Question

The change in the value of acceleration of Earth towards Sun, when the moon comes from the position of solar eclipse to the position on the other side of Earth in line with sun is: (mass of moon = 7.36×10^{22} kg, radius of moon's orbit = 3.28×10^{8} m).

A 6.73×10^{-2} m/s^2

B 7.73×10^{-3} m/s^2

C 8.73×10^{-4} m/s^2

D 9.12×10^{-5} m/s^2

Solution

Correct option is
D)

The acceleration during solar eclipse $a_i = a_s + a_m$

similarly when the moon on other side,

$a_f = a_s - a_m$

So, change in acceleration = $a_i - a_f = (a_s + a_m) - (a_s - a_m) = 2a_m$

But, $2a_m = 2 \times \frac{GM}{R^2} = 2 \times \frac{6.67 \times 10^{-11} \times 7.36 \times 10^{22}}{(3.28 \times 10^8)^2} = 9.126 \times 10^{-5}\ ms^{-2}$