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 MECHANICAL ENGINEERING  
 19/ENG06/016  
 STA 132 ASSIGNMENT

A study of yellow fever disease (YFD) was conducted. The study was restricted to patients under the age of 40. One purpose was to compare the distribution cases by age in group A to that of group B. The group data are given below:

C-I	Group A	Group B
1-5	0	2
6-10	7	4
11-15	10	7
16-20	2	20
21-25	1	16
26-30	5	10
31-35	4	4

Calculate;

- (i) The mean and standard deviation for each group
- (ii) The coefficient of variation for each group.
- (iii) Which group has less variable distribution.

Solution

(i) For Group A:

C-I	Group A (f)	x	fx	x <sup>2</sup>	fx <sup>2</sup>
1-5	0	3	0	9	0
6-10	7	8	56	64	448
11-15	10	13	130	169	1690
16-20	2	18	36	324	648
21-25	1	23	23	529	529
26-30	5	28	140	784	3920
31-35	4	33	132	1089	4356
Total	29		517		11591

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{517}{29} = 17.83$$

$$\begin{aligned}
 S.D &= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2} \\
 &= \sqrt{\frac{11591}{29} - (17.83)^2} \\
 &= \sqrt{399.6897 - 317.9089} \\
 &= \sqrt{81.7808} \\
 \therefore S.D &= 9.04
 \end{aligned}$$

For Group B:

C-I	Group B (f)	x	fx	x <sup>2</sup>	fx <sup>2</sup>
1-5	2	3	6	9	18
6-10	4	8	32	81	324
11-15	7	13	91	169	1183
16-20	20	18	360	324	6480
21-25	16	23	368	529	8464
26-30	10	28	280	784	7840
31-35	4	33	132	1089	4356
Total	63		1269		28665

$$\begin{aligned}
 \text{Mean} &= \frac{\sum fx}{\sum f} = \frac{1269}{63} \\
 &= 20.14
 \end{aligned}$$

$$\begin{aligned}
 S.D &= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2} \\
 &= \sqrt{\frac{28665}{63} - (20.14)^2} \\
 &= \sqrt{455 - 405.62} \\
 &= \sqrt{49.38} \\
 \therefore S.D &= 7.03
 \end{aligned}$$

(ii) For Group A;

$$\begin{aligned}
 C.V &= \frac{S.D}{\text{Mean}} \times 100\% \\
 &= \frac{9.04}{17.83} \times 100\% \\
 \therefore C.V &= 50.70\%
 \end{aligned}$$

For Group B;

$$C.V = \frac{S.D}{\text{mean}} \times 100\%$$

$$= \frac{7.05}{20.14} \times 100\%$$

$$= \underline{\underline{34.91\%}}$$

(ii) Group B has less variable distribution.