CHAPTER I.

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Music is the art of producing pleasing expressive combinations and sequence of tones either vocal or instrumental. Development in the art and music has gone through all the ages of men. Some of these developments have withstood the rigors of time. Others enjoyed short lived popularity and were lost in the oblivion of the past.

The science of music has advanced along with acoustics, mathematics, electronics, physiology and psychology. The various findings in these fields made it possible to use a scientific approach in the study of music. The theory of music has the same relation to the creation of music as grammar to the creation of poetry.

Classical Indian music has withstood the rigors of time, this is perhaps because it is founded on laws which are fundamental and universal. The art of Indian music has already reached an advanced level and further progress in it can take place only by the analysts of our music and musical instruments by using modern technology.

It is said that the gifted artiste can
sing expressive and touching music only when he
puts his soul in the effort and the question often
asked is whether such a divine art can be measured
with instruments. The answer is that music of such
a gifted artiste can be recorded. The recorded
music can be equally effective and it may not
be difficult to analyse the recorded waves. Perhaps
extra precision will be required at various
stages of analysis for proper interpretation.

The present thesis is based on the experimental
work carried out during the last four or five
years.

A number of electronic musical instruments
are now available in which music is played with the
aid of a key board. The desired raga effect is
obtained when all the keys are accurately tuned according
to the scale of the raga.

In CHAPTER II three methods have been
described for accurate tuning of keyboard type
electronic musical instruments, according to Indian
musical scales. The methods are theoretically
perfect and do not require a calibrated oscillator
or musically trained ear.

In the First method use is made of vibration
generator for vibrating a string. In the second
method a tuning galvanometer, specially developed, has
been used as tuning device. In the third method a
standard scale generator, can also be used as a reference standard, is used. This reference standard produces notes according to the natural scale without any error.

An electronic device has been developed for tuning a key-board type electronic musical instrument according to an equally tempered scale.

CHAPTER III describes frequency measurement of musical pillars in South India by different methods.

Acoustical study of musical pillars in South India has been undertaken for the first time on scientific basis. Frequencies of notes emitted by musical pillars have been measured for the first time by various methods. Pillars can be set into resonant vibration by a vibration generator and an audio oscillator. With this method fundamental frequencies as well as overtones of pillars can be measured. The pillars can be looked upon as bars clamped at both the ends. For bars of uniform cross section clamped at both the ends, the overtones are of not harmonics. Musical pillars have a decorative structure and therefore there is a deviation from relative frequencies calculated theoretically. It is however interesting to note that in case of a few pillars overtones are harmonics.
CHAPTER IV describes methods of frequency measurement of musical scales.

One of the objects of musical research is to study musical scales in practice. A number of methods are now available for frequency measurement, if notes produced are of sufficiently longer duration. These methods are not suitable for speech sounds. Measurement of fundamental frequency and its variation with time (frequency time curve or melody plot) is important in the study of speech and music. An electronic device has been developed with which a frequency time curve, of speech and music can be obtained. A unit has been developed for studying finer variations of pitch glides etc. in music. In this unit, the frequency of a note sung in a piece of music is compared with the frequency of a standard note by means of a differential circuit.

An experimental technique has been developed for measurement of frequencies of strings tuned by an artiste according to present day musical scales. Some measurements have been taken by this method.

In CHAPTER V an experimental technique to study the effect of accompanying instrument on the tonality of a singer is discussed.