



ACADEMY OF CLASSICAL AND FOLK ARTS

(A Science and Heritage Initiative)

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Musical Intonation and Indian *Rāga* System

October 27-28, 2025 (5:30 pm to 8:30 pm, each day)

Course Abstract:

Intonation is the procedure of determining each musical note. The major systems of intonations of music will be presented from ancient to modern times. Key elements of modern acoustic theory will be used to critically evaluate the systems of musical intonation. A system of intonation in Indian music, especially *rāgas*, that is largely unknown to practitioners will be discussed, with examples of many ragas. There will be a critical evaluation of the *Mel* or *Thāt* system of Indian ragas currently in vogue. Conjectures will be made as to what makes the Indian *rāgas* melodically so stable, that is, why despite free improvisation the performer can stay within the melodic space of a given *ragā*.

About the instructor:

Asit Kumar De is an academician by profession. He retired on 31 December 2018 as Senior Professor and Head of the Theory Division of the Saha Institute of Nuclear Physics, Kolkata. Brilliant throughout as a student, after finishing undergraduate and post-graduate curricula in Physics from Presidency College and University College of Science in Kolkata, he spent more than 13 years abroad at several US Universities such as Carnegie-Mellon University in Pittsburgh, The Ohio State University in Columbus, and Washington University in St. Louis, and also at the Institute of Theoretical Physics, RWTH in Aachen, Germany for PhD and post-doctoral research work. He joined as a faculty member of the Saha Institute of Nuclear Physics in his hometown, Kolkata, in 1994 where he had an illustrious academic career. He has published many research articles in the best journals of his area of research, theoretical high energy physics and quantum field theory. He has contributed significantly in several fundamental issues and has been engaged in a few novel



areas in his field of research, like non-perturbative formulation chiral gauge theories.

In parallel, Prof. De pursued his deep interest in music, where he has received extensive training from leading stalwarts including Ustad Md. Dabir Khan, Pandit Ajoy Chakrabarty and Pandit Amiya Ranjan Bandopadhyay. He has a keen interest in Musicology and History of Indian Music, especially the 22- shruti system of intonation as described in Bharata's *Natyashastra* and its connection to the ragas currently in vogue in India. He has written several articles on this subject in Bengali and delivered lectures at Rabindra Bharati University, the British Council and a few other places in Kolkata. He has taught part of a Master's level course on Ethnomusicology at the Music Department of the Ohio State University, USA, and has served as external expert of the Higher Degrees Committee of the Instrumental music department at Rabindra Bharati University, Kolkata for more than 10 years along with famous sarodiya Pandit Buddhadev Dasgupta, Padma Bhushan awardee. Asit has taught Indian raga music for a number of years at the Tagore Institute in Bonn, Germany.



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Course Contents:

Lecture 1 (of duration 2 hours on 27 October 2025)

1. General discussion on musical intonations and the notion of the octave
2. An irrational number and the scale of harmonium or piano
3. Another irrational number and the 22 *Shrutis* as understood by Pt. Bhatkhande
4. Key elements of modern acoustic theory relevant for musical intonation
5. Resonance, musical instruments and voice culture
6. The so-called Pythagorean system of intonation and its lack of a closure property
7. The Chinese system of intonation
8. The so-called Harmonic scale
9. Discussion on why a Harmonic scale alone does not constitute the scale of an Indian *raga*

Lecture 2 (of duration 2 hours on 28 October 2025)

1. Continued discussion on Harmonic scale
2. A particular Harmonic scale with given properties relevant for Indian *ragas*
3. Illustration of the above with *raga* Bhoopali and Shuddh Kalyan, and the Pramana Shruti of Bharata's *Natyashastra*
4. *Murchhana* system of Indian music and its difference with modulations of Western music
5. Illustration with *ragas* Bhairav, Lalit, Shree, Puriya, Marwa and a few others
6. Illustration with *raga* Durga (or Shuddh Malhar or Jaladhar Kedar) and the emergence of *Madhyamagrama* of *Natyashastra*
7. Other examples of *ragas* in *Madhyamagrama*
8. A few examples of anomalous *ragas*
9. Emergence of the *Mel* system in Carnatic music and its subsequent spread in North India and their arbitrariness and inconsistency with *raga* music
10. Conclusion

The above is only a rough plan and is subject to change depending on availability of time and interest among audience

How to Apply?

All students of IIT Kharagpur, as well as Faculty/ Staff and their immediate family members, are eligible to apply for the workshop through CEP. No prerequisites necessary except for elementary math skills and an ear for music. The limited number of seats shall be filled-up on 'first come, first served' basis.

- Application fees for Students: INR 100/- + GST
- Application fees for Faculty/Staff (or immediate family members): INR 250/- + GST

For further details, contact:

Prof. Partha Sarathi Chakrabarti (pchak@coral.iitkgp.ac.in)



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#9007882235 | arjun@arp.iitkgp.ac.in