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Q Calculate the actual length of the runway from the following data.

=> Airport elevation: R.t = 100

=> Airport reference Temperature: 30°C

=> Basic length of runway: 800m

=> Highest point along the length: R.l = 98.2

=> Lowest point along the length: R.l = 95.2

Solution:-

∴ Correction of elevation:-

The Basic length is to be increased at the rate of 7% per 300m elevation above mean sea-level.

∴

$$\therefore \text{Correction for elevation: } \frac{800}{100} \times \frac{7}{300} \times 100 = 1800$$

$$\left. \begin{array}{l} \text{Length of runway after.} \\ \text{Correction for elevation} \end{array} \right\} = (800 + 18) = 818 \text{ m}$$

\therefore Correction for temperature:-

$$\left. \begin{array}{l} \text{Standard atmospheric} \\ \text{Temperature at mean sea-level} \end{array} \right\} = 15^\circ\text{C}$$

Taking the temperature gradient as equal to 6.5°C per 1000m rise in elevation, The standard temperature at the airport site will be:

$$\text{Temperature at R.L., 100} = 15 - \left[6.5 \times \frac{100}{1000} \right] = 14.3^\circ\text{C}$$

$$\left. \begin{array}{l} \text{Difference between airport} \\ \text{reference temperature and} \\ \text{Standard atmospheric Temperature} \end{array} \right\} = (30 - 14.3 - 15) = 16.65^\circ\text{C}$$

Applying correction at the rate of 1%
for every 1°C

$$\text{Correction for temperature} = \left[\frac{1}{100} \times 818 \right] \times 15.65$$

$$= 128.017 \quad \text{say } 128 \text{ m}$$

Corrected runway length = (818 + 128) 946 m

$$\text{effective gradient} = \frac{R.1 \ 98.2 - R.1 \ 95.5}{800}$$

$$= \frac{3}{800} \text{ or } 0.003$$

Applying correction for the effective gradient
at the rate of 20% for each 1%

effective gradient

$$\text{Correction for gradient} = \left[\frac{20 \times 946}{100} \right] \times \frac{0.003}{1}$$

Actual length of runway \Rightarrow

$$\Rightarrow 946 + 0.56$$

$$946.56 \text{ m} \text{ --- Ans}$$

∴ Check:-

$$\left. \begin{array}{l} \text{Total correction for} \\ \text{elevation and Temperature} \end{array} \right\} = 18 + 128 = 146 \text{ m}$$

$$\text{Percentage increase} = \frac{146}{800} \times 100 = \boxed{18.25}$$

According to ICAO, this should not be more than 35%.