Hard disk drive is categorized as an important and essential part of computer system. It is a non-volatile memory with better read and write capacity. Hard disk drive consists of a suspension that moves to and fro to read and write data. The suspension vibrates with frequency lower than its resonance frequency to transfer data. In this work, ANSYS simulation tool was used to analyze the frequency modes for the hard disk drive suspension at frequency lower than the resonance frequency. The deflection, stress, strain, shear stress and shear strain are studied to analyze the effect of low voltage of 300 Hz and high voltage of 15000 Hz. The deflection for to and fro motion of suspension increases at high frequencies. At low frequency, graph between sum of deflection and translational displacement shows a linear trend and then a sudden constant value at around 89 um of displacement. In case of higher frequency of 15000 Hz, the trend of translational displacement and sum of deflection is linear which shows better vibration modes near to resonance frequency. The results depict that at low frequency, less deflection and displacement are observed which make the read and write of data slow. At high frequency the deflection of the read and write probe is higher which make reading and writing of data more quickly as compared to the low frequency mode.