PMRF-ISSS Teaching Programme

Prime Minister Research Fellowship students' teaching requirement

facilitated by the Institute of Smart Structures and Systems

Module PMRF-ISSS001/II/2024
Introduction to Elliptic curves and Modular forms-II
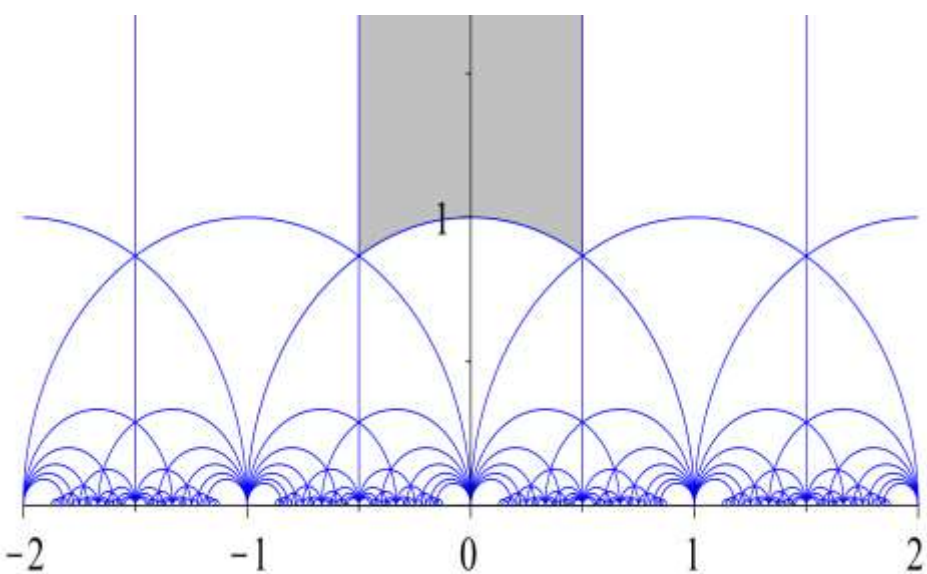
Name of the PMRF student

Ajay Prajapati

Required background of the students taught

Mathematics, Computer Science
Pre-requisites: Basic Abstract
Algebra, Basic Complex Analysis

Online session coordinator

Will be chosen from the list of registrants

Graphic relevant to the module

Details of the content of the module

- In our previous course last semester, we saw the congruent number problem and it's relation to elliptic curves. This course will be a continuation of it and we will discuss how congruent number problem is related to the famous BSD conjecture and then derive functional equation of the Hasse-Weil L-function of our elliptic curves. Then we need to study half-integral weight modular forms in order to get an idea of Tunnel's theorem that we mentioned in our last course. But this is an advanced topic. So instead to get a feel for modular forms, we will see classical modular forms (which are of integral weight) for congruence subgroups and derive their basic properties, action of Hecke operators, and functional equation of its L-function. Later we will see that by a theorem of Shimura, studying half-integral weight modular forms is the same as studying modular forms of integral weights.

- **References:** "Introduction to Elliptic curves and Modular forms" by Neal Koblitz.

Schedule of the module

- Two lectures of 1 hour each will be uploaded per week for 13 weeks.

- Starts- 18th March 2024

- Ends- 10th June 2024

Meeting link : Will be shared later

Link

Contact email ID: ajayp@iisc.ac.in

 Registration link:
https://forms.gle/qJY24b2h5FZFenMF7