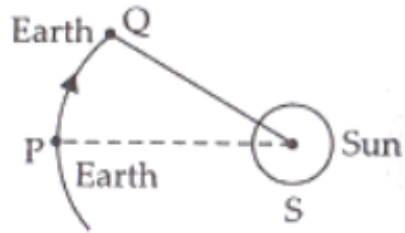## QUES 04:-

Mean solar day is the time interval between two successive noon when the sun passes through the zenith point (meridian). The sidereal day is the time interval between two successive transit of a distant star through the zenith point (meridian).

In drawing appropriate diagram showing earth's spin and orbital motion, show that the mean solar day is four minutes longer than the sidereal day. In other words, distant stars would rise 4 minutes early every successive day.

[Hint: you may assume a circular orbit for the earth.]

Sol. Consider that on a day at noon sun passes through the zenith (meridian). After one revolution (360^0) of the earth about its own axis sun again passes through the zenith.

During this time when earth revolve at its own axis by 360^0 it changes its angle PSQ = 1^0. So 361^0 rotation by earth is considered as one solar day.

If $361°$ corresponds to 24 hrs

$$1^0 = \frac{24}{361} \, hrs = \frac{24}{361} \times 3600 \, sec = 3min59sec \cong 4min.$$

Hence, distant star rises 4 min. early every day.