

*Webinar on "A Walk into the Number Garden"*



# POORNIMA

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## COLLEGE OF ENGINEERING

**WEBINAR**

*On*

**A Walk into the Number Garden**

**Saturday, September 5, 2020**



**Coordinated by**

**Dr. Shilpi Jain**

**(Associate Professor, Department of Civil Engineering, PCE)**

**Mr. Balwan Sheshma**

**(HOD, Department of Civil Engineering, PCE)**

  
**Dr. Mahesh Bundele**  
B.E., M.E., Ph.D.  
Director  
Poornima College of Engineering  
131-6, RIIICO Institutional Area  
Sitapura, JAIPUR

## **ABOUT THE SPEAKER**

**Professor Kalyan Chakraborty, Scientist 'H', Harish-Chandra Research Institute, Allahabad**

Professor Kalyan Chakraborty is Scientist 'H' in Harish-Chandra Research Institute, Allahabad. He is a pure mathematician and have worked in various areas in Number Theory. He has also taught in various Universities worldwide on topics- Measure Theory, Galois Theory, Algebra I, Elliptic curves, as well as Theory of Numbers. He has co-published many books such as- Vistas of Special functions-II, A Quick introduction to Complex Analysis, etc. He is also vice-President of SSFA India. He is Chief Organizer ICCGNFRT Yearly International Conference. He has been mentoring 'PLUS 2' students at various DST inspire camps.

## **BRIEF REPORT**

**Poornima College of Engineering (PCE), Jaipur** organized a distinguished Webinar on the occasion of Teacher's Day on "A Walk into the Number Garden" on Saturday i.e. September 5, 2020 at 12:00 PM. The students of Civil Department marked their presence in the webinar by participating enthusiastically.

The guest and students were welcomed by Ms. Mansi Agarwalla, student IV year. Following it was the introductory speech of Ms. Shruti Sharma, student II year. In the speech she highlighted the whole life of Dr. Sarvepalli Radha krishnan, and history of Teacher's Day celebration.

**Dr. Shilpi Jain, Associate Professor, Poornima College of Engineering** introduce about topic and speaker.

During the technical discussions **Prof. Chakraborty** focused on the number theory as we walked down the lane, in the garden of numbers.

He mentioned four folds: first Part consists of the fundamental theorems of number system; in this he mentioned the theorems of number system in detail with examples. In the second part he described the Twin Prime numbers with some basic examples. Third part consisted of examples as well as definition of Congruent numbers. The fourth and last part was comprised of the  $3n+1$  problem and finally the insightful session came to conclusion.

**Webinar on "A Walk into the Number Garden"**

Mr. Balwan Sheshma, HoD, Department of Civil Engineering (Poornima College of Engineering) proposed the votes of thanks to the speaker and mentioned the knowhow of being in the industry along with all participants.

**POSTER**



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गुरु ब्रह्मा , गुरु विष्णु , गुरु देवो महेश्वरा ,  
गुरु साक्षात् पारब्रह्म , तस्मै श्री गुरु देव नमः

Join Us on Google Meet: [meet.google.com/pph-fznp-udh](https://meet.google.com/pph-fznp-udh)

Organized By:  
Department of Civil Engineering  
Poornima College of Engineering

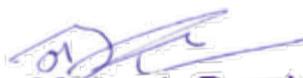
### Webinar on

"A Walk into the Number Garden"



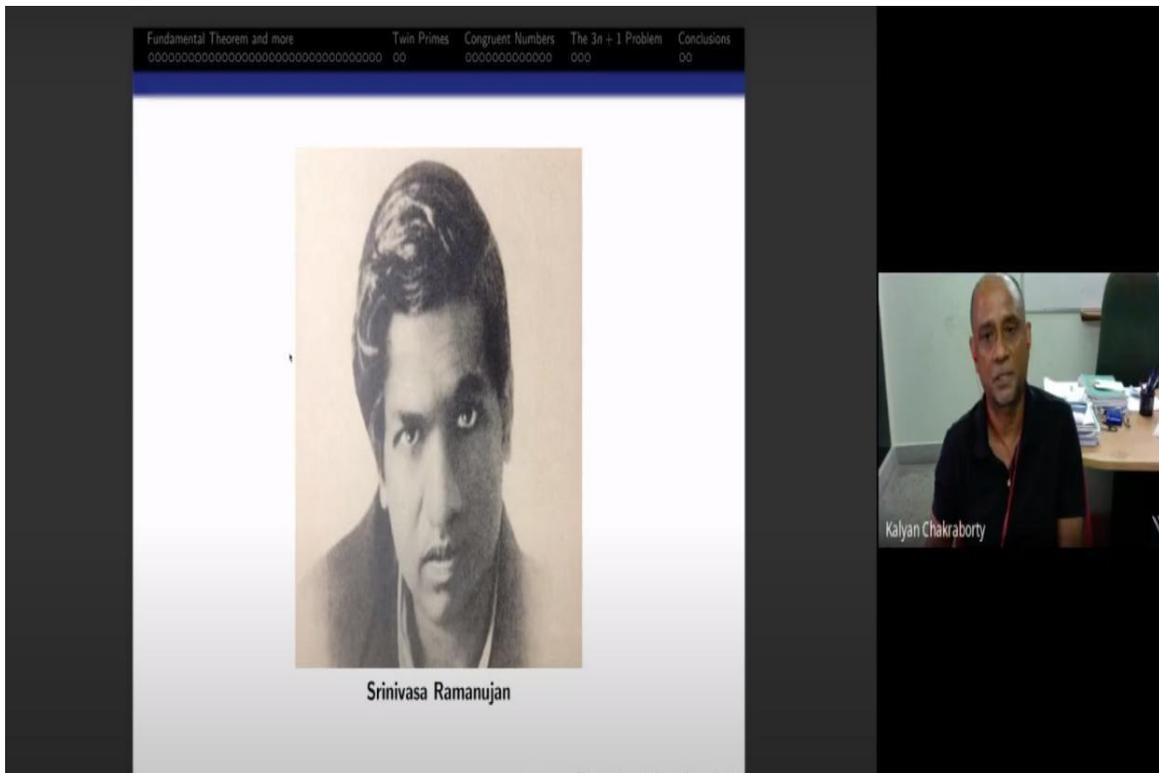
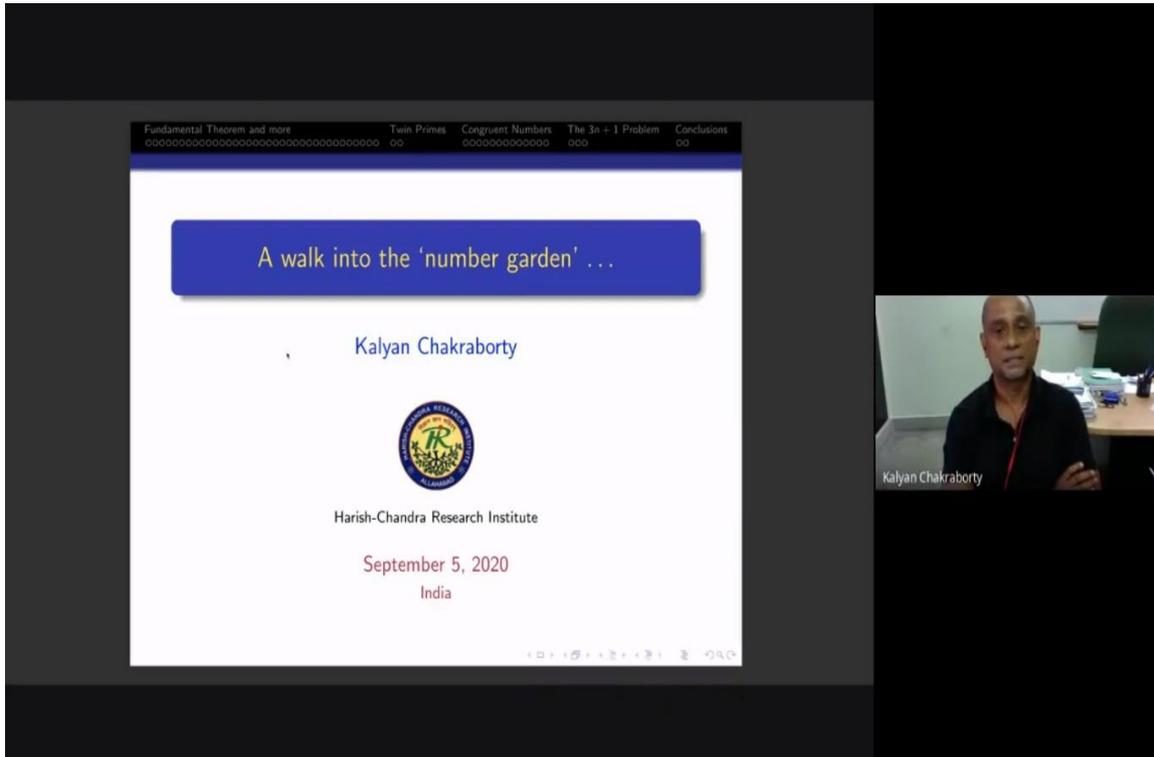
Prof. Kalyan Chakraborty,  
Scientist 'H',  
Harish-Chandra Research Institute

**SEPTEMBER 5, 2020**  
**12:00 NOON – 01:00 PM**

  
**Dr. Mahesh Bundele**  
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**Webinar on "A Walk into the Number Garden"**

**GLIMPSE OF WEBINAR**



  
**Dr. Mahesh Bundele**  
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## Webinar on "A Walk into the Number Garden"

Fundamental Theorem and more    Twin Primes    Congruent Numbers    The 3n + 1 Problem    Conclusions

### Prime numbers

Primes are the basic building blocks of the number universe from which all the other natural numbers are composed, each in its own unique combination, the perceived lack of order among them looked like a perplexing discrepancy in the otherwise so rigorously organised structure of the mathematical world.

—L. Euler



Leonhard Euler



Kalyan Chakraborty

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### Mersenne primes

- ★ René Descartes in 1638 wrote to Marin Mersenne that he thought **all even perfect numbers were of the form as described before**. He added also that he couldn't find any reason why odd perfect numbers can not exist.
- ★ Around 1640 Fermat began his study on **perfect numbers** by determining all the **primes of the form  $a^n - 1$** .

If  $a^n - 1$  is prime for integers  $a, n > 1$  then  $a = 2$  and  $n$  is prime.

- ★ Primes  $\rightarrow 2^p - 1, p$  is a prime, are called Mersenne primes.

**Conjecture**

There are infinitely many Mersenne primes.

- ★ Till now 51 Mersenne primes are known. The last one is discovered recently (Dec. 07, 2018):  
 $2^{8,589,933} - 1$  (has 24, 862, 048 digits!!).



Kalyan Chakraborty

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The problem

## The 3n + 1 problem

Consider the following operation on an arbitrary positive integer:

- If the number chosen is even, **divide it by 2**.
- If it is odd, **multiply it by 3 and add 1**.

$$f(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even,} \\ 3n + 1 & \text{otherwise.} \end{cases}$$

form a sequence by performing this operation repeatedly, beginning with any positive integer.

- n = 6 produces

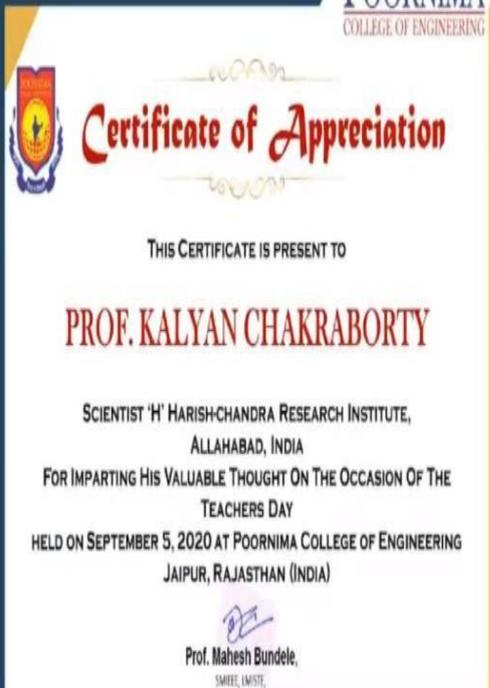
6, 3, 10, 5, 16, 8, 4, 2, 1, ...

### Collatz Conjecture

This process will eventually reach the number 1, regardless of which positive integer is chosen initially.



Kalyan Chakraborty



**POORNIMA**  
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## Certificate of Appreciation

THIS CERTIFICATE IS PRESENT TO

### PROF. KALYAN CHAKRABORTY

SCIENTIST 'H' HARISH-CHANDRA RESEARCH INSTITUTE,  
ALLAHABAD, INDIA

FOR IMPARTING HIS VALUABLE THOUGHT ON THE OCCASION OF THE  
TEACHERS DAY

HELD ON SEPTEMBER 5, 2020 AT POORNIMA COLLEGE OF ENGINEERING  
JAIPUR, RAJASTHAN (INDIA)

*Prof. Mahesh Bundele*  
Prof. Mahesh Bundele,  
SMBEC, I.M.S.T.E.



HOD CIVIL PCE

  
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