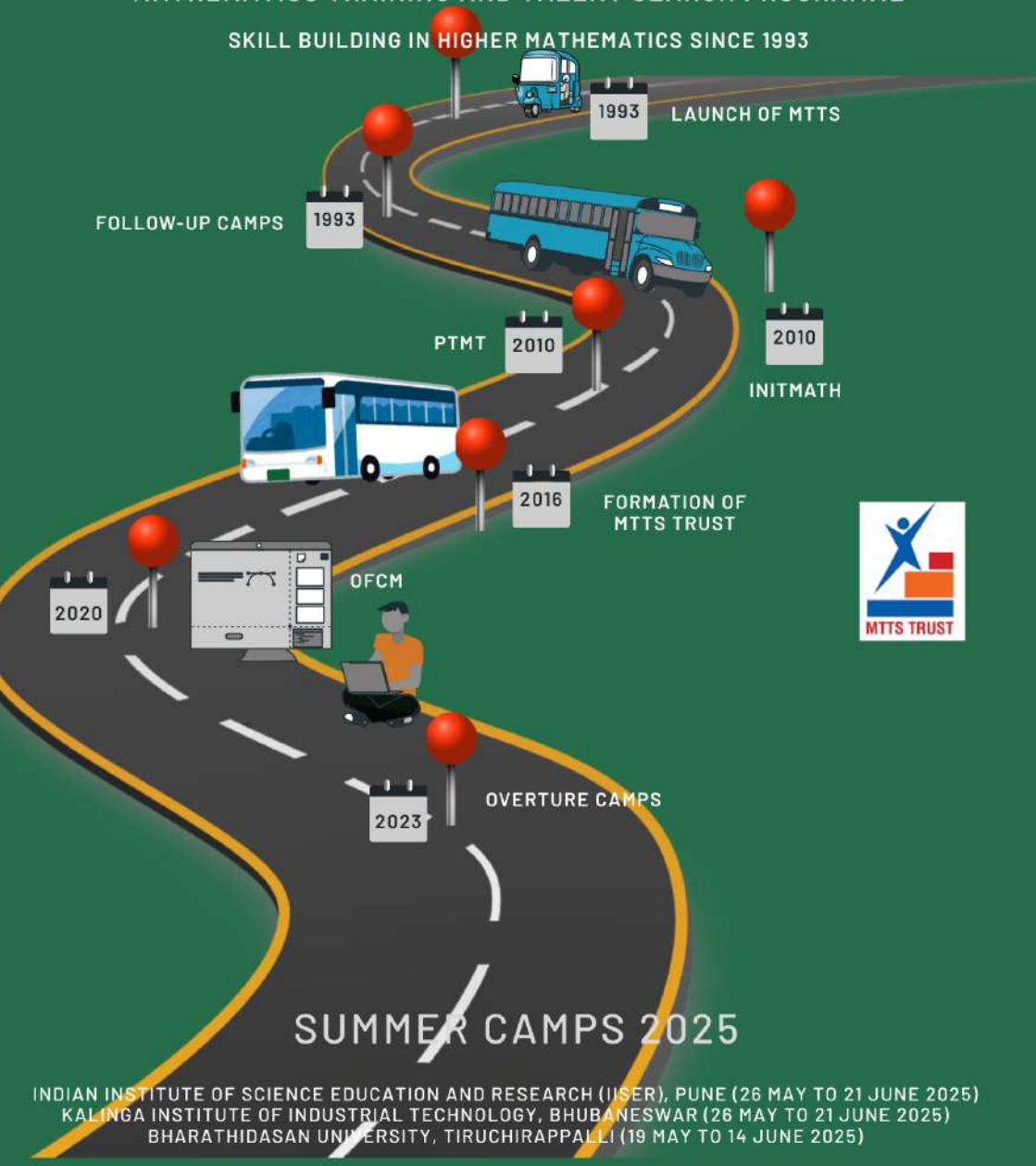
SOUVENIR

MATHEMATICS TRAINING AND TALENT SEARCH PROGRAMME

SKILL BUILDING IN HIGHER MATHEMATICS SINCE 1993



MTTS TRUST

SUMMER CAMPS 2025

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER), PUNE (26 MAY TO 21 JUNE 2025)
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY, BHUBANESWAR (26 MAY TO 21 JUNE 2025)
BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI (19 MAY TO 14 JUNE 2025)

FUNDED BY: NATIONAL BOARD FOR HIGHER MATHEMATICS

MTTS Trust

The MTTS programme, since its inception in 1993, has not only improved itself throughout its journey, but has also grown tremendously with the addition of a number of associated programmes for students and teachers, under the leadership of its founder and director, Prof. Kumaresan. Apart from its flagship programme, the 4-week summer camp, it has added InitMath camps of one week duration for students, PTMT camps catering to a large number of college and university teachers, the OFCM, an online foundation course with six simultaneous camps, and the very recently started Overture camps, which have helped MTTS to reach the farthest corners of the country.

After running the MTTS Programme with a small group of committed mathematicians for about two decades, Prof. Kumaresan formed a National Core Committee to make decisions and execute all matters related to MTTS. On the occasion of the silver jubilee of the MTTS Programme, the members of the core committee formed a non-profitable educational trust, entitled "MTTS Trust" to carry forward this endeavour of MTTS. The Trust was registered in December 2016, and since 2018, all the programmes under the MTTS umbrella are being conducted by the MTTS Trust.

The objectives of the MTTS Trust include the following:

- To continue organizing camps under the MTTS umbrella, and any other training camps as deemed necessary or important for the country to keep its eminence in higher mathematics.
- To provide training in mathematics to students and teachers of colleges and universities in India, promote higher study and research in mathematics, mathematics education, their allied subjects and their applications.
- To bring out lecture notes/textbooks of high quality in any branch of mathematics.
- To help organizations and academic institutions in India to organize such programmes in line with the of objectives of the trust.

The present composition of the MTTS Trust is as follows:

Trustees	1	G. Santhanam (President)	gsanthana@gmail.com
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Former Members	1	S. Kumaresan (Founder President & Former Trustee)	
	2	A. J. Jayanthan (Former Trustee)	

Queries regarding the Trust or suggestions to the Trust may be posted to the Managing Trustee at mttstrust@gmail.com.


MTTS Venues (since 1993)
InitMath, PTMT, and Summer Camps
Online MTTS Camps:
• 8 MTTS Summer Camps
• 30 OFCM Camps
• 3 InitMath Camps
• 15 Online Short Courses
• 2 Online Lecture Series
Srinagar
Jammu
Nadaun
Hamirpur
Mandi
Ferozepur
Killianwali
Uttarkashi
Anandpur Sahib
Roorkee
Chandigarh
Talwandi Sabo
Delhi
Noida
Jaipur
Kanpur
Ajmer
Banasthali
Allahabad
Patna
Sagar
Vallabh Vidyanagar
Indore
Anand
Vadodara
Surat
Nagpur
Raipur
Sambalpur
Kharagpur
Kolkata
Bhubaneshwar
Nanded
Mumbai
Pune
Hyderabad
Nalgonda
Vijayawada
Belagavi
Panjim
Kurnool
Tirupati
Mangalore
Chennai
Mysore
Erode
Salem
Pondicherry
Kozhikode
Coimbatore
Udumalpet
Tiruchirapalli
Irinjalakuda
Thiruvarur
Palakkad
Madurai
Alappuzha
Ramanathapuram
Changanasserry
Sivakasi
Tirunelveli
Thiruvananthapuram
East Sikkim
Sikkim
Tezpur
Guwahati
Dibrugarh
Jorhat
Kohima
Cachipur
Shantiniketan
Dhanbad
Nadia
Purulia
Aizawl
Aizawl
Agartala
Main MTTS Camps
Level "O" Camps
InitMath
PTMT

Programmes conducted during 2024-25

Sl No	Programme	Venue	Region Covered	Dates
1	MTTS Summer Camp Level O	Central University of Tamil Nadu, Thiruvarur	All India	May 20- June 15, 2024
2	MTTS Summer Camp Level I	Central University of Tamil Nadu, Thiruvarur	All India	May 20- June 15, 2024
3	MTTS Summer Camp Level II	Central University of Tamil Nadu, Thiruvarur	All India	May 20- June 15, 2024
4	MTTS Summer Camp Level O	Institute of Chemical Technology, Mumbai	All India	May 20- June 15, 2024
5	MTTS Summer Camp Level O	Sikkim Manipal Institute of Technology, Sikkim	All India	May 27- June 22, 2024
6	InitMath	IIT Jammu	Jammu and Kashmir and neighbouring States	July 08-13, 2024
7	InitMath	Mizoram University, Aizawl	All North-Eastern States	July 08-13, 2024
8	InitMath	V O C College, Thoothukudi	Tamil Nadu and neighbouring states	July 22-27, 2024
9 - 14	OFCM2024 (6 camps)	Online	All India	August 18-31, 2024
15	InitMath	NIT Hamirpur	Himachal Pradesh, Haryana, Punjab	Sept. 16-21, 2024
16	InitMath	Sidho-Kanho-Birsha University, Purulia	West Bengal, Bihar, Jharkhand, and North East	Sept. 17-22, 2024
17	InitMath	IIT Roorkee, Saharanpur Campus	Uttar Pradesh, Uttarakhand and neighbouring states	Nov. 11-16, 2024
18	InitMath	KIIT Bhubaneswar	Odisha, Jharkhand, WB, Bihar	Dec. 23-28, 2024
19	InitMath	VP & RPTP Science College, Vallabh Vidyanagar	Gujarat and neighbouring states	Jan. 06-12, 2025
20	InitMath	Manipal University, Jaipur	Rajasthan and neighbouring states	Jan. 06-12, 2025
21	InitMath	VNIT Nagpur	Maharashtra and neighbouring states	Jan. 06-12, 2025
22	PTMT	Sardar Patel University, Vallabh Vidyanagar	All India	March-03-08, 2025
23	InitMath	Mahatma Gandhi University, Nalgonda	Telangana and neighbouring states	March-17-22, 2025
24	InitMath	Sri G.V.G Visalakshi College for Women, Udumalapet	Tamil Nadu and neighbouring states	March-17-22, 2025
25	InitMath	Guru Nanak College, Killianwali	Punjab and neighbouring states	March-24-29, 2025
26	InitMath	St. Dominic's College Kanjirapally	Kerala and neighbouring states	May 05-10, 2025

Overture programmes during 2024-25

S. No.	Programme Dates	Programme held at	Region
1	27-28 September, 2024	Jawaharlal Nehru College, Pasighat	Arunachal Pradesh
2	27-28 September, 2024	St. Aloysius University, Mangalore	Karnataka
3	09-10 October, 2024	St. Paul's College, Kalamassery	Kerala
4	25-26 October, 2024	Dergaon Kamal Dowerah College, Dergaon	Assam
5	05-06 November, 2024	Pachhunga University College, Aizawl	Mizoram
6	07-08, November 2024	St. Thomas College (Autonomous), Thrissur	Kerala
7	16-17 November, 2024	Govt. Engineering College, Bhojpur	Bihar
8	21-22 November, 2024	Women's College, Agartala	Tripura
9	25-26 November, 2024	Govt. College Sanjauli	Himachal Pradesh
10	29-30 November, 2024	Kohima Science College, Jotsoma	Nagaland
11	02-03 December, 2024	Midnapore City College, Bhadutala	West Bengal
12	04 December, 2024	Garhbeta College, Paschim Medinipur	West Bengal
13	07-08 December, 2024	IIIT, Naya Raipur	Chhattisgarh
14	09-10 December, 2024	Sri Ramakrishna College of Arts & Science, Coimbatore	Tamil Nadu
15	12-13 December, 2024	Alagappa University, Karaikudi	Tamil Nadu
16	16-17 December, 2024	P.K.R .Arts College for Women, Gobichettipalayam	Tamil Nadu
17	19-20 December, 2024	Thiruvalluvar College, Pothigaiadi,	Tamil Nadu
18	26-27 December, 2024	Shri Ramji Ravji Lalan College, Bhuj	Gujarat
19	08-09 January, 2025	Bhattadev University, Pathsala	Assam
20	17-18, January 2025	Farook College, Kozhikode	Kerala
21	09-10 January, 2025	Govt. College, Kasargod	Kerala
22	03-04 February, 2025	HPSM's Ganpat Parsekar College of Education, Goa	Goa

A typical MTTS classroom

Message from Director

We keep hearing that the twenty-first century is the century of knowledge. Everybody is keen that critical thinking should be inculcated among youngsters. New Education Policy wants this to be a core subject in BS. What is Critical Thinking? If you go through the numerous articles/ books and sift through much jargon, you will find that everything boils down to the Art of Asking Questions! Everything else flows from this.

The MTTS Programme has been training young minds of our country in the art of asking questions right from its inception. In fact, two decades ago, we started using the fancy phrase "Critical Thinking". Later, we even included a one-page DIY summary in the Souvenir. We use mathematics as a medium to encourage critical thinking in young minds. We believe that if critical thinking is taught as an abstract set of principles, it may not achieve its purpose. But if it is taught in the context of a subject, you see the principles in action and retain the principles for future use.

What can you expect in an MTTS camp? First and foremost is that a typical session of an MTTS camp is nothing you would have experienced in a classroom back home. The teacher keeps on asking questions, makes you think and encourages you to come up with your own answers. Slowly you will also start enjoying these interactive sessions, and come up with questions on your own. Gradually, with the help of your teachers, you will start "discovering" mathematics rather than results being handed down as gospel truths. You will also perceive that mathematics is not only the mother of science, but is also a scientific discipline, and neither a religious dogma, nor a bagful of algorithms and tricks. Like in sciences other than mathematics, we also observe patterns, make experiments to see whether the same kind of pattern recurs, seek out a general principle (mathematicians may call them conjecture, lemma, proposition or theorem) that could explain the pattern and then prove it rigorously. This is where mathematics differs from other sciences. In other sciences, you can only conduct more experiments to verify the proposed principle, but there is no conclusive proof. In other sciences, one enunciates principles that try to explain the collected data or observed phenomenon but if a new set of data is replicated at many places and the existing principle or theory does not explain the new phenomenon, you look for another principle that explains the past as well as the new data. In mathematics, once a result is proved rigorously, the result/principle remains true forever. You will experience all this and more in a typical MTTS camp.

The sessions in an MTTS camp will be radically different from what you have seen in your institutes. It takes about three days for a new entrant to catch on to what we are trying to do. Do not be discouraged if you – a brilliant student– could not answer simple questions on topics you thought you knew 'well'. This is one of the awakening moments. Just like learning a dictionary by heart does not make you proficient in oral or written communication, knowing the jargon is not the same as understanding the subject. The camp offers an academic ambience that is unique. It is a place where you see a lot of experts who are keen to discuss mathematics, and a whole lot of young minds with a thirst for knowledge. This kind of atmosphere is very rare even among the best institutes in the country. You will see students of varied interests with a variety of talents. Make the best use of this by mixing with other participants and discussing mathematics. We encourage discussion with your peers as it is

the best way to learn ANYTHING, in particular, mathematics.

Some of you may have difficulty in communicating in English. Do not worry, a teacher, a mentor, or a participant will be there to help you. MTTS camps not only groomed good mathematicians, they also gave the confidence to such students to overcome their difficulty in English. Many are now with reputed institutes in the country and have made many foreign visits. So, do not let a language be a barrier to your growth.

Since everyone around you is also committed and good, it is a good idea to see how you compare with them. However, this introspection should be used only to identify areas for self-improvement, and attend to these. *Compare with others, but compete only with yourself.* During the middle of the second week of the camp, do some self-enquiry: where were you at the beginning of the camp and what are the positive changes you could see in yourself?

As our emphasis is to make you think on your own and find your own path to learning and doing mathematics on your own, we may not introduce many new concepts and deal with them in a shallow manner. Those who are fortunate to have had good teachers and peers may, at first, be dismayed that they are not learning anything new! Let this thought not blind you so much that you fail to perceive the other aspects of the camp. Newer perspective, deeper understanding, the inner workings of the proofs, mastery over the subject, the confidence in learning new concepts on your own, and the ability to solve problems by means of asking questions, are some of the key takeaways from our courses.

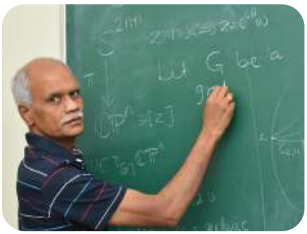
The MTTS methodology can be summed up in one sentence: We learn faster and better by mimicking and emulating experts. In childhood, we learned everything by watching others and imitating them. We made mistakes but that did not deter us from trying again and again. Teachers at MTTS camps think in front of you, show you their raw thinking process, and ask questions aloud that lead them to solve a problem on hand. We hope that consciously or unconsciously, you observe these and put them to use to understand new things and solve unseen problems. This principle is captured by a quote of Henri Lebesgue printed elsewhere in the souvenir.

With these few words, let me welcome you to MTTS2025. I am sure you will enjoy the academic environment and hopefully, this will turn out to be one of the most cherished parts of your life! Your ideas of Mathematics and the way of learning are going to change forever!

All the best!

S Kumaresan

Message from President



On behalf of the MTTS Trust, I welcome you all to MTTS2025 - the 33rd MTTS summer camp. As you all may be aware, the MTTS method of teaching is very much different from the routine classroom teaching. MTTS firmly believes in making learning enjoyable and wants to give each one of its participants a sense of discovery.

The MTTS programmes have been able to achieve this by making the academic sessions interactive in which every student takes active part in learning. When this happens, every student takes part in this active learning, pays attention to what is being said rather than on what is written on the board, and also thinks along with the teacher. This enables the students to think ahead and discover on their own. Prof. S. Kumaresan, Director, MTTS Programme has written exhaustively on various aspects of MTTS teaching. This way of learning may be demanding and it is highly rewarding. I am sure you are willing to work hard to get maximum benefit out of this programme.

The MTTS Trust wishes you all the best.
G. Santhanam

Visit to S. Ramanujan birth place, MTTS2024

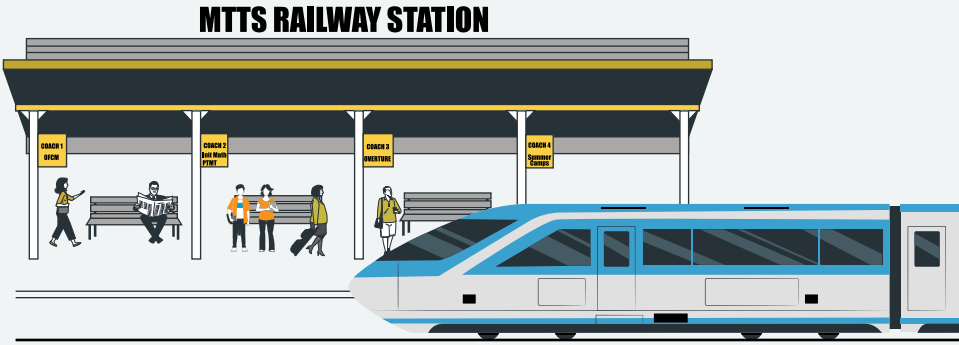
Thanks a lot

The MTTS Trust would like to record its sincere thanks to:

- Prof. S. Kumaresan, Director, MTTS Programmes, and former President, MTTS Trust for his dynamic leadership and his continued, invaluable contributions to the MTTS Programme since its very inception;
- National Board for Higher Mathematics (NBHM), an apex body of the Department of Atomic Energy, Government of India for generously funding the MTTS programmes since its inception in 1993;
- All the donors for their generous support to MTTS Trust to carry out MTTS activities and its mission;
- Prof. G. Santhanam, President of MTTS Trust, for his dedicated guidance and support in steering the activities of the Trust;
- All the trustees and invitees of MTTS Trust for their untiring support and invaluable contributions to the MTTS Trust in its endeavour;
- The Director, Indian Institute of Science Education and Research (IISER) Pune, the Vice-Chancellors of Bharathidasan University, Tiruchirappalli and Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar for according the permission to organize the MTTS 2025 summer camps in their respective institutes and for providing various facilities;
- Local coordinators of MTTS2025 summer camps: Dr. Diganta Borah, Dr. P. S. Srinivasan, Dr. Abhijit Sutradhar and Dr. Manas Ranjan Mohapatra who have very generously shared their organizational expertise and ideas, and worked with great dedication toward our common goal;
- All the members of the Organizing Committee of MTTS2025 summer camps for their whole-hearted support in taking care of various aspects of organizing the programmes;
- All the resource persons and mentors of MTTS2025 summer camps who have agreed to teach and guide students despite their busy schedule;
- All the resource persons, local coordinators and mentors who have contributed to the various camps organized under the MTTS umbrella from April 2024 to April 2025 for their unwavering commitment and steadfast support in this collective endeavours;
- Mr. Nair of Scientific Books, Mumbai for supplying books;
- All of those who have contributed to making MTTS a brand in the last thirty-two years;
- Last but not the least, all the students, who are participating in MTTS2025 summer camps.

– Ajit Kumar
Managing Trustee, MTTS Trust

MTTS Programme - An Introduction



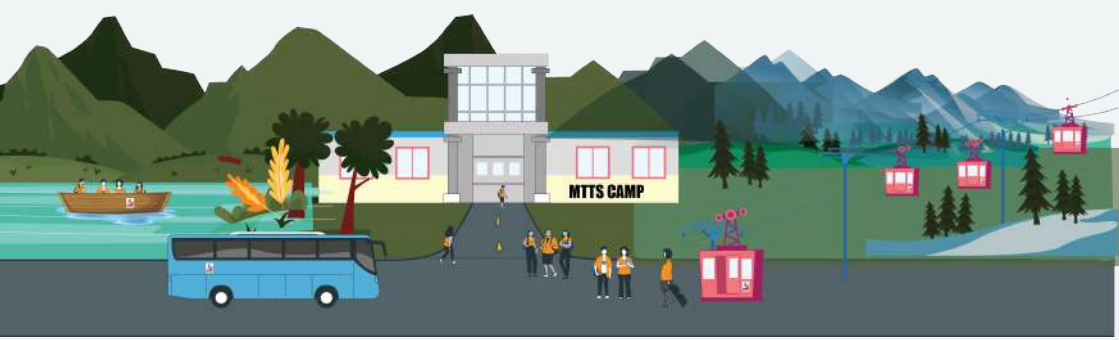
What is MTTS?

The Mathematics Training and Talent Search (MTTS) Programme started in 1993 as a four-week intensive summer training programme for mathematics students and has been organised at different locations across India for the last three decades. The programme, funded by the National Board for Higher Mathematics (NBHM), has been organised by a group of committed mathematicians under the dynamic leadership of Prof. S. Kumaresan (Retd., University of Hyderabad), the first recipient of the INSA Teachers Award in Mathematics.

Over the years, MTTS has grown, with a number of different training programmes held across the country throughout the year. The MTTS programmes are one of the most effective and unparalleled training programmes, making a significant impact on the mathematical scene in India. From 2018 onwards, all MTTS activities are organised by the MTTS Trust, a non-profit educational trust formed in December 2016.

The Genesis

In 1989, during a conference titled "Development of Mathematics" organised by the NBHM, Prof. S. Kumaresan proposed a training programme with a vision different from the then-existing training programmes in mathematics. Subsequently, during "Discussion Meeting on Harmonic Analysis" held at the Indian Institute of Science, Bangalore in 1992, a session was devoted to discuss the academic preparation of the students who come for Ph.D. programmes in Mathematics. Prof. Kumaresan suggested that a training programme, with the aim to expose young minds to the excitement of doing mathematics, and enabling them to have a meaningful career in research and teaching, should start at an early stage, perhaps at the B.Sc. level itself. The NBHM, an apex body of the Department of Atomic Energy, Government of India, was approached with the proposal, which promptly agreed to support such an endeavour. Thus, the programme, christened as the MTTS Programme, took off in the summer of 1993.



Aims

The manifold aims of MTTS include

- exposing bright young students to the excitement of doing mathematics;
- promoting creative thinking and inculcating the art of asking questions;
- promoting problem solving skills;
- reaching out to students interested in mathematics across every nook and corner of the country;
- preparing students in various aspects of mathematics required to become professional mathematicians;
- improving the teaching methodology of mathematics in the country.

The Magic of MTTS

The teaching methodology in MTTS is radically different from regular classrooms. Resource persons refrain from delivering well-polished lectures. All the sessions are highly interactive, and the participants are asked to think, experiment, formulate and prove mathematical results on their own at every stage. The principle followed in this programme, is best explained in the words of Lebesgue,

"The best way to teach students is to think in front of them"

Some of the regular features in the MTTS camps are: group discussions, student seminars, thinking and writing assignments, sessions on how to read mathematics books and counseling sessions.

In each on-site camp, all resource people, which include the instructors, as well as the mentors, are present throughout the day, in all the sessions and are involved in round-the-clock discussions with the participants. They reside with the participants and spend most of their time engaged with them. MTTS camps provide an effective platform for the participants to interact with peers and experts in the fields, which helps them to build strong mathematical foundations.

MTTS gives preference to participants from rural backgrounds, from remote areas, and to women participants. During the past 32 years, MTTS has reached the farthest corners of the country. Every year it is ensured that the participants of the programme are drawn from almost every state of the country.

Due to the covid pandemic outbreak in 2020, the MTTS Trust had to abandon its traditional on-site camps in the summer and switch over to the online mode. It was a challenge for the Trust to replicate the highly successful interactive and students-participation based methodology of the MTTS camps, if the programmes were to be conducted online. Under the guidance of Prof. Kumaresan, several rounds of extensive discussions among MTTS Trustees and invitees were held, and experimentation with various online tools available were conducted. The success of a pilot online course conducted by Prof. Kumaresan with select students of MTTS2019 made the Trust confident enough to conduct online camps.This became an initial model for the Trust to follow, and an abridged version of MTTS2020 was conducted online. Since then all programmes under the umbrella of MTTS were conducted online by the Trust successfully until the annual summer camps in 2022. The untiring efforts of the faculty and the mentors, and the positive response from the students, made this possible.

Through the online programmes conducted in 2020 and 2021, the Trust gained expertise in teaching using online platforms. The magic of the MTTS style of teaching in the on-site camps was almost recreated in these online camps. The online programmes are immensely useful in reaching out to a large number of students from remote geographical locations, giving them an initial training, and for holding the follow-up camps of different MTTS programmes. After the easing out of the covid situation and pandemic induced restrictions in the country, the Trust has not only resumed its on-site activities starting from MTTS2022, but also continued to use its collective experience and expertise, by conducting various highly appreciated programmes in the online mode.

A key aspect of all the MTTS camps is that feedback is taken from all the stakeholders, including students, mentors, coordinators, and faculty. The MTTS motto "I'mproving Myself" is also applicable to itself, as appropriate measures based on constructive feedback are taken up for future improvement. In fact, this meticulous exercise is one of the reasons why MTTS has had continued success for over three decades, and has evolved into one of the most effective training programmes.

Academic Programmes

MTTS Annual Summer Camps

The main and oldest format of MTTS camps, itself known as the MTTS Programme in the initial decade, is the intensive four-week MTTS annual summer camp. It has been held uninterrupted every summer since 1993 (including the years 2020 & 2021 disrupted by the pandemic, when it was held online). The main centre comprises three camps, one at each of the following levels: Level-O, Level-I and Level-II meant for B.Sc. 2nd year, B.Sc. 3rd year,

and M.Sc. 1st year students respectively, catering to around 130-150 students every year. Two more Level-O camps are held at geographically separated locations in the country, catering to approximately 90-100 more students of BSc second year with the aim of reaching out to students, and inspiring them to take up a career in mathematics.

Usually, at each level, four fundamental topics in mathematics are taught by a highly committed team of faculty members from various leading institutes in India, well-versed in MTTS pedagogy. The camp is set up so as to give individual attention to every student and ensure that no student feels left out. All teaching faculty, aptly called resident faculty, as well as the mentors, stay with the students in all the classes, and help them resolve their doubts and queries not only during lunch and tea breaks but often also after dinner.

After four weeks of intensive training, one experiences a remarkable improvement in students' critical and independent thinking, mathematical writing, and problem-solving abilities. In fact, the whole approach of these students towards mathematics changes. Group discussions at the end of each session and student seminars are hallmarks of this programme, which enable, nurture and hone these abilities. Innovative sessions like reading mathematics from a book, and learning effectively from online video content, are conducted for students to keep up their learning even after returning from the camp.

The Summer Camp is advertised sometime in December and the applications are invited through an online application portal. Around 250 students out of about 3000 applicants, in three levels are selected to participate in the summer camps after a very rigorous selection procedure. The selection of students primarily depends on their consistently good academic record, and the recommendation of a teacher closely acquainted with the student. The process also ensures that students from all states, including a fair proportion of girl students, are selected. The programme takes care of the travel, accommodation and food of the participants, and provides other study materials including books. A mini-feedback after a week and detailed feedback towards the end of the programme are collected, which are used for self-assessment and improvement.

InitMath (formerly known as miniMTTS) and PTMT

In order to provide opportunities to a larger number of students and teachers, regional level programmes of shorter duration are held that are modelled on the MTTS methodology. Two initiatives that have served the mathematics community across the country are Initiations into Mathematics (InitMath), and Pedagogical Training for Mathematics Teachers (PTMT) programmes. So far 85 InitMath camps and 18 PTMT programmes have been organised in various parts of the country in the past decade. These camps have been organised in almost all states in the country, including several in geographically disadvantaged regions, motivating a large number of students from remote areas to pursue a career in mathematics. Several InitMath camps from 2020 to 2022 were also held online. *These camps are conducted throughout the year, and potential applicants should see the MTTS website for information about upcoming camps.*

Online Foundation Course in Mathematics (OFCM)

"Foundations" is a unique course taught in the MTTS camps to initiate the students to some fundamental topics of mathematics based mainly on mathematical logic. After attending a 2-week course on Foundations in the MTTS camps, almost all participants so far have experienced a change in their attitude towards mathematics, problem solving abilities, and logical and analytical thinking. They also acquire a high level of confidence for self-study to undertake courses in higher mathematics. In order to facilitate the transfer of the positive changes that the Foundations course brings to MTTS participants, to many more students across the country, the idea of hosting it in an online form was mooted after the MTTS2020 Summer Camp.

The first edition was held online in October 2020 with six parallel online camps (with 12 sessions each, over a duration of 3 weeks) covering almost all states of the country. One of these camps was also live streamed on YouTube, which was watched by a large number of students and the viewers were guided online by several mentors. The Trust has been successfully conducting this programme every year since then. 30 OFCM camps have been conducted so far, reaching out to a large number of motivated students. It is expected that OFCM will be held in August each year in the near future, *with the application portal opening some time in July.*

Overture

To further the reach of MTTS training to a larger audience of deserving students, a new programme titled "MTTS Overture" was started in 2023, through which two-day workshops are held in colleges in different parts of the country. The pilot project in 2023 has had a significant impact, leading the Trust to make this a regular activity. In each of these camps, about fifty students studying in colleges in the locality, are trained by two experienced MTTS faculty. Two very short courses out of Real Analysis, Linear Algebra, Foundations, etc., are run, exposing the young undergraduate students to the MTTS learning methodology, and to various resources for self-learning.

The MTTS trust bears the cost pertaining to the resource persons and the host institutes are asked to arrange food, refreshment, etc., for the participating students (at times with a nominal fee, if needed). The Overture camps are conducted during the period September - December every year, and preference is given to the institutions that are serving students in geographically disadvantaged locations. In the academic year 2024-25, 22 open camps were held in all, at different locations in the country. *The colleges interested in organizing Overture camps can apply online on the MTTS website.*

Follow-ups of MTTS Camps

A follow-up of an MTTS camp is often conducted, depending on the availability of resource persons, if there is sufficient interest from the students. The main premise is that a smaller number of students who have made full use of the opportunity presented by the

original camp, and are well-trained by it, can be pushed a lot more in a short intensive camp.

Follow-ups of the summer camps have been held on-site in the initial years of MTTS, and then again in Dec 2023, where those coming out of Level II were trained further in advanced courses, helping them head towards research in mathematics. These follow-ups have been conducted in different formats, with the most recent being in the form of two intense advanced courses covered in one week, with at least as much time for discussion as the sessions themselves.

Various versions of online follow-ups have also been regularly conducted for the OFCM camps since 2021. In 2024, the Trust experimented with two versions; the first was in the form of 2-3 sessions followed by watching 2-3 videos on YouTube, on related topics, covered by Prof. Kumaresan, while the second was a self-study based approach, where the group of students were given links to videos similar to the above, and a discussion meeting arranged, if they needed it. It has been observed that the second format may have a better impact if it is combined with MTTS Self-Assessment in some format.

Online Short Courses (OSC) and Online Lecture Series (OLS)

Encouraged by the success of the online programmes since 2020, a number of short courses and lecture series have been organised by the Trust depending upon the availability of resource persons, and feasibility for students. These also include several online courses, which served as a follow-up to various camps.

These courses are based on advanced topics in mathematics aimed at students at different levels, and are given by experts in the respective fields. Each OSC has about 8-10 online sessions, and each OLS has about 12-15 online sessions consisting of 60 minutes of lecture followed by discussion by the participants in groups for about 40 minutes. Since May 2020, 2 lecture series and 15 short courses in different areas have been organised, with a large number of students and teachers from across the country participating in, and benefiting from these.

Online Open Mathematics Forum

The purpose of this forum is to organise expository lectures by mathematicians with high levels of expertise in diverse areas. These online lectures are usually for about 60 minutes and are followed by a discussion with the participants. The forum is an ideal way of exposing talented students in the country to various aspects needed for a successful career in mathematics. This is aimed to attract a large number of students, and prepare and entice them for further studies and research in the area of the exposition. The forum is expected to build a critical mass of scholarship in more areas in the long run.

MTTS Self-Assessment (MTTS-SA)

MTTS Self-Assessment, an initiative taken by the MTTS trust during the pandemic days to improve student learning and understanding, is born out of Prof. Kumaresan's years of experience as a teacher, and conviction that assessment is different from tests/exams. In

our prevalent system, the marks and grades obtained by the students do not reflect their real learning and confidence in the subject, since the evaluation, *which is not the same as assessment*, is often solely based on memorisation and rote-learning. In order to bring meaningful changes in the assessment system in the country, Prof. Kumaresan conducted an online workshop, attended by over a hundred teachers. This introduced the teachers to some radically different ways of assessment that are class-tested over three decades and are practical, and encouraged them to experiment with the same.

MTTS-SA is built upon these ideas, and provides a way for the participants of the MTTS camps to assess their own learning, understanding and improvement. This activity is conducted online through the MTTS Moodle site, which can be accessed by logging in at https://-classroom.mtts.org.in/. While regular examinations are never conducted during MTTS programmes, this activity is in the form of a quiz, but without any marks, or judgement. There are several types of questions, all of which are created in a manner so that a student can attempt it online, identify their mistakes, reflect on their (correct as well incorrect) answers, without the presence of a teacher. If they are unsure, they are encouraged to think, discuss with their peers, the mentors, or teachers, in that order.

The self-assessment has been regularly conducted during the online programmes, especially OFCM. It was also made available during the on-site MTTS2022 camp, and many InitMath camps in the past two years. It has been observed that though the self-assessment was not mandatory, most students end up attempting it multiple times. There is a tendency among students initially to go through multiple attempts just to increase one's "score", but (with a couple of gentle reminders from the resource persons) many of them get used to thinking over the answers at the end of each attempt, once they realise that understanding of concepts is far more important.

Various MTTS faculty and mentors involved in multiple camps have taken a part contributing to the question pool. The primary sources for these questions have been (i) the questions asked, and examples shared by the instructors during the sessions, which help the students avoid, or get over mental blocks, (ii) those generated by the students in their group discussion, and (iii) those arising out of the points of difficulty of students, and their frequently made mistakes.

Once these questions are generated, there has been a dedicated team of volunteers, from among the MTTS faculty and mentors, who go over these raw questions, and work on them to make them moodle-compatible, make them appropriate for self-assessment, and help run the self-assessment modules in various camps. The efforts of this team, with its dedicated approach, has led to the creation of a sizable number of SA-ready questions in almost all the subjects taught in Level O, and some in Level I. In the future, the MTTS Trust plans to make MTTS-SA available to students at various levels and on various subjects, and these teams have been working hard to make this vision come true.

Future Plans

MTTS has managed to reach out to students from almost every part of the country and has inspired a large number of students to become highly competent mathematicians, including mathematics teachers at all levels. But for a vast country, just having 3 camps for Level O, one camp of Level-I and Level-II each and few InitMath camps are not sufficient. MTTS would like to organise more such camps in the country so that it can help students to learn mathematics in an engaging manner and also help mathematics teachers in pedagogy. As a first step, OFCM has helped by leveraging the reach of the online mode, and MTTS Overture is making forays into territories which have been untouched so far in terms of exposure, thereby getting the Trust closer to its goal of reaching the farthest reaches of the country.

A large number of MTTS alumni who have become established mathematicians are willing to contribute in the Trust's endeavours, which can change the way mathematics is being taught in the country in the long run. Further, the Trust also plans to build a movement for bringing meaningful changes in the assessment system in the country, by conducting more workshops on Assessment, as well as expanding the scope of Self-Assessment, and run it independently of individual camps.

In case you wish to organise an InitMath, Overture, or PTMT programme, you can log into the MTTS website (https://4dspace.mtts.org.in/) and apply online. Proposals which assure some partial financial support from the host institution may be given preference. Your co-operation, help and suggestions will help us make the programmes successful.

If you have any specific questions or wish to send your valuable suggestions, please feel free to write to us at the Trust email id: mttstrust@gmail.com.

PTMT2025 Gujarat - Preparatory Meeting

OFCM2024 - Mentors Meeting

"The art of teaching is the art of assisting discovery."
– Mark van Doren

MTTS Pedagogy

Teaching Methodology in MTTS Activities

The teaching methodology in the MTTS camps, whether on-site or online, is radically different from regular classrooms. The faculty for these programmes are active mathematicians with a strong commitment to teaching, and are chosen from various leading institutions in the country. These resource persons refrain from delivering well-polished lectures. All the sessions are highly interactive, and the participants are asked to think, experiment, formulate and prove mathematical results on their own, at every stage. The aim of the instructions is not to give routine lectures, but to stimulate the participants to think and discover mathematical results on their own.

From its inception, the MTTS programme has adopted this inquiry-based learning methodology which, in recent studies, has been identified as a core part of the effective teaching methodologies in pedagogy courses all over the world. It is evident from students' feedback and faculty assessments that the MTTS teaching methodology nurtures the inquisitive nature of students, equipping them for self-study and research.

The Philosophy Behind this Methodology

Every mathematics textbook is filled with results and techniques which were once unknown. The results were discovered by mathematicians who explored, guessed, experimented, discussed their work, and explored further. Many promising ideas turned out to be dead-ends, and lots of hard work resulted in little output. Often the first progress was the understanding of some special cases. Continued work led to greater understanding, and sometimes a complex picture began to be seen as simple and familiar. By the time the work reaches a textbook, it bears no resemblance to its origins, earlier form, and the details of its birth and evolution have been lost. The precise and methodical exposition of a typical textbook often leads students to mistakenly believe that mathematics is a dry, rigid and unchanging subject, missing out on its vibrant nature.

The most exciting part of mathematics is the process of invention and discovery. The aim of the MTTS camps is to introduce this process to the participants. By means of a variety of tasks, the camps lead them to discover some real mathematics. By looking at examples, searching for patterns in those examples, and investigating reasons behind those patterns, the participants are encouraged to develop their own mathematical ideas. The camps are only to get the participants started in the right direction, the rest is up to them.

Role of the Resident Faculty

In any session, questions are asked and time is given for the participants to think along. These questions are different from those encountered in usual classes, and are meant to provoke thinking. Some examples of such questions are, "Why is this true?", "Why is this relevant?", and often "What do you think is the next question?" The definitions, and proofs of theorems, are derived using inputs from the participants, often based on well-chosen leading examples. The emphasis is on thinking first, refining the thoughts, and then putting them down on paper into a standard "textbook" definition, statement, or proof.

The teachers attend all the sessions, not just their own. They identify the difficulties of the students and give individual attention to each one of them. Many-a-times, teachers and mentors also have discussions with interested students in the evenings or after dinner. This is one of the unique features of the MTTS camps, and reasons why each student leaves the camp with the sense of betterment in their learning abilities.

Group Discussions, Student Seminars and Writing Assignments

Each session is followed by a group discussion slot given for students to internalize, revise, and refine the concepts learnt in the previous session. The students are subdivided in small groups and all of them are asked to discuss and clarify the concepts, examples seen, and proofs learnt in the previous session amongst themselves.

Students are also encouraged to give short seminars on various topics enhancing their communication, as well as develop skills for understanding the concepts and explaining it to others. They are also given writing assignments regularly to formulate and write logical proofs of theorems and solutions of problems. These assignments are assessed and elaborate feedback is given, so as to improve their mathematical writing skills. All teachers are present during group discussions and seminar sessions to identify difficulties of the students, and assist them.

Role of Mentors

MTTS alumni pursuing their higher studies, and teachers familiar with the MTTS teaching methodologies are being inducted as mentors during the programs. Their primary role is to facilitate discussion sessions, correct assignments, and often, as the name suggests, act as a mentor for those students who are initially reluctant to approach the resident faculty. It is envisaged that these mentors would adopt the MTTS pedagogy in their teaching, thereby adding to the pool of resource persons for future MTTS activities.

Methodology of MTTS Online Activities

In the online camps, each session consists of a lecture part, followed by a mandatory discussion session. The lecture sessions are as interactive as in the on-site camps, with the students encouraged to use non-verbal feedback in response to the Yes/No type questions asked by the teacher. Some of the participants are then called upon, and the course often builds on their responses.

After explaining a concept or a proof, students are given time to go through the same orally, and once they finish going through it, the non-verbal feedback, like the Yes/No and Raise Hand options are used to ensure that many of the students have followed the concept. Each session is followed by a discussion time in smaller groups which utilises the breakout

rooms. The discussion sessions are facilitated by the MTTS faculty and mentors designated for the same. The mentors are students pursuing higher studies and faculties who understand the spirit of the MTTS teaching methodology. They are assigned to work with smaller groups of students, thus ensuring individual attention, even in the online mode. The mentors' presence is a crucial aspect, especially in helping first-time participants imbibe the MTTS methodology. Online polls are conducted at the end of each session to understand how much students have followed in the particular class. Thus, a supportive classroom atmosphere and eliciting student intellectual input is effectively recreated even in the online mode of instructions.

The teaching methodology followed in the online MTTS camps has been found to be very effective and has been appreciated by all the students, mentors, and teachers who have participated in MTTS activities. The mentors are the backbone of success in this format, since they act as a conduit between the instructor and the students, helping provide individual attention to the student, and immediate feedback to the instructor. Feedback from all stakeholders reveal that the Trust has been truly successful in recreating its on-site teaching model in the online camps.

MTTS2024 - Post-dinner Discussion

InitMath2024 Jammu & Kashmir - Group Discussion

InitMath2024 Tamil Nadu - Post-dinner Discussion

"All depends, then, on finding these easier problems, and solving them by means of devices as perfect as possible and concepts capable of generalization."

– David Hilbert

MTTS1996

PTMT2025

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Prof. Kumaresan & MTTS: Intertwined Legacies

Prof. Kumaresan is arguably the most influential teacher of mathematics in India for the past four decades. His passion for teaching and empathy towards mathematics students of the country, propelled him to conceive the unique MTTS programme, which has transformed the lives of many. From the start, the MTTS programme has been an experiment, which is still evolving, after 33 years.

After a brief academic stint abroad, his strong academic stature naturally led to a good academic position, and a comfortable life abroad. However, he chose to take the path less travelled, and decided to return and serve his motherland, especially in the field of education. The impact of his untiring efforts through MTTS training, his learner-centric books, hundreds of freely accessible expository articles and videos for students and teachers have been phenomenal for the development of higher mathematics in the country.

While many others have had similar goals, and have had success at individual levels, skill-building while scaling up at the same time is the difficulty Prof. Kumaresan has overcome. With a team of committed mathematicians, many trained by him, he has made a difference. He has made a MTTS model that is used effectively and efficiently, to scale up what one can do individually, and make a significant difference, with a widespread impact. Impressed by its success, many scientists from other disciplines periodically approach Prof. Kumaresan seeking his help to launch similar programmes in their disciplines. Such programmes were started in physics and statistics by the academic community in these subjects.

For an entire generation of students & teachers, MTTS & Kumaresan have been synonymous. But the hallmark, and foresight of a true leader is to have a sustainable succession plan. As MTTS was approaching its silver jubilee in 2017, he formed the a non-profit educational trust in December 2016, to carry out the activities under the MTTS umbrella. Moreover, he has trained a group of mathematicians to carry forward the legacy of MTTS effectively. In order to give them an opportunity for the same, he relinquished his position in the Trust and its routine activities in 2022. But he continues to be the Programme Director of all MTTS programmes, actively mentoring and looking after its academic aspects, and is also tirelessly engaged in mentoring teachers, and sharing his wisdom with students, through the MTTS camps, and otherwise.

On the occasion of his 75th birth anniversary, the Trust wishes him on behalf of the thousands trained by him, either directly or indirectly, and thanks him for his vision of MTTS, his dedication and perseverance in executing the vision, his leadership, and for training and mentoring the next generation to carry forward the MTTS legacy.

Prof. Kumaresan & MTTS: A Personal Note

- Prof. A. J. Jayanthan

On the occasion of the 75th birth anniversary, I wish Prof. Kumaresan a healthy long life. I am grateful to the editors of this volume for giving me an opportunity to share my thoughts about Prof. Kumaresan here. Most of my interaction with Prof. Kumaresan is in connection with MTTS. Any write up on Prof. Kumaresan is thus synonymous with MTTS for me.

I met Prof. Kumaresan during some conferences in the early nineties. Right from the beginning, I was attracted by his sharp observations on various matters including mathematics and education. Later on, he visited our department on our invitation, and on our request, he agreed to organize a camp of MTTS in Goa University during 1998. Probably, that is the first time an MTTS camp is conducted at a second venue during summer. To my surprise, Prof. Kumaresan chose me as a resource person to lecture at that camp. That is the beginning of my journey with MTTS, that is still continuing. Prof. Kumaresan himself was present at all sessions and guided us in the conduct of the sessions and ensured that the students are comfortable. I also started learning to conduct classes in an interactive mode enabling the students to work out mathematics with minimum help from us. I think that was a wonderful experience. We started reinventing ourselves in the process.

Prof. Kumaresan mooted the idea of MTTS some time in 1992. As is shared by many others, he was of the opinion that the graduate education in mathematics in India need a lot of transformation. Prof. Kumaresan designed the MTTS programme, including its duration, contents to be discussed, the way it should be implemented, etc.

Each branch of learning has its own methods of confirming information, such as experimental, empirical, statistical etc. As I understand, Mathematics is a way of confirming information by 'proving them logically' after declaring the assumptions to be used. Therefore, education in mathematics should aim at enabling the students to work out mathematics, including proving statements themselves. I think MTTS also aims at this.

Prof. Kumaresan insists that mathematical concepts are to be developed in an interactive manner with slow pace breaking statements into simpler ones that could be resolved by students, allowing them to raise questions and even making guesses in the class. I keep hearing many mathematicians describing it as the 'MTTS-style' of teaching in the context of organizing training programmes. For most students, it is a thrilling experience that they are able to do mathematics and prove theorems themselves.

Prof. Kumaresan's way of handling MTTS participants needs a special mention here. Needless to say that it is very difficult to handle such a large number of students coming from different parts of the country, after a year of rigorous classes and examinations, staying for a duration of one month forgoing their annual vacation and focusing on training in

mathematics, that too in hot summer. It is an art to make this happen. While demanding a lot of dedication in classes, his empathy and camaraderie outside manifests the personality of Prof. Kumaresan. He personally meets the students and ensures their comforts. It is a great experience watching Prof. Kumaresan doing it. In this context, I should also mention that Prof. Kumaresan sacrificed his annual vacation from 1993 till his retirement to ensure the proper conduct of MTTS.

Starting with a set of exercises, Prof Kumaresan produced a large number of articles in basic mathematics, many of them giving self-contained simpler proof of basic results, to complement and supplement the materials discussed in MTTS sessions. Many of these articles are later used by the participants to give seminars during the programme. Later on, he brought out some excellent books on basic mathematics with a flavor of MTTS-style.

From a modest beginning of training 40-50 graduate students each year, MTTS is now developed under the leadership of Prof. Kumaresan into a programme training hundreds of students at different levels for different duration and training a good number of teachers with thousands of alumni. During the Covid period when almost all educational programs were struggling to carry out their activities, Prof. Kumaresan took the initiative to hold the MTTS camps in the online mode. He then went a step ahead and initiated an online Foundation Course In Mathematics involving six batches with hundreds of students. This speaks volumes of his determination to achieve the goals set by him.

Initially, the whole MTTS organising responsibility was on the shoulders of Prof. Kumaresan with the help of a handful of friends on a personal interest. It is his vision that MTTS should have a permanent status. To ensure that, he initiated the formation of a trust to carry out the MTTS activities. Presiding the trust for few years initially, he insisted on relinquishing it so that a new leadership would emerge, setting a good practice. Later, he was the first person to retire from the trust paving way for younger persons to take over, though his valuable advices are still the guiding force behind MTTS.

Personally, I have learned a lot from him. I shall quote some of his statements in this context that I repeat whenever I get a chance. I quote: “never accept a statement because it is printed or is told by a teacher”, “a good mother cooks good food for her children, but the best mother is the one who trains her children how to cook good food”. I consider the second one as one of the most important aims of MTTS. “Instead of passing a lot of information in mathematics, it is better to train the students how to learn mathematics on their own”. Through MTTS, I found a new dimension in my personal and professional life. I am totally indebted to Prof. Kumaresan for that. A big Thanks to him.

His conviction on mathematics education, determination to improve it in our country and dedicated effort to implement it is unparalleled in India, probably in the whole world in mathematics education. He is an outstanding mathematician, educationist, organiser, author/writer and a powerful leader with a good heart. Prof. Kumaresan was indeed the natural choice for INSA when they decided to institute the best teacher award. A big Salute to him.

The MTTS Impact

MTTS Programmes - Direct Impact

Since 1993, 146 MTTS four-week summer camps, 85 InitMath camps of duration one to two weeks, 17 PTMT camps, 30 Online courses on Foundation Course in Mathematics, 44 Overture camps, 2 lecture series and 15 short courses, and many follow-up camps have been organised. More than 10,000 students and 550 teachers have been trained in the various MTTS camps.

- More than 500 MTTS Alumni have received Ph.D. degrees in Mathematics or are in the process of finishing their degree from prestigious institutes of India and abroad.
- More than 1000 have become mathematics teachers at various levels from schools to universities and research institutes.
- The programme has inspired a large number of girl students, and students from rural areas, to become professional mathematicians and who are serving in many of the leading institutions.
- In recent years many of the MTTS alumni/ resource persons have received various prestigious awards and recognitions.
- It is widely acknowledged by the alumni, mentors and resource persons of MTTS that the quality of training is such that it helps them not just in mathematical careers, but also any other fields in which they choose to work. The training and work ethic that they take away from the camps is also appreciated by their peers.

All of these show that the MTTS programmes have made a significant contribution towards the mathematical community.

Contribution Towards Learning Resources

Video Lectures by Prof. Kumaresan

In order to reach a wide audience, for learning mathematics online in the MTTS methodology, Prof. Kumaresan has been producing a number of video lectures and has made them available on YouTube. Till now more than two hundred video lectures have been produced so far. A large number of students, researchers and teachers have been benefited by these video lectures.

These are for various UG/PG level topics, and are available at https://4dspace.mtts.org.in/vl

Books by MTTS Faculty

Several books have been written by resident faculties, based on years of experience in MTTS. These books have been widely acknowledged by teachers and students across the country and abroad.

SageMath

Prof. Ajit Kumar, associated with MTTS from his student days in 1996, to being managing trustee of the MTTS Trust since its formation, has given a series of lectures on SageMath, which are available at https://www.youtube.com/channel/UC7Lej7b jqlXjjmczCsY55jQ/featured

Expository articles by Prof. Kumaresan

Expository articles written by Prof. Kumaresan have benefited many learners, and have been downloaded innumerable times. They are categorized both by level and subject, can be searched by keywords, and are available for downloading at https://4dspace.mtts.org.in/ea

MTTS Classroom

The Moodle page for all MTTS Programmes (https://classroom.mtts.org.in/login/) is where class transcripts and Self-Assessment for the participants are available. (Login credentials are needed).

It is envisaged that MTTS Self-Assessment can be run through this forum, independent of camps.

MTTS YouTube Channel

The MTTS Trust has a YouTube channel(https://www.youtube.com/c/mttsprogramme), where online courses and discussions from past camps are available. Some of the MTTS online camps are also live streamed on this channel.

I'mproving Myself - Impact beyond the camps

A] The MTTS camps endeavour to train their participants in critical thinking, in inculcating the art of asking questions, discussing with peers and in particular, rather than just teach or instruct, showing them how one learns. These transferable skills imparted in the camps have a long-lasting impact no matter what career the participants choose to follow.

The above is reflected in the following reminiscences of MTTS alumni, who have gone on to have successful careers in different walks of life.

A Journey Shaped by MTTS

Aditi Gandhe (née Vaishali Kulkarni), Mathematics Educator and Classical Music Singer, Pune

I am Aditi Gandhe (née Vaishali Kulkarni), based in Pune. For over 25 years, I've had the privilege of serving the mathematics ecosystem in Pune as a freelance teacher. From Algebra to Topology and from school-level to postgraduate students — including those preparing for competitive exams—this journey has been nothing short of thrilling. I owe much of my mathematical bent of mind to my gurus: Prof. M. R. Modak sir, Prof. Sholapurkar sir, Prof. M. Prakash sir, and others whose inspiration has been a lifelong treasure.

It was Prof. Sholapurkar who first told me about the MTTS program. I had the privilege of participating in MTTS 1996 at Fergusson College, followed by Level I and Level II programmes at IIT Chennai in the summers of 1997 and 1998. These experiences were pivotal in shaping me - first as a student, and later as an educator.

MTTS deepened my mathematical understanding and fostered overall intellectual growth. I fondly recall the encouraging and insightful interactions with Prof. Kumaresan at Fergusson College. The engaging lectures by Prof. Santhanam sir and Prof. Vinay Acharya sir are still vivid in my memory. Later, at IIT Chennai, learning from Prof. S. D. Adhikari sir, Prof. Pradipta Bandopadhyay sir, and Prof. Shridhar Inamdar sir and others left a lasting impact on me.

MTTS was also where I delivered my first seminar - on Fermat's method of infinite descent. The heuristic and intuitive approach emphasized throughout the program significantly enhanced my conceptual clarity and deepened my love for mathematics. In my teaching career, especially while guiding students preparing for Olympiads and JEE, I've consistently drawn upon these methods. It is deeply fulfilling to inspire young minds and foster creative thinking in mathematics.

Another invaluable takeaway from MTTS was the practice of 'बैठक'—a sustained, contemplative engagement with mathematical ideas. This habit still shapes how I learn and teach. I often tell my students how enjoyable it was to spend almost an entire day immersed in mathematics during the MTTS program. The friendships built with peers from across the country, the picnic, and the cultural evening added warmth and joy to an already enriching academic experience.

Mathematics has also influenced my journey in classical music. I have been learning and pursuing music for over 35 years. My background in mathematics helps me see music

with greater clarity and depth. This way of thinking—shaped by MTTS and my mentors—continues to guide my growth as both a learner and an artist.

For more than two and a half decades, MTTS has inspired and shaped generations of students in mathematics. I hold deep respect for its clarity of approach, the depth it fosters, and the positive transformation it brought into my life. I remain immensely grateful to all my teachers and mentors at MTTS—especially Prof. Kumaresan—for his vision, dedication, and generous sharing of knowledge.

Thank you—with heartfelt gratitude.

My Experiences at the MTTS summer camp

Himadri Shekhar Mondal, Associate Professor, Department of Mathematics, Midnapore College and Sculptor

I attended the MTTS summer camp at IIT Madras way back in May, 1997 at level II when I was an M.Sc 1 st year student. Professor S. Kumaresan (coordinator of the course) himself, Professor Krishna Maddaly, Professor D. S. Nagraj were among our mentors. It was a wonderful and immersive experience that focused on encouraging creative mathematical thinking and innovative ways of problem solving. It was a very hot summer but inside the classrooms we were kept so busy grasping new ideas and trying to solve challenging problems that we could hardly feel the scorching heat outside.

Though from my B.Sc. days, I had a passion for analysis, linear algebra, topology and geometry, it was the MTTS summer camp where I began to realise the true essence of these subjects. Besides other things we were introduced to fundamentals of algebraic topology and differential geometry which helped me a lot in my studies later on. Though I didn't contribute much as a researcher in mathematics, the lessons I learnt from the camp really did impact deeply on me specially when I became a mathematics teacher at Midnapore College. Throughout my teaching career I followed the way we were taught at the MTTS camp.

I am proud that some of my students are very good mathematicians now. They are doing really well in their respective field of research and teaching. It's really a transitive kind of affair.

The practices in the camp brought about some philosophical changes in me as well. I am still carrying within me the thought process that I was introduced to. I was inspired to learn aspects of geometry and topology which helped me to have a better feeling of forms and shapes. I was inclined to art from very early days of my life. This understanding helped me immensely in my art practices also. I could co-relate the mathematical ideas like homeomorphism, diffeomorphism, isometry, isotropy, homogeneity etc. in the creation process of art objects. Even the idea of triangulation in algebraic topology helps me a lot when I take piece mould from a clay model in the process of making a sculpture.

Anyway, in a sentence , what I can say is that the experiences that I had at the MTTS camp were life- changing.

My Journey with the MTTS Programme

Dr. Rahul Jain, IPS, New Delhi

I had the privilege of attending the MTTS programme in 1998 (Level O) at Panjab University, Chandigarh while pursuing my B.Sc. at Ambala Cantt. The following year, in 1999, I participated in Level 1 at RIE Mysore. These experiences profoundly shaped my understanding of mathematics and set me on the path to a lifelong engagement with the subject.

MTTS played a pivotal role in strengthening my mathematical foundations. It introduced me to the beauty and rigor of pure mathematics—an aspect often overlooked in conventional college curricula, especially in smaller towns. For the first time, I encountered the art of constructing rigorous mathematical proofs, a skill indispensable to any mathematician. The program instilled in me a deep appreciation for critical thinking and problem-solving beyond just obtaining solutions.

One of the most significant impacts of MTTS was its role in my decision to pursue a career in mathematics. The emphasis on logical reasoning and structured problem-solving proved invaluable throughout my academic journey, particularly during my Ph.D. at IISc and TIFR. The training I received at MTTS not only helped me clear the written entrance exams but also impressed the interview board with my problem-solving skills and strong foundation in mathematical analysis. The panel was delighted to hear about my MTTS background, further affirming the program's reputation for nurturing mathematical talent.

Even after completing my Ph.D., the influence of MTTS has remained with me. Though my professional career took a different route, my passion for mathematics never waned. Decades later, I authored a book on advanced mathematical analysis, published by Springer Nature. Today, I am actively involved in science popularisation, particularly among children, striving to impart the analytical skills I first developed at MTTS.

Beyond academics, MTTS also broadened my horizons by exposing me to diverse cultures across India. The program's rotational venues allowed participants to adapt to different climates, cuisines, and languages, fostering resilience and cultural appreciation—an invaluable aspect of personal growth.

I owe a debt of gratitude to MTTS and, in particular, to Professor S. Kumaresan. A personal incident from my first MTTS camp remains etched in my memory. Due to a family tragedy, I arrived a day or two late, at a time when late entries were generally discouraged. However, Professor Kumaresan extended a personal gesture of support and allowed me to participate. I often wonder how my life might have unfolded had he not made that decision. Would I have pursued a Ph.D. in mathematics?

MTTS was more than just a training programme - it was a transformative experience. I wholeheartedly thank Professor Kumaresan and the entire faculty for shaping my mathematical journey. The programme continues to inspire me, and I am deeply honoured to be part of the MTTS legacy.

Impact of MTTS camps

Dr. Devendra Shirolkar, Assistant Vice President, Deutsche Bank

The Mathematics Training and Talent Search (MTTS) Programme is a cornerstone of mathematical education in India, designed to identify, nurture, and inspire young talent in mathematics across India. In 1990 to early 2000, when most of the universities were struggling to provide quality content and education in mathematics, Professor S. Kumaresan and his colleagues had addressed these shortcomings by designing this program and new ways of teaching and learning maths. MTTS has now become a prestigious platform for undergraduate students to deepen their mathematical understanding and prepare for advanced studies. Since its inception, this programme has motivated many young talents in India to study and pursue mathematics as their career option.

As a former participant in Level I (2004, RIE Mysore) and Level O (2002, IIT Bombay), I can attest to its rigorous yet enriching approach, which profoundly shaped my mathematical journey and career in the corporate industry as well. For me, MTTS was more than a training programme - it's a transformative experience that ignited my interest in mathematics and laid the foundation stone for my Ph.D in mathematics.

Before attending MTTS, my understanding of mathematics was shaped by standard undergraduate curricula, which often presented the subject as a collection of isolated techniques and computations. MTTS was a pivotal moment in breaking free from misconceptions, such as the notion that linear algebra is purely algebraic rather than geometric or that mathematics is dry exercises in calculation rather than a tapestry of elegant concepts. (The book by Prof. Kumaresan, "Linear Algebra A Geometric Approach" was the first such for me. I still carry the notes distributed at the time of the program and read it in my leisure time. It gives me the same pleasure today as well.)

My time in Levels O and 1 exposed me to a dynamic blend of lectures, tutorials, and collaborative problem-solving sessions, delivered by some of India's finest mathematicians. These sessions emphasized active learning, encouraging us to grapple with problems, question assumptions, and articulate solutions—an approach that honed my analytical rigor and mathematical intuition. Unlike traditional classroom settings, MTTS fosters a participatory environment where students engage directly with faculty and peers. MTTS was a turning point; it bridged the gap between undergraduate coursework and research-level mathematics, equipping me with the skills and confidence to pursue a doctoral degree. Moreover, MTTS's holistic approach, including informal discussions with mentors, sparked curiosity and opened doors to advanced topics I later pursued. Even in industry nowadays, while explaining linear algebra and calculus required to build a transformer, concepts learned 20 years back at Mysore are still relevant and instrumental for me.

Beyond its academic impact and due to its residential nature for four weeks, I got introduced to many friends and colleagues across India. A few friends to mention are Prof. Chandrasheel Bhagwat, Prof. Swanand Khare, and Mrs. Udita Paralkar. I do carry my memories of my time spent with them.

Now, while teaching my daughter, I carry the same teaching of Prof. Kumaresan:
I hear, I forget, I listen, I remember, and I do, I understand.

B] The MTTS activities are known to provide an opportunity for introspection and improvement for each and every person involved, irrespective of their role. The MTTS slogan "I'mproving Myself" is apt, and applicable to everyone who is engaged in these endeavours. The following write-ups provide a glimpse of the same.

The MTTS influence

Some participants of MTTS camps choose to stay associated by contributing as mentors in future camps. Four such MTTS alumni, all of whom are currently pursuing their PhD, have the following to say.

The MTTS programme has been a turning point in our academic lives. Before participating in the camps, we lacked confidence in our mathematical abilities. Attending MTTS helped us develop a deeper understanding of the importance of discussions and collaborative learning. The teachers often emphasized that all participants would receive the same certificate, encouraging us to focus on the learning process rather than competition.

As students, the camp was not like regular classes, but it was more about thinking and writing. In the class, we made sure to think and understand, and after that, if we still had any doubts, we discussed them in the discussion session. Earlier, we had a tendency to give overly detailed answers, but thanks to the MTTS camps, we learned to respond more precisely, answering just to the point depending on the context. We also used to find it difficult to read textbooks, but after the camp gradually we could read and understand books on relevant topics independently. This significantly boosted our confidence. In college, it was quite common to simply memorize proofs without understanding the underlying reasons. However, the professors at MTTS were different. They encouraged us to ask the right questions at every step, allowing us to witness the beauty of solutions unfolding naturally.

As mentors, we realized the importance of guiding students through questions rather than providing direct answers, helping them develop problem-solving skills on their own. Watching students who initially struggled gradually improve and solve problems by the end of the camp has been a strong source of motivation for us. We realized mentoring the students deepened our own understanding.

We learned how to work as a team. We also learned how to explain any concept to students and how to break the ideas into relatable pieces using hints. Since we avoid giving direct answers to students and instead guide them through questions, this greatly improved our ability to frame effective questions. Interacting with students in breakout rooms was a unique experience - one had to be prepared for all sorts of questions, and it was interesting to see how different students responded to the same problem.

Currently, all of us are enrolled in Ph.D. programs at different institutes, and we are deeply thankful to MTTS for instilling in us the confidence and motivation to advance in higher mathematics.

Jyoti (NIT Hamirpur), Priya (University of Copenhagen), Sandeep (IISER Mohali) & Shashank (NITK Surathkal)

MTTS and our mathematical journey

The following is shared by some teachers and researchers in institutes around India, who have been involved in MTTS activities in various roles, such as participants, mentors, coordinators.

The Mathematical Training & Talent Search (MTTS) programmes have played a pivotal role in shaping our academic journeys and transforming us into more thoughtful educators, mentors, and learners. What began as individual participation in mini-MTTS (now known as InitMath) and PTMT camps soon evolved into collaborative contributions as mentors, coordinators, and faculty members. Each role reinforced the MTTS spirit of inquiry, discipline, and shared learning.

Our initial exposure to MTTS's inquiry-based learning approach profoundly influenced our understanding of mathematics. Engaging with foundational concepts through questions like "what," "why," and "how" deepened our conceptual clarity and rekindled our love for abstract concepts. The unique teaching methods adopted by MTTS, emphasizing exploration over explanation, encouraged us to rethink our regular classroom strategies.

As mentors in different programs, we experienced the effectiveness of dialogic teaching and the impact of fostering student-led discovery. In particular, the OFCM programme was an excellent opportunity to recognize that online learning can be as effective as offline learning. Breakout room sessions made it clear that discussion plays a pivotal role in learning. Being a mentor, we were also learning to ask questions that would get students to think and steer them in the right direction without giving them the answer directly. Also, it reminds us that there is always more to learn and to keep our inner student alive.

Motivated by these transformative experiences, we took the MTTS philosophy back to our institution. Initiatives such as forming mathematics clubs, conducting daily problem-solving sessions, and organizing student-centric workshops have improved student engagement and academic performance. Many students, empowered by these efforts, have gone on to pursue higher studies and clear national-level competitive exams such as NET-JRF, NBHM Fellowship, etc.

As a coordinator, we understood how much effort is needed to complete a programme successfully. It was an opportunity to realize and improve our organizing capabilities.

Coordinating programmes that include multiple regions of the country enriched our collaborative skills and gave us deeper insights into program planning, execution, and evaluation.

The collaborative teaching model and community-driven ethos of MTTS have fostered a strong professional network and a deep sense of belonging. We remain deeply grateful to the MTTS Trust for giving us this platform to grow and contribute. Each experience has left an indelible mark on our professional journey, whether as a participant, mentor, coordinator, or faculty member. With MTTS, we are improving ourselves and shaping the future of mathematical education in our communities.

Gokulraj S (NIT Calicut), Jayakran Singh (Rani Chandra Prabha Degree College, Khaga Fatehpur), Smruti Ranjan Sahoo (BJB Autonomous College, Bhubaneswar), Sunil Kumar Sharma (NSCBM Govt. Degree College, Hamirpur)

MTTS Self-Assessment and our perspective on learning

MTTS Self-Assessment (MTTS-SA) is an initiative started by the Trust in recent times. While questions are contributed by a larger pool of MTTS faculty and mentors, there is a dedicated team working on making the questions SA-friendly. Some members of this team, who have been associated with MTTS in roles of participants, mentors, coordinators, and faculty for MTTS programmes over the years, share their views on how this activity is shaping their perspective towards learning and teaching.

Being members of the MTTS Self-Assessment (MTTS-SA) team, we would like to point out the following aspects that changed our perspective towards learning and teaching.

Listening: The people who contribute to SA questions consist of volunteers that include faculty, postdocs, PhD and M.Sc students, and there is an origin story attached to many of these questions. A doubt raised by a student while teaching, a difficulty faced by a classmate in understanding, a missing detail or a crucial case omitted by the students in their answers, and so on. Rather than just converting the material into questions, working on SA has nurtured the skill of listening to the confusions that arise in a classroom.

Purpose, Precision, and Brevity: While reviewing the SA questions, a question we learned to ask as a part of the SA team is "What is this question testing?" and "Is there a better way to achieve the same goal?" These exercises made us first hack into the mind of the original creator to understand the origin and purpose, and then tailor the question to make it as easy as possible for the students to understand in as minimal words as possible.

Assessment as a Way of Learning: The correct and incorrect answers in MCQs as well as the statements of the T/F questions test are framed so that it gives the students a chance to solidify the things they understood, throw light on the things that they might not have thought about and to weed out common misconceptions. Our goal has been to provide the students with a judgment-free platform to grow, shift their perspective from "we are testing you" to "you are assessing yourselves" and help them to recognize the areas where they need to improve.

Hierarchy of topics: The team debates on the order of learning a subject: what is taught first, are there some notions we assume the students know while teaching that, what comes next, and so on. That helps in setting up the modules so that Self-assessment sessions can be conducted based on the audience and their familiarity with the topics. This also takes care of the situations where there are multiple entry points to a course. This practice has created a roadmap for the courses in our mind though we have not taught many of them. This also helps in being focused on a single theme for a question.

Implementing SAs in our regular classes: The training from working with the team made it easy for us to implement SAs as part of the assessment in our regular teaching. A few of us who are teachers are doing this on a regular basis, and the students are enjoying it. We get feedback from students asking for resources, such as books, that contain more such questions. We have also noticed that it is a good habit to generate a few SA questions while preparing for our lectures, as the right questions pop out quickly in our minds during the lecture.

Arusha C, Chellapillai D, Janson Antony and Jay Mehta

"The best way of overcoming a difficult problem is to solve in some particular easy cases. These give much light into the general solution. By this way, Newton says, he overcame the most difficult things."
– David Gregory

MTTS2024 - Self-Assessment Team at Work

InitMath2024 Himachal Pradesh

InitMath2024 Jammu & Kashmir

InitMath2024 Uttar Pradesh

InitMath2025 Telangana

InitMath2025 Punjab

InitMath2025 Gujarat

The MTTS Impact - In their own words

I started thinking "why", "how", "so", "what next" " is there a better way to handle this" , "e.g." etc behind each theorem/ statement in a much more enthusiastic way!
Praveen K C, Participant (Level O) MTTS2024 - CUTN.

Our camp has created a positive & supportive environment which is essential for students to grow and develop their maths skills. After the camp, we received feedback over the phone from many colleges saying that their students who used to be reluctant towards maths have changed a lot. They gained confidence and returned with a completely different mental attitude than what they had been sent with.
Dr. Payal Singla, Local Coordinator, IM2025 - Punjab.

The sessions dedicated to learning from books and videos were really amazing. Generally we go on reading the solution/proof given in the book/video, we didn't try to think for ourselves but due to these MTTS sessions, we learned to first see what is given, what we have to prove/solve and think about the solution. If not able to get the solution then (we would) see in the book/video. And we also learned to ask ourselves questions about the next step in the solution/proof. It helps to build our thinking skills.
Hetvi Ladhani, Participant (Level O) MTTS2024 - ICT Mumbai.

I was scared to come here but now I don't want to leave. It was a wonderful journey. I couldn't express my gratitude just in words. The span of a month changed my entire perspective of my ideas and has made me much clearer. This was really life changing. The amount of effort given by MTTS trust does not get that much recognition. Thank you so much.
G Sivaranjani, Participant (Level O) MTTS2024 - ICT Mumbai.

This camp helped me improve my math skills very much. I learnt to have patience and not rush directly to write before thinking things properly. This is crucial as it prevents me from wasting time just going in the wrong direction. I also identified and rectified many misconceptions in the process of getting solutions.
Roshan V Billava, Participant, Overture - Mangalore.

Programme greatly triggered my mathematical ability and group discussions hit on the spot right after each class.
Anonymous Participant (Level II) MTTS2024 - CUTN.

This program was very useful for me. The guidance and hospitality were exceptional, enhancing my understanding of fundamental concepts. I feel transformed after just one week: my thinking process has expanded significantly. I have become more proactive in both formulating and answering questions, even posing my own inquiries. These skills will undoubtedly benefit me throughout my academic journey and beyond. The professors were outstanding; their dedication and selfless efforts were truly motivating. Their support played a pivotal role in my learning experience ensuring that I gained valuable insights and knowledge
Palak Kamboj, Participant, IM2024 - Jammu & Kashmir.

Thinking was one of the most ignored parts of our lives. I thank MTTS for reminding us that thinking is very important. Now I will always try to think first and then do maths or any other task.
Anonymous Participant (Level I) MTTS2024 - CUTN.

The programme was useful in teaching me how to visualize Mathematics and solve problems. It taught me to construct abstract ideas from basic understating. It enhanced my ability to collaborate effectively in groups, face diverse ideas and critically evaluate them.
Asif Shahriyar, Participant, IM2024 - Uttar Pradesh.

My experience in OFCM was extremely eye-opening as it introduced me to a new way of learning mathematics. I have always been curious about how various formulae came to be, and in MTTS, a topic is introduced only after it becomes clear where it originates—a natural progression from the simplest idea. Our teacher was very patient with the students and had a natural flow when transitioning from topic to topic. My mentor was incredibly supportive and provided new perspectives whenever I was stuck.
The InitMath camp provided a much better opportunity for connecting with my peers and engaging in longer discussions. I really appreciated the schedule, which included a discussion session immediately after each subject was taught. Outside the classes, teachers and mentors enthusiastically answered our doubts and provided valuable guidance. I will always look back on this experience whenever I feel stuck in life.
Charvi Lulla, Participant, OFCM2024 & IM2025 - Rajasthan.

NURTURING CRITICAL THINKING

Questions to ask to assess, improve and refine one's idea

Clarity	Could you elaborate further? Could you give me an example? Could you illustrate what you mean?
Accuracy	How could we check on that? How could we find out if that is true? How could we verify or test that?
Precision	Could you be more specific? Could you give me more details? Could you be more exact?
Relevance	How does that relate to the problem? How does that bear on the question? How does that help us with the issue?
Depth	What factors make this a difficult problem? What are some of the complexities of this question? What are some of the difficulties we need to deal with?
Breadth	Do we need to look at this from another perspective? Do we need to consider another point of view? Do we need to look at this in other ways?
Logic	Does all this make sense together? Does your first paragraph fit in with your last? Does what you say follow from the evidence?
Significance	Is this the most important problem to consider? Is this the central idea to focus on? Which of these facts are most important?
Fairness	Do I have any vested interest in this issue? Am I sympathetically representing the viewpoints of others?

The Foundation for Critical Thinking
800-833-3645 www.criticalthinking.org

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ISRP-LO-08	Ms. Tanya Ghai, Panjab University, Chandigarh
ISRP-LO-09	Ms. Prakriti Verma, Govt. College Sanjauli
ISRP-LO-10	Ms. Sakshi Sharma, Govt. College Sanjauli
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ISRP-LO-12	Ms. Rachana Thakur, Netaji Subhash Chander Bose Memorial Govt. College, Hamirpur
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ISRP-LO-16	Mr. Rishabh Tomar, N. R. E. C. College, Bulandshahr
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ISRP-LO-35	Mr. Sumit Sandeep Bari, KVPS SPDM Arts, SBB & SHD Commerce And SMA Science College, Dhule
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MTTS Selection Id (MTTS2025 -)	Name and Institute Details
ISRP-L1-54	Mr. Rohan Basnett, Sikkim Manipal Institute Of Technology, Majitar
ISRP-L1-55	Mr. Divesh Bhalotiya, Institute Of Mathematics & Applications, Bhubaneswar
ISRP-L1-56	Mr. Satwik Kumar Sahoo, Christ Degree College, Cuttack
ISRP-L1-57	Mr. G. Abhilash, Kendrapara Autonomous College, Kendrapara
ISRP-L1-58	Sri. Ashutosh Sahu, Veer Surendra Sai University Of Technology, Burla
ISRP-L1-59	Sri. Abinash Saikia, Tezpur University
ISRP-L1-60	Mr. Arghya Das, Tezpur University
ISRP-L1-63	Mr. Sukamal Paul, Tripura University
ISRP-L1-64	Mr. Sanyasi Kumar, Patna Science College
ISRP-L1-65	Mr. Bhavish Jain, Birla Institute Of Technology, Mesra
ISRP-L2-01	Ms. Anamika, Delhi University
ISRP-L2-02	Ms. Kajal Gahtyari, Delhi University
ISRP-L2-03	Ms. Astha Jain, IIT Delhi
ISRP-L2-04	Mr. Almas Akhtar, Jamia Millia Islamia, Delhi
ISRP-L2-05	Ms. Rishu Sahu, Jawaharlal Nehru University, Delhi
ISRP-L2-06	Ms. Richa, NIT Kurukshetra
ISRP-L2-11	Mr. Prateek Shukla, Central University Of Jammu
ISRP-L2-12	Ms. Megha Sharma, Aligarh Muslim University
ISRP-L2-13	Kum. Priyanshi Agarwal, K.S. Saket PG College, Ayodhya
ISRP-L2-14	Mr. Hardik Murari, MB Govt. PG College, Haldwani
ISRP-L2-15	Mr. Sachin Trivedi, Kisan PG College Bahraich
ISRP-L2-16	Mr. Shubham Kumar Gupta, MNIT Jaipur
ISRP-L2-17	Ms. Shah Khushi Vipulbhai, St. Xavier's College, Ahmedabad
ISRP-L2-18	Ms. Ashara Prachee Ajaybhai, IIT Gandhinagar
ISRP-L2-19	Ms. Jansi Sureshbhai Vaghasiya, SVNIT Surat
ISRP-L2-21	Ms. Vishwakarma Ankita Yogesh, University Of Mumbai
ISRP-L2-22	Ms. Vaishnavi Gajendra Dhole, Shivaji University Kolhapur
ISRP-L2-23	Mr. Om Nanasaheb Bachhav, Loknete Vyankatrao Hiray Arts, Science & Commerce College, Panchvati Nashik

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
ISRP-L2-24	Ms. Jadhav Vaibhavi Tukaram, Swami Ramanand Teerth Marathwada University, Nanded
ISRP-L2-25	Mr. Suraj Rameshwar Tidke, IISER Bhopal
ISRP-L2-27	Ms. Sheetal Gupta, Indira Gandhi National Tribal University, Amarkantak
ISRP-L2-28	Mr. Sumit Ram Naik, NIT Raipur
ISRP-L2-29	Ms. Manognya Bala Bisani, University Of Hyderabad
ISRP-L2-30	Mr. Tusar Mohanty, IIT Hyderabad
ISRP-L2-31	Mr. Hemanta Das, NIT Warangal
ISRP-L2-32	Mr. Rananjay Nair, Krea University, Andhra Pradesh
ISRP-L2-35	Mr. Sonukumar, Manipal Institute of Technology, Manipal
ISRP-L2-36	Mr. Jefrin Antony S, Loyola College (Autonomous), Chennai
ISRP-L2-37	Ms. Ezhilarasi Munirajan, IIT Madras
ISRP-L2-38	Ms. Devasri V M, Pondicherry University, Puducherry
ISRP-L2-39	Mr. P Tapan Patro, Pondicherry University, Puducherry
ISRP-L2-40	Mr. Sanand G Dev, Pondicherry University, Puducherry
ISRP-L2-41	Ms. R.G.Madhumitha, St.Joseph's College (Autonomous), Tiruchirappalli
ISRP-L2-42	Ms. Abenaya M A, Bharathidasan University, Tiruchirappalli
ISRP-L2-43	Ms. T Sindhu Kavi, St. Xavier's College (Autonomous), Tirunelveli
ISRP-L2-44	Sri. Prathiksha C, PSGR Krishnammal College For Women, Coimbatore
ISRP-L2-45	Kum. Niveditha P V, PSG College Of Arts And Science, Coimbatore
ISRP-L2-46	Ms. Sreya Hariharan, NIT Calicut
ISRP-L2-47	Kum. Devika B Nair, Cochin University Of Science And Technology
ISRP-L2-49	Ms. Agnus Anna Sabu, Mar Athanasius College Of Arts And Science, Ernakulam
ISRP-L2-50	Ms. Mahima Mukherjee, Indian Association For The Cultivation Of Science, Kolkata
ISRP-L2-51	Mr. Manik Maji, Sidho Kanho Birsha University, Purulia
ISRP-L2-53	Ms. Barsha Mohanty, Utkal University, Bhubaneswar
ISRP-L2-56	Ms. Mamina Patel, Govt. College Sundergarh

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
ISRP-L2-57	Sri. Ramen Pathak, Gauhati University
ISRP-L2-58	Mr. Souvik Majumder, IIT Guwahati
ISRP-L2-60	Sri. Abhinab Hazarika, North Eastern Regional Institute Of Science And Technology, Itanagar
ISRP-L2-61	Ms. Busara Rehman, North Eastern Regional Institute Of Science And Technology, Itanagar
ISRP-L2-62	Ms. Sapam Aaeena Devi, Manipur University
ISRP-L2-64	Ms. Pallabi Pal, NIT Agartala
ISRP-L2-65	Mr. Monukumar, College Of Commerce Art's And Science, Patna
ISRP-L2-66	Ms. Khushi Parween, BBMK University, Dhanbad

"Believe nothing
Merely because you have been told it. Or because it is traditional.
Or because you yourself have imagined it.
Do not believe what your teacher tells you,
merely out of respect for the teacher.
But whatever, after due examination and analysis, You find to be conducive to the good,
The benefit,
The welfare of all beings,
That doctrine believe and cling to, And take it as your guide."

– Gautam Buddha

"It is the supreme art of the teacher to awaken joy in creative expression and knowledge."

– Albert Einstein

Bharathidasan University (Participants)

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
BDUT-LO-01	Mr. Venkatakrishnan, Shiv Nadar University, Delhi NCR
BDUT-LO-02	Mr. Abhishek Rajan, Chatrapati Shahu Ji Maharaj University, Kanpur
BDUT-LO-03	Mr. Kushagra Upadhyay, Dayalbagh Educational Institute, Agra
BDUT-LO-04	Mr. Utkarsh Tiwari, Dayalbagh Educational Institute, Agra
BDUT-LO-05	Ms. Mansi, Banasthali Vidyapith, Vanasthali
BDUT-LO-06	Ms. Sakshi Yadav, Banasthali Vidyapith, Vanasthali
BDUT-LO-07	Ms. Milee Himanshu Shah, Jai Hind College, Mumbai
BDUT-LO-08	Mr. Faisal Akhtar Shaikh, SIES College Of Arts, Science And Commerce (autonomous), Mumbai
BDUT-LO-09	Mr. Nikhil Rajman Prajapati, Guru Nanak Khalsa College, Mumbai
BDUT-LO-10	Mr. Rakshak Ramchandra Kavlekar, Govt. College Of Arts, Science And Commerce, Khandola
BDUT-LO-11	Ms. Kanak Pradeep Waingankar, PES Ravi S. Naik College Of Arts And Science, Ponda
BDUT-LO-12	Ms. Shreya Dilip Kolmule, Govt. College Of Arts, Science And Commerce, Sanquelim
BDUT-LO-13	Ms. Minosha Lourdes Rodrigues, HPSM Ganpat Parsekar College Of Education, Arambol
BDUT-LO-14	Kum. Siddhi Dhiraj Kothawade, Abasaheb Garware College Of Arts And Science, Pune
BDUT-LO-15	Ms. Shreya Singh, Flame University, Pune
BDUT-LO-17	Ms. Rupali Ramkrishna Dhaigude, Rajarshi Shahu Mahavidyalaya (autonomous), Latur
BDUT-LO-18	Mr. Saras Sunil Magade, B. K. Birla College Of Arts, Science And Commerce, Kalyan
BDUT-LO-19	Ms. Damini Gorakh More, SSVPS L.K. Dr. P.R. Ghogrey Science College, Dhule
BDUT-LO-20	Ms. Tirumalasetti Shraavya, Loyola Academy, Secunderabad
BDUT-LO-21	Mr. Hamdaan Ahmed, University Of Hyderabad
BDUT-LO-22	Mr. Janapati Sree Jeevan Sai, Govt. College (autonomous), Anantpur
BDUT-LO-23	Mr. Balla Poli Reddy, Silver Jubilee Govt. College, Kurnool
BDUT-LO-24	Ms. Bankuru Himabindu, Silver Jubilee Govt. College, Kurnool

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
BDUT-LO-30	Ms. Kavini. M, M.O.P. Vaishnav College For Women (autonomous), Chennai
BDUT-LO-31	Mr. Aravindhan, Perunthalaivar Kamarajar Arts College, Puducherry
BDUT-LO-32	Ms. Aleena Benedict, NIT Puducherry
BDUT-LO-33	Mr. Praveen S, St. Joseph's College (autonomous), Tiruchirappalli
BDUT-LO-34	Ms. A P Abinaya Sree, The Gandhigram Rural Institute (Deemed To Be University), Dindigul
BDUT-LO-35	Mr. Harinathan S, Vivekananda College, Madurai
BDUT-LO-36	Ms. Kavitha, Ayya Nadar Janaki Ammal College, Virudhunagar
BDUT-LO-37	Ms. P Petchilakshmi, Ayya Nadar Janaki Ammal College, Virudhunagar
BDUT-LO-40	Ms. Arthi R, V. O. Chidambaram College, Thoothukudi
BDUT-LO-41	Ms. Nandhini, Namakkal Kavignar Ramalingam Govt. Arts College For Women, Namakkal
BDUT-LO-42	Ms. A Aysha Mufasara, Sri GVG Visalakshi College For Women, Tiruppur
BDUT-LO-43	Ms. Swethaa K V, Sri GVG Visalakshi College For Women, Tiruppur
BDUT-LO-44	Kum. Bhavya N S, Christ College, Thrissur
BDUT-LO-45	Ms. Fathima Nm, St Paul's College, Kalamassery
BDUT-LO-46	Ms. Honey Maria Biju, Govt. College Kattappana
BDUT-LO-47	Ms. M S Lekshmi Priya, Catholicate College Pathanamthitta
BDUT-LO-48	Ms. Anukarthika R, Mahatma Gandhi College, Thiruvananthapuram
BDUT-LO-49	Ms. Nima Murukan S, Mahatma Gandhi College, Thiruvananthapuram
BDUT-LO-51	Ms. G Premanjali, Ravenshaw University, Cuttack
BDUT-LO-54	Ms. Anjali Barik, Govt. Women's College, Sambalpur
BDUT-LO-55	Ms. Beauty Dehury, Govt. Women's College, Sambalpur
BDUT-LO-57	Ms. Raina Ahmad Usmani, NIT Rourkela

"The only instruction which a teacher can give, in my opinion, is to think in front of his students."

– Henri Lebesgue

"Do not satisfy your vanity by teaching them great many things. Awake their curiosity. It is enough to open their minds, do not overload them. Put there just a spark. If there is some good inflammable stuff it will catch fire."

– Anatole France

"I keep six honest serving men
They taught me all I know,
Their names are what and why and when
And how and where and who."

– Rudyard Kipling

Level O summer camp at ICT, Mumbai

Overture, Kerala

Tree Plantation at ICT, Mumbai During Summer Camp

Overture, Mangalore

Kalinga Institute of Industrial Technology (Participants)

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
KIIT-LO-04	Ms. Bhawna, Multanimal Modi (PG) College, Ghaziabad
KIIT-LO-06	Mr. Shivam Maheshkumar Vadgama, D.K.V. Arts & Science College, Jamnagar
KIIT-LO-08	Ms. Tanushri, St. Xaviers College (autonomous), Ahmedabad
KIIT-LO-09	Mr. Devang Kiritkumar Chauhan, Govt. Science College, Gandhinagar
KIIT-LO-10	Ms. Kavya Mayurbhai Patel, Indian Institute Of Teacher Education Gandhinagar
KIIT-LO-11	Mr. Harsh Prajapati, Dr. Hari Singh Gour Vishwavidyalaya Sagar
KIIT-LO-13	Mr. Pushpraj Sahu, Shaildevi Mahavidhayalaya, Durg
KIIT-LO-14	Kum. Sakshi Verma, Pt. Ravi Shankar Shukla University, Raipur
KIIT-LO-16	Ms. Sanskriti Sharma, Govt. E.V. PG College Korba
KIIT-LO-17	Ms. Rupavathi M, Guru Nanak College (autonomous), Chennai
KIIT-LO-18	Ms. Reena S, Vellalar College For Women, Erode
KIIT-LO-19	Ms. Kalaiselvi.v, Vellalar College For Women, Erode
KIIT-LO-20	Mr. Arnab Ghosh, Ramakrishna Mission Vivekananda Centenary College, Rahara
KIIT-LO-21	Ms. Supriya Samanta, Raja Narendra Lal Khan Women's College (autonomous), Medinipur
KIIT-LO-22	Mr. Subhadip Ghosh, Garhbeta College, Garhbeta
KIIT-LO-23	Ms. Tithi Ghosh, Midnapore City College
KIIT-LO-24	Mr. Jyoti Dawadi, Nar Bahadur Bhandari Govt. College, Tadong
KIIT-LO-25	Ms. Monalisha Giri, Nar Bahadur Bhandari Govt. College, Tadong
KIIT-LO-26	Ms. Nrityanjali Tamang, Nar Bahadur Bhandari Govt. College, Tadong
KIIT-LO-27	Ms. Ayushma Pradhan, Sikkim Manipal Institution Of Technology, Majitar
KIIT-LO-28	Mr. Mithun Kumar Swain, B.J.B. Autonomous College, Bhubaneshwar
KIIT-LO-31	Mr. Baryu Murmu, Kalinga Institute Of Social Sciences, Bhubaneswar
KIIT-LO-32	Ms. Priyadarshini Pradhan, Kalinga Institute Of Social Sciences, Bhubaneswar
KIIT-LO-33	Ms. Sunita Hembram, Kalinga Institute Of Social Sciences, Bhubaneswar

MTTS Selection Id (MTTS2025 -)	Name and Institute Details
KIIT-LO-35	Ms. Pritipragya Rout, Bhadrak Autonomous College, Bhadrak
KIIT-LO-36	Mr. Ritesh Mandal, Govt. Science Degree College, Chatrapur
KIIT-LO-37	Mr. Omprakash Padhan, Larambha College, Larambha
KIIT-LO-45	Ms. Loushambam Lanchenbi, Dhanamanjuri College Of Science, Imphal
KIIT-LO-46	Mr. Akiezo Peseyie, Kohima Science College
KIIT-LO-47	Mr. Manavgurung, Kohima Science College
KIIT-LO-48	Mr. Tutu Ahmed Choudhury, Patkai Christian College, Patkai
KIIT-LO-49	Mr. Saibal Saha, Tripura University
KIIT-LO-51	Mr. Rajib Sutradhar, Ramakrishna Mahavidyalaya, Unakoti
KIIT-LO-52	Ms. Samiyaafreen, Patna Science College
KIIT-LO-53	Mr. Gaurav Anand, College Of Commerce, Arts And Science, Patna
KIIT-LO-54	Mr. Parshuram Gorain, Chas College, Chas
KIIT-LO-55	Kum. Pallavikumari, Ranchi Women's College
KIIT-LO-56	Ms. Sonam Kumari, Ranchi Women's College
KIIT-LO-57	Mr. Akash Raj, Central University Of Jharkhand, Ranchi
KIIT-LO-58	Kum. Annu, Central University Of Jharkhand, Ranchi
KIIT-LO-59	Ms. Nishu Kumari, Central University Of Jharkhand, Ranchi

"Newton, when questioned about his method of work, could give no other answer but that he was wont to ponder again and again on a subject... Scientists and artists both recommend persistent labour."

– E. Mach

MTTS2024, CUTN

MTTS2025 - FAQ

The following is a list of some of the frequently asked questions about the programme, and their answers.

For how many years has the programme been conducted?

The programme has been conducted since 1993.

Who organizes the MTTS Programmes?

Since its inception, the MTTS programme (as the annual summer camp was originally referred to) has been organized by a group of committed mathematicians under the leadership of Prof. S. Kumaresan, while he had been working in Mumbai University and University of Hyderabad. As the activities of the Programme broadened, a national core committee was formed to advise, organize, and supervise various aspects of the MTTS Programmes. On the occasion of the silver jubilee of MTTS, the members of this committee formed a non-profitable educational trust entitled "MTTS TRUST " to carry forward this endeavour. From 2018, all programmes under the MTTS umbrella are being conducted by the MTTS Trust.

What is the basis of selection for participating in the programme?

The selection depends mainly on the following two criteria: (i) a consistent academic record and (ii) the recommendation letter of a teacher, who is mathematically well-acquainted with the applicant. The selection is very much influenced by the specifics rather than by the general comments in the recommendation.

How are the participants assigned the centres?

Based on geographical reasons and exam schedules of the students. Applicants should mention the tentative dates of the examinations if they want us to consider this aspect while assigning them the centre.

Is there any fee to be paid by the students?

Absolutely none. In fact, the Trust reimburses travel (sleeper/2nd class railway fare by the shortest route), provides books and reading materials, and gives free lodging and food during the period of the programme to all the participants.

What do I do if my name appears in the selection list but no letter of admission is received?

The admission/ selection letter is sent to the selected candidates by email. Visit the MTTS site where the selection list is available. Look for instructions to be followed in case you are selected but did not receive the admission letter.

Where will the participants be accommodated?

The participants are usually accommodated in the hostels of the host institution. There will be separate hostels for boys and girls.

Is there any scholarship available for the participants (after the programme) for pursuing higher studies in mathematics?

No, but there may be follow-up activities for students from the current camp.

Will the participants receive any certificate at the end of the programme?

All participants who attend the programme for the entire period will receive a certificate of participation.

Will the programme help the students in getting jobs? In getting admissions in good institutions?

The main aim of the programme is to train the students so that they can work independently, achieve a high level of confidence in the learning/understanding of mathematics, to give them a global perspective about mathematics, and to make them enjoy doing mathematics. We do NOT think of this camp as a job-training programme. However, the knowledge and attitude acquired during the programme, if further cultivated by the participants, seem to help them achieve better goals in their academic career. It is also envisaged that if the participants choose the teaching profession, they will be able to impart mathematical knowledge in a more interactive manner and motivate students for further study.

Can you say something about the way the training is carried out? How are the courses different from the ones we have at the colleges?

Radically different. In fact, it takes about three days for the participants to get used to our way of doing things. The faculty is from various leading institutions of the country and is not confined to the host institute. People who are experts in the field, who are known for their teaching and have a commitment towards high quality mathematics in India are chosen to teach the courses. As a rule, each course is taught by a single expert. This paves the way for better interaction (over a period of 4 weeks) between the faculty and students and also imparts a perspective of the field among the students. The faculty is requested to be present for all the sessions – not for their sessions only! All the four teachers of a level actively help the students during the sessions. The teachers identify the difficulties of the individual students. Giving individual attention is one of the unique features of this programme. Some reading material is also provided.

The teachers keep asking questions, sometimes well-formulated, sometimes vague, to demonstrate how mathematics is discovered. They often develop a proof from the ideas given by the students and ask them to write in the way a textbook will present it. There will be a great deal of pressure on you to think on your own and actively participate in the course. Unless you are keen and ready to work very hard, please do not apply for the programme. But if you are seriously interested in pursuing higher mathematics, this programme will be immensely useful to you.

The programme also provides a platform for students with (linguistically, culturally, and mathematically) varied backgrounds to come together and interact with peers and experts in the field. This serves two purposes: i) the participants come to know where they stand academically and what they must do to bring out their full potential and ii) they establish a rapport with other participants and teachers which help them shape their career in mathematics.

Are there tests at the end of the programme?

It is our belief that one should learn mathematics for its own sake and for the love of it rather than focusing one's attention on the tests.

However, there will be writing assignments for each of the courses. You will be asked to sub-

mit them the next day. These written assignments will be corrected and may be discussed in the classroom or individually. The main aim of this exercise is to improve your writing skills. You may discuss your assignments with anybody and consult books if necessary. But the most important requirement is that at the time of writing, you should be on your own. There may also be online self-assessment activities. These are not intended to grade you, but are rather aimed at giving you an opportunity to keep track of your improvements during the programme. Take these quizzes seriously.

Can you say something about the student seminars?

The participants interested in giving seminars should talk to a teacher of their level. Depending on the interest of the participants, the teacher will suggest some topics and reading material. The participant may discuss the topic with the teachers to acquire more insight before giving the seminar. Usually, such seminars are of 15-30 minutes duration. Sometimes, a longer presentation is shared by a group of students. While they present the topic, the speakers among them are chosen randomly. This ensures that each member of the group understands, and is comfortable with the entire topic.

Is it possible to change the Level after joining the Programme?

Yes. In fact, we offer even more flexibility. If some participants of a particular level know and are good at a particular subject of their level, they may be allowed to go for the same subject at a higher level. Similarly, if they lack either the background or find a particular subject difficult, they may attend the same subject at a lower level. The timetable is drawn up to facilitate this migration. For example, Algebra will be taught at the same time for Levels I and II.

What subjects are taught? Are they pure or applied?

The emphasis is on so-called pure mathematics. The courses are on linear algebra, algebra, analysis, geometry, number theory, topology, etc. It is our firm belief that a deeper understanding of these subjects is a must whether you wish to pursue pure or applied mathematics.

What is the medium of instruction?

The medium of instruction is English. It is very essential that the participants should be able to communicate in English, at least in mathematics. If you have any difficulty, please talk to a teacher or mentor of your level. We shall find a way to mitigate your difficulty.

Do we have to have a great deal of background in mathematics?

No. The courses are usually designed in such a way that 30-40% of the concepts may already be familiar to most of the students. The main aim of the course, as was mentioned above, is to promote thinking. As a matter of fact, it was observed in the past that the students who learn a topic for the first time in the programme have performed better as the courses progressed. It is not our aim to introduce a lot of jargon to the students. (You cannot master any language by learning the dictionary by heart!) Instead, we introduce the very basic concepts, use well-chosen examples, and train the students thoroughly.

Can we join the programme a few days after the inaugural day?

It takes about three days for the students to get used to our method of teaching. Anybody who joins the programme after the third day is at a distinct disadvantage, as the other participants would be in a better position to participate in the discussions. Thus, the students who join later will feel miserable due to their inability to participate actively and may even lose their confidence. Hence, as a rule, nobody is allowed to join the programme after the

second day. The only exceptions would be former participants who performed well in a previous camp, but prior approval will be needed in these cases.

PLEASE do not send requests for joining the programme on or after the 3rd day.

A class-mate of mine is given admission. I know that he/she is not going to participate and is going to cancel the admission. Can I replace him/her in the camp?

We are aware that some of the selected students have a very genuine problem, namely the clash of dates of examinations with that of our camps. Students with this problem fail to participate, since they are not allowed to join after the second day of the programme. Due to unforeseen circumstances, even those who confirmed their participation often fail to join the programme. To avoid vacancies created by such incidents, we offer admission to 50-55 applicants though our sanctioned strength is 35 per level. Our overbooking takes care of the vacancies arising out of this problem. Note that there are about 6000+ autonomous institutions such as universities, colleges and institutes in our country. It would be impossible to find even a single day which will be convenient to students of all these institutions. To mitigate such issues, we have floated the concept of Initiation into Mathematics (InitMath) and Overture camps, which are organized at the regional level.

Are there some programmes for mathematics teachers similar to MTTS?

To spread the MTTS methodology to a larger number of students, a camp for teachers called Pedagogical Training for Mathematics Teachers (PTMT) was started over a decade ago. The suggestion for this came from the participants of earlier camps. The participants of PTMT are introduced to the MTTS methodology, so that they can adopt it in their regular teaching. More details on this programme can be obtained from the MTTS website.

How can I organise an MTTS camp in my college/ university/ institution?

The application process for organising any of the camps under the MTTS umbrella is detailed on the MTTS Trust website. This includes Overture, InitMath, PTMT or any of the Summer Camps.

If you are a faculty and are enthusiastic about organising one of these at your institution, you can apply online by following the process described at
https://mtts.org.in/training-programmes/organize-mtts-initmath-ptmt

If you are a student, who wishes to have such a camp at your institute, you may request some interested faculty member to apply for the same.

A question less frequently asked: How can we help the MTTS Programme?

In many ways. To start with, you may inform your juniors, and others, who exhibit a certain amount of motivation, and who have an aptitude for mathematics, about this programme and encourage them to apply. Having undergone this training, you will be in a better position to judge which students from your college will be suitable for this activity more than the teachers, who may not have any idea of this programme. You may distribute copies of the application and recommendation form to those interested.

Secondly, you may share a copy of the Souvenir with committed teachers, and students of your college. This will enable them to encourage suitable students to future camps. Instead of keeping the Souvenir as a private trophy, you may also give it to the teacher who recommended you.

Thirdly, you may offer seminars at your institute about the way we teach. Your friends will also have a taste of the way mathematics is taught in a typical MTTS camp.

Fourthly, you may inform us of teachers who are likely to be interested in this mode of teaching. We are constantly on the look-out for motivated teachers who will be ready to sacrifice their vacation and offer training in this programme. We also allow teachers to participate in this programme if they want to know how training is imparted. For this purpose, interested teachers may visit for a week or two during the camp. They should write to the MTTS Trust about this. Such participation is only by invitation. Those invited by us will be reimbursed the travel expenses and provided the local hospitality.

If you want students in and around your college to benefit from MTTS teaching methodology, you can request your teachers to organise one of the MTTS programmes at your college.

Finally, you can also help financially by donating to the MTTS Trust. So far the Trust has been able to organize a limited number of camps with the help of funding from the National Board for Higher Mathematics (NBHM). Expansion of these programmes will require a lot of infrastructural resources, both human as well as material. The financial implications require the support of MTTS well-wishers like you. Any amount, however small, is welcome. For more details, please see the back cover.

For examples of what other alumni have done, see the section on alumni contributions starting on Page 23 in the MTTS2024 Souvenir. (https://mtts.org.in/downloads/mtts2024-souvenir).

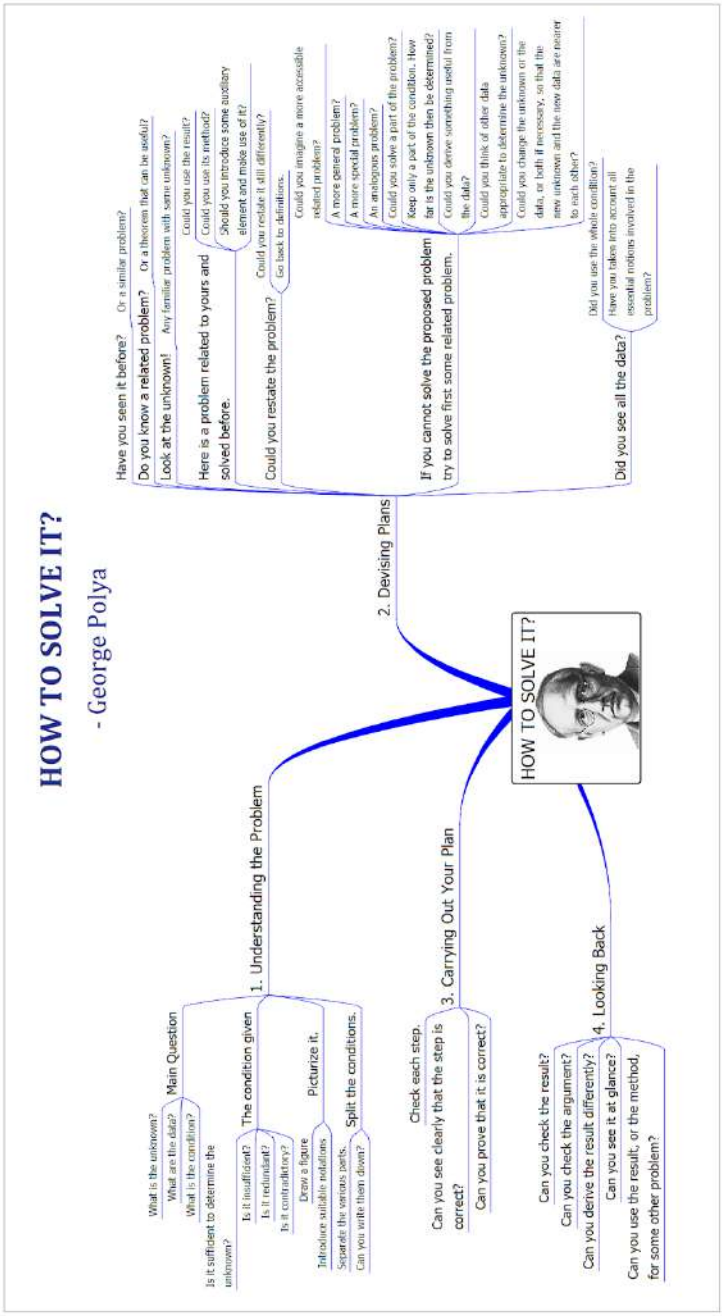
"I hear, I forget.
I see, I remember.
I do, I understand."

– A Chinese Saying

MTTS2024 CUTN - Tree Plantation on World Environment day

How to derive the maximum benefit out of the programme

- Take active part in the classroom discussions. As a rule, the teachers will develop the theme from the answers provided by you to their questions. Make an honest attempt to answer them. If you are afraid of making mistakes, you will never learn or improve.
- Feel free to discuss mathematics with the teachers, mentors, as well as with the participants. Mathematics is best learnt from discussions. This is also a quicker way of learning than reading books or attending lectures passively. Please work on the assignments given by the teachers on the same day. Even if you could not solve it, the mere attempt will help you follow the next day's classroom discussions, as well as the hint/ solution offered by the teacher later. Go through the excerpt from Polya's "How to Solve It?" given in the souvenir. Try your best to adopt the techniques as much as possible.
- It is not our aim to introduce you to a lot of jargon. Instead, we want to promote active learning of the subject and original thinking, to make you gain a perspective and see the essential beauty of the subject. For this reason, we have devised syllabi in such a way that they will have a lot in common with what you might have learnt already.
- As you will have less time after the day's work, we suggest that you make it a point to understand everything in the classroom itself and use the evenings to reflect up on the day's material. To achieve this, you have to be alert and stop the teachers if they go too fast or you do not understand certain points.
- Even though you will be provided a lot of reading material, we suggest that you use them sparingly during the camp. You can always learn from them once you go back! Instead try to exploit this opportunity of meeting experts and other talented students by means of interactions and discussions. One of the aims of this programme is to provide you with an intellectual atmosphere which will motivate you to rise higher and realize your potential.
- We suggest that you use your communication devices sparingly during the camp, and keep social media activity to a minimum. You can always get back to them once you go back! Instead try to exploit this opportunity of meeting experts and other talented students by means of face-to-face interactions and discussions. Reiterating what is said above, remember that the camp provides you with an intellectual ambience which will motivate you to rise higher and realize your potential.


HOW TO SOLVE IT?
- George Polya
HOW TO SOLVE IT?
1. Understanding the Problem
What is the unknown?
What are the data?
What is the condition?
Main Question
Is it sufficient to determine the unknown?
Is it insufficient?
Is it redundant?
Is it contradictory?
The condition given
Draw a figure
Introduce suitable notations
Picturize it.
Separate the various parts.
Can you write them down?
Split the conditions.
2. Devising Plans
Have you seen it before?
Or a similar problem?
Do you know a related problem?
Or a theorem that can be useful?
Look at the unknown!
Any familiar problem with same unknown?
Here is a problem related to yours and solved before.
Could you use this result?
Could you use its method?
Should you introduce some auxiliary element and make use of it?
Could you restate the problem?
Could you restate it still differently?
Go back to definitions.
Could you imagine a more accessible related problem?
If you cannot solve the proposed problem try to solve first some related problem.
A more general problem?
A more special problem?
An analogous problem?
Could you solve a part of the problem?
Keep only a part of the condition. How far is the unknown then be determined?
Could you derive something useful from the data?
Did you see all the data?
Could you think of other data appropriate to determine the unknown?
Could you change the unknown or the data, or both if necessary, so that the new unknown and the new data are nearer to each other?
Did you use the whole condition?
Have you taken into account all essential notions involved in the problem?
3. Carrying Out Your Plan
Check each step.
Can you see clearly that the step is correct?
Can you prove that it is correct?
4. Looking Back
Can you check the result?
Can you check the argument?
Can you derive the result differently?
Can you see it at glance?
Can you use the result, or the method, for some other problem?

Be a partner to MTTS Endeavours

So far the MTTS Trust has been able to organize all its training camps with funding predominantly from the NBHM. However, to make the benefits of MTTS reach the large portion of the target audience, broadening of these programmes and therefore expansion of infrastructural resources, both human as well as material, will be necessitated. The financial implications require the support of MTTS well-wishers like you. The Trust thanks its wellwishers and solicits their financial support. Any amount, however small, is welcome, from the patrons who would like to support this endeavour. The following are some headings under contributions can be made:

- • For organising an InitMath/MTTS camp at a location of your choice.
- For organising an Overture camp at a location of your choice.
- For organizing a PTMT camp on a subject or location of your choice.
- For organizing a regional Online Foundation Course in Mathematics.
- For support for women participants.
- For scholarship for top performing participants.
- For procuring books for distribution to participants.
- For publication of programme souvenirs, articles and books.
- For maintenance of the MTTS website and online system management.
- For travel expenses to explore and identify training needs.
- For processing of applications; selection of participants.
- For organization of infrastructural facilities for the camps.
- For maintenance and running expenses of the trust
- As a general donation.

We are very happy to inform you that the MTTS Trust has been registered under section 80G (5) (vi) of the Income tax act 1961, and hence donations are eligible for a tax benefit of 100% deduction under the Section 80G. We appeal to you to give donations to the Trust generously and hope that you will not miss this opportunity to serve the cause of mathematics in India.

Please do not forget to visit https://4dspace.mtts.org.in/donations and give your details for a receipt on your donations. The receipt will be sent to you by email.

The MTTS Trust thanks you for your continued support!

Note : WE CANNOT ACCEPT FOREIGN CONTRIBUTIONS as per the existing government rules. Payments from Indian citizens from Indian bank accounts alone can be accepted.

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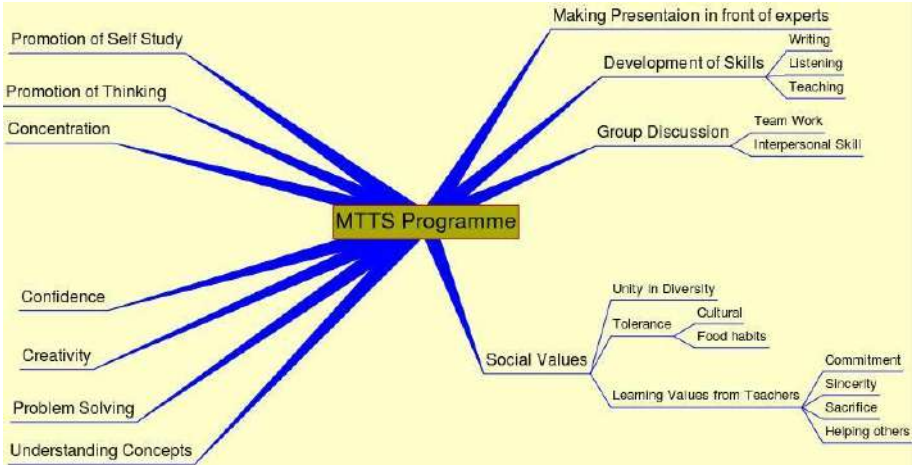
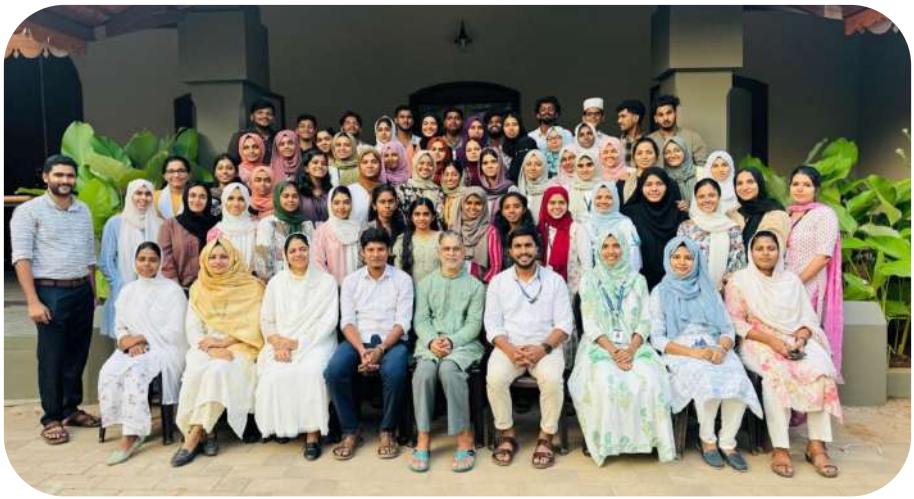
MTTS2024 CUTN

Credits
Photos:
Faculty and students of various MTTS camps





Overture 2025 Camp, Kerala

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