**Ref. No.: ……………. Date:** 30 March, 2020

**CORE CONCEPT OF**

**BUSINESS MATHMATICS & STATISTICS**

1. What is the difference between mean and arithmetic mean?
2. Briefly illustrate the grouped data?
3. What do you understand by mode? Please explain.
4. Define central tendency and point out its concept.
5. What are the main reasons for the increasing importance of business statistics?

**Measure of Central Tendency**

 **For Grouped Data (Continuous Series)**

For a grouped frequency distribution, the mean, mode, and median cannot be determined exactly and so must be estimated.

 $\overbar{x}$ =A+$\left(\frac{Σfdx}{N}\right)2$ or $\overbar{x}$ **=** $∑fx/n$

 This will be illustrated in the following example.

**Example 5:**

Calculate **Mean, Median and Mode** from the following data—

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **C.I.** | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| **f** | 14 | 10 | 12 | 20 | 19 | 16 | 13 |

1. **Mean-**

 $\overbar{x}$ **=** $∑fx/n$

x= mid value of class intervals (L1+L2)/2

n= Total of frequency

|  |  |  |  |
| --- | --- | --- | --- |
| **C.I.** | **f** | **x** | **fx** |
| **0-10** | 14 | 5 | 70 |
| **10-20** | 10 | 15 | 150 |
| **20-30** | 12 | 25 | 300 |
| **30-40** | 20 | 35 | 700 |
| **40-50** | 19 | 45 | 855 |
| **50-60** | 16 | 55 | 880 |
| **60-70** | 13 | 65 | 845 |
|   Total= | 104 |   | 3800 |

 $\overbar{x}$ **=** $∑fx/n$

**=** 3800 / 104

= 36.54 Ans.

**2) Median**:

 m= N/2 items

|  |  |  |
| --- | --- | --- |
| **C.I.** | **f** | **c.f.** |
| **0-10** | 14 | 14 |
| **10-20** | 10 | 24 |
| **20-30** | 12 | 36 |
| **30-40** | 20 | 56 |
| **40-50** | 19 | 75 |
| **50-60** | 16 | 91 |
| **60-70** | 13 | 104 |
|  Total= | 104 |   |

m= 104 / 2 = 52th items

M= $L1+\left[\frac{M-cfo}{f}\right]\*i$

Where = L1= lower boundary of the median class interval

m= N/2 items

cfo=  cumulative frequency of class above the median class interval

 f = Actual frequency in the median class interval

i= gap of class intervals (L1-L2)

L1=30, cfo= 36, m=52, f=20, i= 10

 M= $30+\left[\frac{52-36}{20}\right]\*10$

 M= $30+[16/20]\*10$

 M= 30 + 0.8\*10

 M= 30+8= 38

 M= 38 Ans.

**3) Mode-**

Z=$L1+\left[ \frac{f1-f0}{2\*f1-f0-f2}\right]\*i$

L1= lower boundary of the mode class interval

f1= Highest frequency of given distribution

 f0 = Above frequency of f1

 f2= below frequency of f1

 i= Gap of class intervals (L1-L2)

 Z= $30+\left[ \frac{20-12}{2\*20-12-19}\right]\*10$

= $30+\left[ \frac{8}{40-31}\right]\*10$

= $30+\left[ \frac{80}{9}\right]$

= 30+8.89

Z= 38.89 Ans.

**Example 6:**

Calculate **Mean, Median and Mode** from the following data—

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **C.I.** | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| **f** | 28 | 20 | 24 | 40 | 38 | 32 | 26 |

1. **Mean-**

 $\overbar{x}$ **=** $∑fx/n$

x= mid value of class intervals (L1+L2) / 2

n= Total of frequency

|  |  |  |  |
| --- | --- | --- | --- |
| **C.I.** | **f** | **x** | **fx** |
| **0-10** | 28 | 5 | 140 |
| **10-20** | 20 | 15 | 300 |
| **20-30** | 24 | 25 | 600 |
| **30-40** | 40 | 35 | 1400 |
| **40-50** | 38 | 45 | 1710 |
| **50-60** | 32 | 55 | 1760 |
| **60-70** | 26 | 65 | 1690 |
|   Total= | 208 |   | 7600 |

 $\overbar{x}$ **=** $∑fx/n$

**=** 7600 / 208

= 36.54 Ans.

1. **Median**:

 m= N/2 items

|  |  |  |
| --- | --- | --- |
| **C.I.** | **f** | **c.f.** |
| **0-10** | 28 | 28 |
| **10-20** | 20 | 48 |
| **20-30** | 24 | 72 |
| **30-40** | 40 | 112 |
| **40-50** | 38 | 150 |
| **50-60** | 32 | 182 |
| **60-70** | 26 | 208 |
|  Total= | 208 |   |

m= 208/2 = 104th items

M= $L1+\left[\frac{M-cfo}{f}\right]\*i$

Where = L1= lower boundary of the median class interval

m= N/2 items

cfo=  cumulative frequency of class above the median class interval

 f = Actual frequency in the median class interval

i= gap of class intervals (L1-L2)

L1=30, cfo= 36, m=52, f=20, i= 10

 M= $30+\left[\frac{52-36}{20}\right]\*10$

 M= $30+[16/20]\*10$

 M= 30 + 0.8\*10

 M= 30+8= 38

 M= 38 Ans.

**3) Mode-**

Z=$L1+\left[ \frac{f1-f0}{2\*f1-f0-f2}\right]\*i$

L1= lower boundary of the mode class interval

f1= Highest frequency of given distribution

 f0 = Above frequency of f1

 f2= below frequency of f1

 i= Gap of class intervals (L1-L2)

 Z= $30+\left[ \frac{20-12}{2\*20-12-19}\right]\*10$

= $30+\left[ \frac{8}{40-31}\right]\*10$

= $30+\left[ \frac{80}{9}\right]$

= 30+8.89

Z= 38.89 Ans.