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Matric NO: 19/ENG06/010.

Mechanical Engineering

Group A

Class interval	f (group A)	x (mid value)	fx	D (x−18)	D^2 $(x-18)^2$	FD	FD^2	
1–5	0	3	0	−15	225	0	0	
6–10	7	8	56	−10	100	−70	700	
11–15	10	13	130	−5	25	−50	250	
16–20	2	18	36	0	0	0	0	⇒ Group A
21–25	1	23	23	5	25	5	25	
26–30	5	28	140	10	100	50	500	
31–35	4	33	132	15	225	60	900	
	$\Sigma f = 29$		$\Sigma = 517$			$\Sigma = -5$	$\Sigma = 2375$	

$$\bar{x}(\text{group A}) = \frac{\Sigma fx}{\Sigma f} = \frac{517}{29} = 17.90 \approx 18 \text{ mm}$$

$$\text{Standard Deviation for group A} = \sqrt{\frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f}\right)^2}$$

$$= \sqrt{\frac{2375}{29} - \left(\frac{-5}{29}\right)^2}$$

$$= \sqrt{\frac{2375}{29} - \frac{25}{841}} = \frac{45\sqrt{34}}{29}$$

$$SD(\text{group A}) = 9.05 \text{ mm}$$

$$\text{Coefficient of Variation (group A)} = \frac{\text{Standard deviation}}{\text{mean}} \times 100$$

$$= \frac{9.05}{18} \times 100 = 50.28 \text{ m}$$

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Group B

Class Interval	F (group B)	x (mid-value)	Fx	D (x-20.4)	D^2 $(x-20.4)^2$	FD	FD^2
1-5	2	3	6	-17.4	293.78	-34.28	587.56
6-10	4	8	32	-12.14	147.38	-48.56	589.52
11-15	7	13	91	-7.14	50.98	-49.98	356.86
16-20	20	18	360	-2.14	4.58	-42.8	91.6
21-25	16	23	368	2.86	8.18	45.76	130.88
26-30	10	28	280	7.86	61.78	78.6	617.8
31-35	4	33	132	12.86	165.38	51.44	661.52
	$\Sigma F = 63$		$\Sigma = 1269$			$\Sigma = 0.18$	$\Sigma = 3035.74$

$\Rightarrow$ Group B

$$\bar{x}\ (\text{group B}) = \frac{\Sigma Fx}{\Sigma F} = \frac{1269}{63} = 20.14$$

$$\text{Standard deviation of group B} = \sqrt{\frac{\Sigma Fd^2}{\Sigma F} - \left(\frac{\Sigma Fd}{\Sigma F}\right)^2}$$

$$= \sqrt{\frac{3035.74}{63} - \left(\frac{0.18}{63}\right)^2}$$

$$= \sqrt{48.18634921 - \frac{1}{122500}}$$

$$\text{S.D (group B)} = 6.94$$

$$\text{C.V}_{(\text{group B})} = \frac{\text{S.D}}{\text{mean}} \times 100 = \frac{6.94}{20.14} \times 100 = 34.46$$

(ii) Group B has a lesser variabu distribution.