Lecture Programme for students of class XI and XII,
in association with National Academy of Sciences, Allahabad,
to be held at the Chennai Mathematical Institute, Siruseri
on 2nd & 3rd July 2022.

Saturday, 2nd July:

Time	Speaker	Title
10.00-11.00	**Ms. Namitha C.H.** **IMSc**	**A journey to infinity** Abstract: In this talk, we will introduce the students to the notion of finiteness and infiniteness using examples. We will discuss various notions of 'infinity' informally. We then try to make the ideas rigorous.
11.00-11.30		**Discussion**
11.30-11.45		**Tea break**
11.45-12.45	**Prof. Nithin Varma** **CMI**	**How to multiply numbers fast?** Abstract: We are all familiar with the problem of multiplying integers. We even know how to solve it using pen and paper using the so-called "long multiplication" method. Some of us may have also noticed that the time taken for multiplication grows longer as the integers to be multiplied gets bigger. Until the early 1960s, most mathematicians used to think that the long multiplication method was the fastest way to multiply two integers. Famously, Andrey Kolomogorov, an influential mathematician of the twentieth century, held a conference where he conjectured that there is no method that can multiply integers faster than the long multiplication method. The conference was called off abruptly in between due to a dramatic event that led to a fundamental revolution in computation. In this talk, I will formally introduce the notion of an algorithm, how to mathematically measure the speed of any algorithm to multiply integers, and briefly discuss the mathematical outcomes of Kolomogorov's conference on integer multiplication.
12.45-13.15		**Discussion**
13.15-14.15		**Lunch**
14.15-15.15	**Prof. K. Narayan** **CMI**	**Black holes and the information paradox** Abstract: Black holes arise as the endpoint of gravitational collapse of massive stars. I will give a broad overview of black holes as classical solutions in Einstein's general relativity and then describe the consequences of quantum fluctuations, in particular the Hawking evaporation process and the associated information paradox. I will conclude by outlining some recent progress on understanding this using quantum entanglement.

Time	Speaker	Title
15.15-15.45		**Discussion**
15.45-16.00		**Tea break & disperse**

Sunday, 3rd July:

10.00-11.00	**Ms. Rashi Sanjay Lunia IMSc**	**Magic with maths** Abstract: In this talk, we shall introduce the students to pigeon hole principle and modular arithmetic using a card trick.
11.00-11.30		**Discussion**
11.30-11.45		**Tea break**
11.45-12.45	**Prof. Ramya C. IMSc**	**From Euler's puzzle to Google Maps: The enchanting world of Graph Theory** Abstract: Computing devices are ubiquitous and have become an integral part of our lives. From Google maps and Wikipedia to Facebook and LinkedIn several mobile applications occupy our lives from dawn to dusk. Going back centuries, Leonhard Euler, in 1735 posed the following puzzle: You are given a map of Konigsberg, a city in Prussia(modern day Russia) that has seven bridges and your goal is to start at some point, walk along every bridge exactly once and return back to the starting point. This might remind you of a childhood puzzle that asks you to trace a drawing on paper without lifting the pencil! Sometimes you could succeed and at other times you may have failed. You will be startled to know that the walk in this puzzle posed by Euler has tremendously changed the way we perceive the world. It also marked the birth of "Graphs", fascinating mathematical structures that can be used to model many real-time problems. Several problems such as searching for the fastest route on Google Maps or finding a suitable job announcement on LinkedIn that are solved by computers can be modeled using graphs. In this talk, we will ride through several such puzzles and explore how they can be modeled in a way that can be handled by computers.
12.45-13.15		**Discussion**
13.15-14.15		**Lunch**
14.15-15.15	**Prof. M.V.N. Murthy IMSc**	**Mysterious Dark Matter** Abstract: Nearly seventy percent of matter in the universe is made up of the so-called "Dark Matter". We know it is there, but we do not know what it is nearly a century after it was postulated. This talk will review the present understanding in the search for Dark Matter.
15.15-15.45		**Discussion**
15.45-16.00		**Tea break & disperse**