7. Based on the equation $\Delta E = -2.0\times10^{-18}$ J $(1/n_2^{\,2} - 1/n_1^{\,2})$ the wavelength of the light that must be absorbed to excite hydrogen electron from level n = 1 to level n= 2 will be ($h = 6.625\times10^{-34}$ Js, $C = 3\times10^{8}$ ms^{-1})

(1) 2.650×10^{-7}m

(2) 1.325×10^{-7}m

(3) 1.325×10^{-10}m

(4) 5.300×10^{-10}m

Solution:

$\Delta E = -2.0\times10^{-18}\ J\ (1/n_2{}^2 - 1/n_1{}^2)$

$= -2.0\times10^{-18}(1/2^2 - 1/1^2)$

$= -2.0\times10^{-18}(1/4 - 1/1)$

$= -2.0\times10^{-18}(-3/4)$

$= 1.5\times10^{-18}$

Also $\Delta E = hc/\lambda$

So $\lambda = hc/\Delta E$

$= 6.625\times10^{-34} \times 3\times10^{8} /1.5\times10^{-18}$

$=13.25\times10^{-8}$

$= 1.325\times10^{-7}m$

Hence option (2) is the answer.