Q- Using mass of earth, distance between sun and earth and gravitation constant as given in your text, calculate mass of sun.

The gravitational force of the Sun on the earth is given by Newton's law of gravitation as

$$F = \frac{GM_sM_e}{r^2}$$

Where Ms is mass of the sun, Me is the mass of earth and r is the orbital radius of the earth. As the earth is in almost circular orbit, the force is behaving as the centripetal force and hence we get

$$\frac{GM_sM_e}{r^2} = M_e\omega^2 r$$

Here w is the angular velocity of the earth round the sun.

Or $$M_s = \frac{\omega^2 r^3}{G}$$ ---------- (1)

Now as the earth makes one complete revolution round the earth in one year or 365 days, the angular velocity is given by

$$\omega = \frac{2\pi}{T}$$

Hence substituting in equation 1 we get

$$M_s = \frac{4\pi^2 r^3}{T^2 * G}$$ ---------- (2)

Now the distance of earth from the sun r = $1.50*10^{11}$ m

Time period or revolution or earth T = $365*864000 = 3.15*10^7$ s

And G = $6.67*10^{-11}$ Nm^2/kg^2

Gives $$M_s = \frac{4*3.14^2*(1.50*10^{11})^3}{(3.15*10^7)^2*6.67*10^{-11}} = 2.01*10^{30}\ \text{kg}$$