{x}$ |
| $400-500$ | 17 | $36+\mathrm{x}$ |
| $500-600$ | 20 | $56+\mathrm{x}$ |
| $600-700$ | Y | $56+\mathrm{x}+\mathrm{y}$ |
| $700-800$ | 9 | $65+\mathrm{x}+\mathrm{y}$ |

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| $800-900$ | 7 | $72+\mathrm{x}+\mathrm{y}$ |
| :--- | :--- | :--- |
| $900-1000$ | 4 | $76+\mathrm{x}+\mathrm{y}$ |

It is given that $n=100$
So, $76+x+y=100$, i.e., $x+y=24$ (1)
The median is 525 , which lies in the class $500-600$
So, $l=500, f=20, \mathrm{cf}=36+x, h=100$
Using the formula : Median $=1+[(\mathrm{n} / 2-\mathrm{cf}) / \mathrm{f}$ X h
we get
$525=500+[50-36-\mathrm{x}] 100 / 20$
i.e., $525-500=(14-x) \times 5$
i.e., $25=70-5 x$
i.e., $5 x=70-25=45$

So, $x=9$
Therefore, from (1), we get $9+y=24$
i.e., $y=15 \quad \underline{\mathbf{x}=9}$ And $\mathbf{y}=\mathbf{1 5}$

Q15. . The mean of the following frequency table is 50. Find the missing frequencies

| Class | $0-20$ | $20-40$ | $40-60$ | $60-80$ | $80-100$ | Total |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Frequency | 17 | F1 | 32 | F2 | 19 | 120 |

Ans:

| Class | fi | Xi | $\mathrm{Ui}=\frac{x i-a}{h}$ | fiui |
| :---: | :---: | :---: | :--- | :--- |
| $0-20$ | 17 | 10 | $\frac{10-50}{20}=-2$ | -34 |
| $20-40$ | F1 | 30 | $\frac{30-50}{20}=-1$ | -f 2 |
| $40-60$ | 32 | 50 | 0 | 0 |
| $60-80$ | F2 | 70 | $\frac{70-50}{20}=1$ | F2 |
| $80-100$ | 19 | 90 | $\frac{90-50}{20}=2$ | 38 |

$$
\mathrm{F} 1-\mathrm{F} 2=52-(1)
$$

Mean $=\mathrm{a}+\mathrm{h} \frac{\Sigma f i+f u i}{\Sigma f i}=50+20\left(\frac{4-f 1+f 2)}{120}\right.$
$\mathrm{F} 1-\mathrm{F} 2=4-(2)$
$\mathrm{F} 1=28 \quad \mathrm{~F} 2=24$

Q16 : The following distribution gives the daily income of 50 workers of a factory.

| Daily income <br> (in Rs.) | $100-120$ | $120-140$ | $140-160$ | $160-180$ | $180-200$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number of <br> workers | 12 | 14 | 8 | 6 | 10 |

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Convert the abovedata into a less than type Cumulative frequency distribution and draw its ogive.

Ans:

| Daily income(in Rs.) | Number f workers <br> (F1) | Cumulative frequency less <br> than type $\quad$ (x1) |
| :--- | :--- | :--- |
| $100-120$ | 12 | 12 |
| $120-140$ | 14 | $12+14=26$ |
| $140-160$ | 8 | $26+8=34$ |
| $160-180$ | 6 | $34+6=40$ |
| $180-200$ | 10 | $40+10=50$ |
| Total | $€ \mathrm{fl}=\mathrm{n}=50$ |  |

Now, by drawing the points on the graph
i.e $(120,12) ;(160,34) ;(180,40) ;(200,50)$.

We get graph of less than type Cumulative frequency.


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