Section - 1

Q.5 ⇒ Hour Angle (ω) ⇒

Answer ⇒

→ It is the angle through which the earth must be rotated to bring the meridian of a point directly in line with the Sun's ray.

→ In other words, it is the angular displacement of the sun, east or west of the local meridian, due to the rotation of the earth on its axis at an angle of 15° per hour.

→ Mathematically hour angle can be expressed as

$$\omega = 15(LST - 12)$$

where, LST = Local Solar time

* Day Length ⇒

→ The time of sunrise, sunset and the duration of the day length depend upon the latitude of the location and the month in the year.

→ At sunrise and sunset, the sunlight is parallel to the ground surface with a zenith angle of 90°.

→ The hour angle pertaining to sunrise or sunset (ω_s) is given below:

$$\theta_z = 0 \text{ and } \omega = \omega_s$$

→ At Solar noon,

$$\cos \omega_s = -\tan\phi \tan\delta$$

→ On tilted surface,

$$\omega_s = \cos^{-1}\left[(-\tan(\phi-\beta)\tan\delta)\right]$$

→ The corresponding day length (in hours) is given by

$$N = \frac{2}{15}\cos^{-1}\left[-\tan(\phi-\beta)\tan\delta\right]$$