

# **REPORT ON ONLINE SPECIAL LECTURE SERIES IN MATHEMATICS, 2020** **(OSLSM-2020)**

## **Phase I Lecture Codes: 01.A1 & 01.A2**

**Dates:** 13.07.2020 [for 01.A1] & 15.07.2020 [for 01.A2].

**Time:** 11:30 am to 1:00 pm [IST].

**Topic:** Few Geometric and Combinatorial aspects of Group Theory and its application to Cyber Security-I&II.

**Target Audience:** The lectures are meant primarily for the UG/PG students of Department of Mathematics of Netaji Subhas Open University [NSOU]. However, students of other universities and institutes, research scholars, faculties of different colleges/ universities or any interested person were welcome to attend the lectures.

**Technical Platform:** The webinar was conducted using Zoom app through the LMS platform of ICT, NSOU. Technical Support was extended by M/s School Guru.

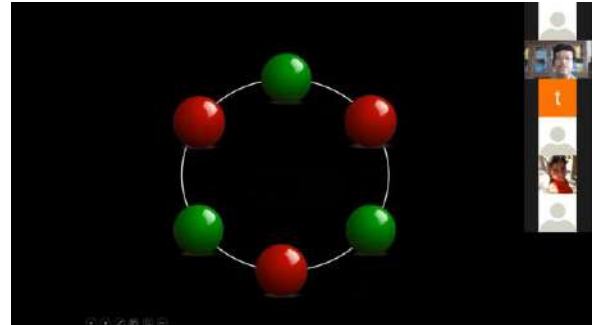
**Speaker:** Dr. Avishek Adhikari, Professor, Department of Mathematics, Presidency University, Kolkata.

**About the speaker:** Professor Adhikari is the recipient of President of India Medal, ISCA Young Scientist Award and NANUM fund by International Mathematical Union (IMU). After completing his Ph. D. from ISI Kolkata under the guidance of Padma Shri Professor Bimal Roy, Professor Adhikari was a post- doctoral fellow at INRIA- Rocquencourt, France and a visiting scientist at Linkoping University, Sweden and a visiting scientist at Indian Statistical Institute, Kolkata. He was also a former faculty member of Department of Pure Mathematics, University of Calcutta.

He has published four basic textbooks on mathematics and edited two research monographs. He has published several papers in reputed international journals, conference proceedings and contributed volumes. He is on the editorial board of several journals. He is/was one of the investigators of Research Projects funded by the agencies like DRDO, WESEE (Ministry of Defense), DST, DST-SERB (MATRICS), DST-JSPS (Indo-Japan Project) and DST-JST (Indo-Japan) etc. His research interest includes Applications of Algebra, Graph Theory, Cryptanalysis, Wireless Sensor Networks etc.

**Abstract of the lectures:** There is no doubt that in today's scenario, due to the massive improvement of technologies, especially technology related to Internet, the possibilities for transmitting multimedia data over the Internet or storing them on computers, mobiles or cloud storage have increased enormously. However, these media do not appear to be 100% secure. That is why, sometimes, it is easy to the intruders to steal or distort digitally stored important multimedia data. But it is very important to

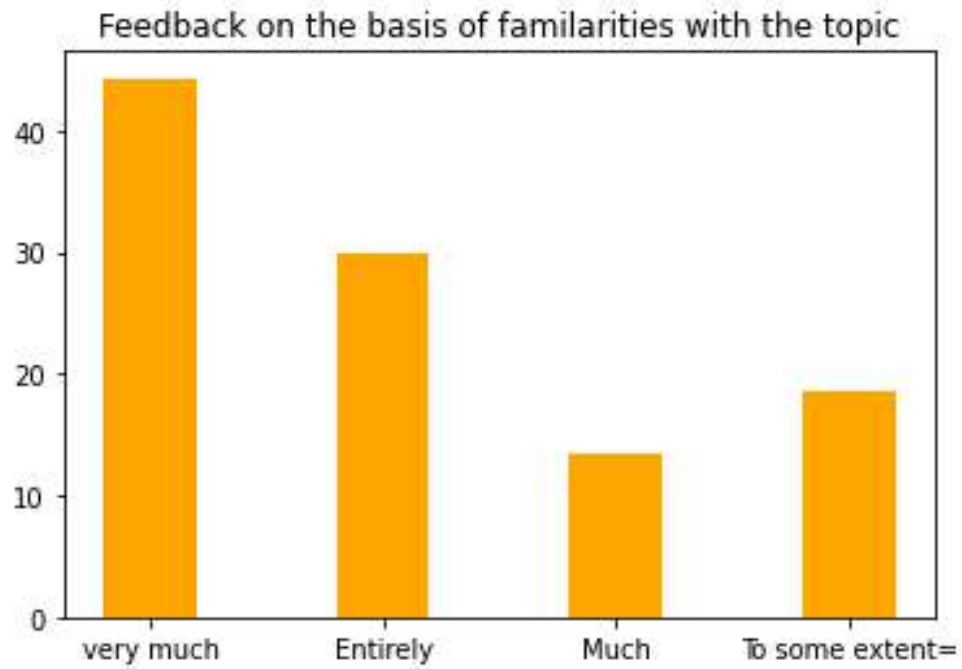
protect these important multimedia data from being stolen or distorted by hackers in certain fields, especially in industrial or in defense sectors. Cryptographic primitives may be considered as one of the most important tools to handle the situation. In the first talk, mathematically, we shall deal with such issues and provide few important information regarding cyber security and try to explore how number theory and abstract algebra play important roles in this scenario. In the second talk we shall show how Group Action plays an important role in counting principle.

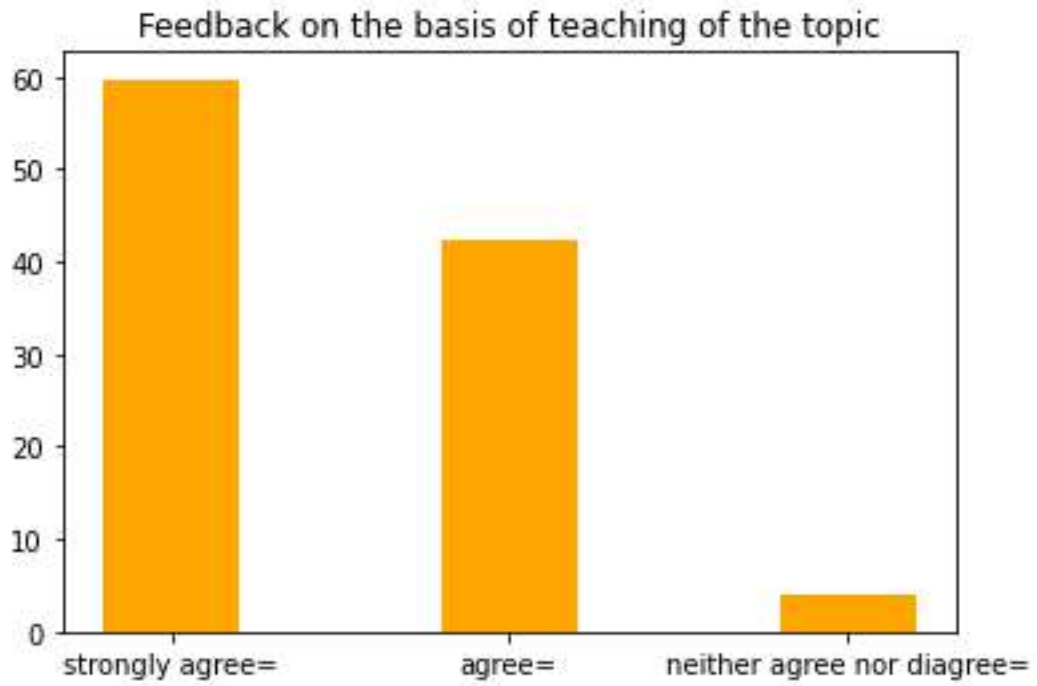


**A brief proceeding/ overview:** The arranged webinars were two days' online lectures, which were primarily focused on illustrating and elaborating the notions of group theory from geometric and combinatorial viewpoints. Moreover, the relevance of group theory and its applicability to the cryptography and cyber security of modern days were also explained with several examples.

The webinars were commenced by the organizing Secretary Dr. Ushnish Sarkar, Assistant Professor of Mathematics, NSOU. After a brief introduction of the speaker Prof. Avishek Adhikary by Dr. Sarkar, the welcome address was delivered by Chairperson Prof. Kajal De, Head of the Department of Mathematics & Director, School of Sciences, NSOU. Later Prof. Avishek Adhikari took over the session. On day 1, the lecture was mainly focused on the interplay of group theory and cryptography as well as cyber security. Day 2 was devoted primarily for explaining geometric and combinatorial perspectives of group theory with a special emphasis on group action. After the concluding remarks of Prof. Kajal De and Dr. Ushnish Sarkar, the programme ended with the vote of thanks by Mr. Chandan Kumar Mondal, Assistant Professor of Mathematics, who is also Organizing Secretary of this series. A special thanks was given to the Honourable Vice Chancellor, Prof. Subha Shankar Sarkar of Netaji Subhas Open University (NSOU) for his exemplary and inspirational leadership and support towards materializing this event into a reality.

## Feedbacks at a glance





**Remarks:** The lectures were a huge success and received a positive response from the participants.