

Task

① $M.S.D = 0.5 \text{ mm}$



③ $M.S.D = 1 \text{ mm}$

$$L.C = \frac{\text{Value of } M.S.D}{\text{No. of Div. V.S}}$$

$$M.S.D = \frac{1}{10} \text{ cm}$$

$$= 0.1 \text{ cm}$$

Given $q.M.S.D = 10 \text{ V.S.D}$

$$\Rightarrow 1 \text{ V.S.D} = \frac{q}{10} M.S.D$$

$$L.C = M.S.D - V.S.D$$

$$\Rightarrow 0.02 = \frac{0.5}{N}$$

$$\Rightarrow N = \frac{0.5}{0.02} = 25$$

20 $V.S.D = 10 \text{ M.S.D}$

$$V.S.D = \frac{10}{20} M.S.D$$

$$= 0.5 M.S.D$$

$$L.S = M.S.D - V.S.D$$

$$\Rightarrow M.S.D - \frac{1}{2} M.S.D$$

$$= \frac{1}{2} M.S.D$$

$$= 0.05 \text{ cm}$$

④ $M.S.D = \frac{1}{10} = 0.1 \text{ cm}$

Given $10 \text{ V.S.D} = 8 \text{ M.S.D}$

$$\Rightarrow V.S.D = \frac{8}{10} M.S.D$$

$$= \frac{4}{5} M.S.D$$

⑤ $M.S.D = 1 \text{ mm}$

$$M.S.R = 10 \text{ mm} \cdot 5 + 21$$

$$V.\text{coincidence} = 15 + 21$$

$$L.C = M.S.D - V.S.D$$

Given $10 \text{ V.S.D} = 9 \text{ M.S.D}$

$$\Rightarrow 0.1 - \frac{1}{9} (0.1)$$

$$\Rightarrow V.S.D = \frac{9}{10} M.S.D$$

$$\Rightarrow 1 \times 0.1 = 0.02 \text{ cm}$$

$$L.C = M.S.D - V.S.D$$

$$\Rightarrow 1 - \frac{9}{10}$$

⑥ Zero error = 0.02 cm

$$\text{Total Reading} = 1.4 \text{ mm}$$

$$\text{Correct Reading} = T.R - Z.E$$

$$= 1.4 - 0.02 = 1.02 \text{ mm}$$



$$M.S.D = \frac{1}{10} \text{ cm} = 0.1 \text{ cm}$$

$$\text{Vernier coincidence} = n = 4$$

$$\text{Least count} = \frac{M.S.D}{\text{No. of V.S.D}} = \frac{0.1}{10}$$

$$= 0.01 \text{ cm}$$

$$T.R = M.S.R + n \times L.C$$

$$= 1.8 + 4 \times 0.01$$

$$\Rightarrow 1.8 + 0.04$$

$$= 1.84 \text{ cm}$$



$$M.S.D = \frac{1}{10} = 0.1 \text{ cm}$$

$$L.C = \frac{M.S.D}{\text{No. of Div. V.S}}$$

$$= \frac{0.1}{10} = 0.01 \text{ cm}$$

$$V.C = n = 4$$

$$M.S.R = 1.8 \text{ cm}$$

$$Z.E = -0.02 \text{ cm}$$

⑧ correct length = $T.R - Z.E$

$$= M.S.R + n \times L.C - Z.E$$

$$= 1.8 + 4 \times 0.01 - (-0.02)$$

$$\Rightarrow 1.84 + 0.02$$

$$\Rightarrow 1.86 \text{ cm}$$

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9) From the fig.

$$1 \text{ cm} = 10 \text{ DIV}$$

$$1 \text{ DIV} = \frac{1 \text{ cm}}{10} = 0.1 \text{ cm}$$

$$N = 10$$

$$L.C = \frac{M.S.D. = 0.1}{N} = \frac{0.1}{10}$$

$$L.C = 0.01 \text{ cm}$$

$$T.R = M.S.R + n \times L.C$$

$$= 4.2 + 6 \times 0.01$$

$$= 4.2 + 0.06$$

$$= 4.26 \text{ cm}$$

18) $L.C = 0.01 \text{ cm}$; $Z.E = 0.07 \text{ cm}$

$$M.S.R = 2.9 \text{ cm}, n = 5$$

$$\text{Correct Reading} = T.R + Z.E$$

$$D = M.S.R + n \times L.C + Z.E$$

$$= 2.9 + 5 \times 0.01 + 0.07$$

$$= 2.9 + 0.05 + 0.07$$

$$= 2.88$$

$$\text{radius} = \frac{D}{2} = \frac{2.88}{2} = 1.44 \text{ cm}$$

9) From fig

$$M.S.R = 0.2 \text{ cm}$$

M.S zero is left of vernier zero

so zero error = +ve.

zero correction = -ve

$$L.C = \frac{M.S.D.}{N} = \frac{0.1}{10} = 0.01 \text{ cm}$$

$$Z.E = M.S.R + n \times L.C$$

$$= 0.2 + 4 \times 0.01$$

$$= 0.2 + 0.04$$

$$= 0.24 \text{ cm}$$

10) $N = 50$

$$V.C = n = 44$$

$$L.C = \frac{M.S.D}{N}$$

$$= \frac{0.05}{50}$$

$$L.C = 0.001$$

16) 1) Given $10 \text{ M.S.D} = 9 \text{ V.S.D}$

$$\Rightarrow 10 \text{ V.S.D} = \frac{10}{9} \text{ M.S.D}$$

$$L.C = M.S.D - V.S.D$$

$$\Rightarrow \frac{1}{9} \text{ M.S.D}$$

$$= \frac{1}{9} \times 1 = 0.11 \text{ mm}$$

$$= 0.11 \text{ cm}$$

2) Error = $n \times L.C$

$$= 3 \times 0.01$$

$$= +0.03 \text{ cm}$$

Table

1) Given

$$20 \text{ V.S.D} = 19 \text{ M.S.D}$$

$$\Rightarrow 1 \text{ V.S.D} = \frac{19}{20} \text{ M.S.D}$$

$$L.C = M.S.D - V.S.D$$

$$= M.S.D - \frac{19}{20} \text{ M.S.D}$$

$$\Rightarrow \frac{1}{20} \text{ M.S.D} = 0.05 \text{ mm}$$

4)

$$M.S.R = 3.6 \text{ cm}$$

$$n = 8$$

$$T.R = \text{Diameter} = M.S.R + n \times L.C$$

$$\Rightarrow 3.6 + 8 \times 0.01$$

$$= 3.68 \text{ cm}$$

$$\text{radius} = \frac{D}{2} = \frac{3.68}{2}$$

$$= 1.84 \text{ cm}$$

$$M.S.D = 7 \text{ n blw } 5.10 \rightarrow 5.15 = 0.05 \text{ cm}$$

$$\text{Total reading} = M.S.R + n \times L.C$$

$$= 5.10 + 24 \times 0.001$$

$$\Rightarrow 5.124 \text{ cm}$$

17) $L.C = 0.0025 \text{ cm}$

$$Z.E = 0.0125 \text{ cm}$$

$$n = 12$$

$$M.S.R = 7.55 \text{ cm}$$

$$\text{Correct length} = T.R + Z.E$$

$$= M.S.R + n \times L.C + Z.E$$

$$= 7.55 + 12 \times 0.0025 + 0.0125$$

$$= 7.567 \text{ cm}$$

2) Given $25 \text{ V.S.D} = 24 \text{ M.S.D}$

$$\Rightarrow 1 \text{ V.S.D} = \frac{24}{25} \text{ M.S.D}$$

$$M.S.D = 1 \text{ mm}$$

$$L.C = M.S.D - V.S.D$$

$$\Rightarrow M.S.D - \frac{24}{25} \text{ M.S.D}$$

$$= \frac{1}{25} \text{ M.S.D}$$

$$= 0.04 \text{ mm}$$

5)

$$M.S.D = 1 \text{ mm}$$

$$20 \text{ V.S.D} = 16 \text{ M.S.D}$$

$$\Rightarrow 1 \text{ V.S.D} = \frac{16}{20} \text{ M.S.D}$$

$$L.C = M.S.D - V.S.D$$

$$= M.S.D - \frac{16}{20} \text{ M.S.D}$$

$$\Rightarrow \frac{4}{20} \text{ M.S.D} = \frac{1}{5} \text{ M.S.D}$$

$$\Rightarrow 0.2 \text{ mm}$$



⑥ From fig $M \cdot S \cdot R = 0.5 \text{ mm}$

$n = 2$

$10 \rightarrow 1 \text{ mm}$

$M \cdot S \cdot R = \frac{1}{10} = 0.1 \text{ mm}$

$L \cdot C = \frac{0.1}{10} = 0.01 \text{ mm}$

$T \cdot R = M \cdot S \cdot R + n \cdot L \cdot C$

$= 0.05 + 2 \times 0.01 \text{ mm}$

$= 0.07 \text{ mm}$

Scale was not mentioned

⑦ $M \cdot S \cdot R = 8.5 \text{ cm}$

$n = 6$

$2.5 \text{ cm} = 0.02 \text{ mm}$

$1 = 0.02 \text{ cm}$

$L \cdot C = 0.01 \text{ cm}$

$C \cdot R = T \cdot R - 2 \cdot E$

$= M \cdot S \cdot R + n \cdot L \cdot C - 2 \cdot E$

$= 8.5 + 6 \times 0.01 - 0.02$

$= 8.54 \text{ cm}$

⑧ $M \cdot S \cdot D = 1 \text{ mm} = 0.1 \text{ cm}$

Given $20 \text{ V.S.D} = 16 \text{ M.S.D}$

$V.S.D = \frac{16}{20} \text{ M.S.D}$

$= \frac{4}{5} \text{ M.S.D}$

$M \cdot S \cdot D = M \cdot S \cdot D - V \cdot S \cdot D$

$= M \cdot S \cdot D - \frac{4}{5} \text{ M.S.D}$

$= \frac{1}{5} \text{ M.S.D} = \frac{1}{5} \times 0.1$

$= 0.02 \text{ cm}$

⑨ From fig

$M \cdot S \cdot D = 0.1 \text{ cm}$

$n = 7$

$M \cdot S \cdot R = 4.3 \text{ cm}$

$L \cdot C = \frac{M \cdot S \cdot D}{N} = \frac{0.1}{10}$

$L \cdot C = 0.01 \text{ cm}$

$T \cdot R = M \cdot S \cdot R + n \cdot L \cdot C$

$= 4.3 + 7 \times 0.01$

$= 4.37 \text{ cm}$

⑩ Given

$19 \text{ M.S.D} = 20 \text{ V.S.D}$

$V.S.D = \frac{19}{20} \text{ M.S.D}$

$L \cdot C = M \cdot S \cdot D - V \cdot S \cdot D$

$= M \cdot S \cdot D - \frac{19}{20} \text{ M.S.D}$

$= \frac{1}{20} \text{ M.S.D}$

$= 0.05 \times 0.1$

$= 0.005 \text{ cm}$

From the fig

$M \cdot S \cdot R = 7.4 \text{ cm}$

$n = 5$

on main scale $1 \text{ cm} = 10 \text{ div}$

$1 \text{ div} = \frac{1}{10} \text{ cm}$

$= 0.1 \text{ cm}$

$L \cdot C = \frac{M \cdot S \cdot D}{N} = \frac{0.1}{10} = 0.01 \text{ cm}$

$T \cdot R = M \cdot S \cdot R + n \cdot L \cdot C$

$= 7.4 + 5 \times 0.01$

$= 7.45 \text{ cm}$

$= 7.45 \text{ cm}$

⑪ $1 \text{ cm} = 10 \text{ div}$

$1 \text{ div} = \frac{1}{10} \text{ cm}$

$= 0.1 \text{ cm}$

$V \cdot S \cdot D = \frac{8}{10} \text{ M.S.D}$

$= \frac{4}{5} \text{ M.S.D}$

$L \cdot C = M \cdot S \cdot D - V \cdot S \cdot D$

$= \frac{4}{5} \times 0.1$

$= 0.08 \text{ cm}$

$T \cdot R = M \cdot S \cdot R + n \cdot L \cdot C$

$= 7.4 + 5 \times 0.01$

$= 7.45 \text{ cm}$

$M \cdot S \cdot R = 35 \text{ div} = 35 \text{ N/mm}$

Each division value = 1 mm

$M \cdot S \cdot D = 35 \text{ mm} = 3.5 \text{ cm}$

$T \cdot R = M \cdot S \cdot R + n \cdot L \cdot C$

$= 3.5 + 4 \times (0.005)$

$= 3.5 + 0.02$

$= 3.52 \text{ cm}$

$x = \frac{D}{2} = \frac{3.52}{2} = 1.76 \text{ cm}$

