

## Preface

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*Music is both an Art and a Science since it deals with the expression of One's feelings and emotions through sound.*

*In the Sanskrit tradition, unstruck sound is called Anahata Nada, and the ancients say that the audible sound, which most resembles this unstruck sound, is the syllable OM.*

*In Indian Philosophy of Vedanta, nada itself is Brahima. Matang muni in his book Brihaddeshi wrote*

*"na naden vina geetamna naden vina swarah,  
na naden vina nrityam tasmannadatmakam Jagat."*

*There is no song or music without Nada, there are no musical notes without Nada. There is no dance without Nada, The world is filled with the essence of the Nada.*

*In the same connection Sarang Dev in his book 'Sangit Ratnakar' wrote*

*"Gitam NadatmakamVadhyam,  
Nada Vyakta Prashshyate.  
Tad Dwayanugatam Nratam  
Nadadhi Matstayam.  
Naden Vyanjatvarnah,  
Padam varnapradadwachahia  
Vachaso Vyavaharoyam,  
Nadahin Mato Jagat."*

*The western Scientists say that sound is nothing but a sensation caused in the first instance by certain oscillatory motions of the particles of the body.*

*The music is the biggest high for me the ultimate form of emotional expression. It is a vast subject like ocean where every time you take a dip you are still in the middle of it.*

*I was inclined to Indian Classical Music when I listened 'Lecture cum Demonstration' programmes of eminent artistes during my schooling days I decided to master the art of classical music from a learned traditional Guru Late Pt.N.V.Patwardhan H.O.D, Vocal department, Faculty of Performing arts, M.S. Universtiy of Baroda. I was imparted extensive training to enrich my knowledge.*

*A value based and effective system of education is necessary to bring out one's talent for acquiring skills with greater precision.*

*Education in Science is a process of enlightenment and progress to attain a better and higher quality of work. I therefore preferred to get academic education in Physics along with Indian Classical Music.*

*I got impetus on the subject topic of my research project during my practical training of Vocal Music when I did not get scientific explanation for minor differences in usage of swars in different ragas like Darbari, Multaani, Todi etc.*

*It is accepted that North Indian classical music is not based on standardized frequency system as used mainly in western music and is practically depend on some metaphysical concept of Raga Bhava etc.*

*'Little was known about the science of sound until about 1600. The first suggestion for a standard had been made about 1700 by French physicist Joseph Sauveur, who proposed C equals 256, German physicist Johann Heinrich Scheibler made the first accurate determination of pitch corresponding to frequency and proposed the standard A equals 440 in 1834.'* (Microsoft® Encarta® Encyclopedia 2003. © 1993-2002 Microsoft Corporation.)

*In Indian concept of music, "Bharatmuni discussed concept of 'shrutiniirdeshan' with the help of 'Sarana Chatustai' and introduce 'antar gandhar' and 'kakali nishad' explained for experience through 'Kalsadhra'." (Bharat Ka Sangeet Itihas by Acharya Brihaspati, P.16) Later on, 'Pt. Ahobal(1665), Srinivas(1800) and Pt. Bhatkhande(1900) gave frequency of note based on Assumption.'* (Sangeet Visharad by Laxminarayan Garg)

*In this scientific era, music cannot be kept aside without discussing its scientific aspects so I felt the necessity to do research on the above subject.*

*I carried out practical work on oscilloscope and was able to get frequency of different swars through Sruti box. I thought why not frequencies of swars of ragas be established? I got software, which gave me frequencies of swars. Based on my observation I carried out analysis of different ragas in different ways and achieved desired result shown in this thesis.*

*I hope this subject thesis will be useful to all those in the field of music to understand the concept of Science behind Music thereby enhancing their talent for better understanding and performance.*