

HOMI BHABHA CENTRE FOR SCIENCE EDUCATION
TATA INSTITUTE OF FUNDAMENTAL RESEARCH
and
NATIONAL BOARD FOR HIGHER MATHEMATICS
DEPARTMENT OF ATOMIC ENERGY
GOVERNMENT OF INDIA

2014-2015

Mathematical Olympiad Programme in India

Leading to participation in
International Mathematical Olympiad

Homi Bhabha Centre for Science Education
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August 2014

MATHEMATICAL OLYMPIAD PROGRAMME IN INDIA AND RELATED ACTIVITIES

The Mathematical Olympiad Programme in India, which leads to participation of Indian students in the International Mathematical Olympiad (IMO) is organized by the Homi Bhabha Centre for Science Education (HBCSE) on behalf of the National Board for Higher Mathematics (NBHM) of the Department of Atomic Energy (DAE), Government of India. This programme is one of the major initiatives undertaken by the NBHM. Its main purpose is to spot mathematical talent among pre-university students in the country.

For the purpose of training and selection of students for the Olympiad contest, 25 regions all over the country have been designated and each assigned a Regional Coordinator. Additionally, three groups (Central Board of Secondary Education (CBSE), Navodaya Vidyalaya Samiti (NVS) and Kendriya Vidyalaya Sangathana (KVS) have a 'Regional Coordinator' each. The Mathematical Olympiad programme consists of the following stages:

Stage 1: Regional Mathematical Olympiad (RMO and pre-RMO). The RMO is a three hour written test with six or seven problems. On the basis of the performance in RMO, a certain number of students from each region is selected for Stage 2 (INMO). The Regional Coordinators are in charge of conducting the RMO in their respective regions. They have the option of preparing RMO question papers all by themselves or they may choose to use the central RMO question paper prepared by the Mathematical Olympiad Cell, HBCSE, TIFR. Some regions may hold a pre-RMO examination by way of which students will be selected to appear for RMO. All pre-RMOs will be conducted by the concerned regions. The format of the pre-RMO paper and the criteria for selecting students for RMO are at the sole discretion of the respective Regional Coordinator.

The central RMO will be held on the first Sunday of December this year (December 07, 2014) between 1.00 p.m. and 4.00 p.m. RMO for those regions **not** opting for the central RMO will be held on a date decided by the concerned Regional Coordinator, but this date will be no later than December 15, 2014.

Eligibility. All Indian students who are born on or after August 1, 1995 and, in addition, are in Class IX, X, and XI are eligible to appear for the RMO. Class XII students will not be eligible to appear for RMO/pre-RMO from 2014 onwards. Highly motivated and well prepared students from Class VIII may also take the RMO at the discretion of the Regional Coordinator. The Regional Coordinators may charge a nominal fee to meet the expenses for organizing the contest.

Stage 2: Indian National Mathematical Olympiad (INMO). The INMO will be held on the first Sunday of February (February 01, 2015) between 1.00 pm and 5.00 pm (12.00 noon to 4.00 p.m. at some centres). Only those students who are selected in RMO 2014 and those who have received an INMO certificate of merit

in 2014 are eligible to appear for the INMO. This contest is a four hour written test. On the basis of the INMO, the top 30-35 students in merit from all over the country are chosen as INMO awardees. In addition to INMO awardees, the next 45-50 students who are in class X or lower and have done well in INMO, but have not qualified as INMO awardee are awarded INMO certificate of merit. These students are eligible to appear for INMO 2016 directly without qualifying through RMO 2015.

Stage 3: International Mathematical Olympiad Training Camp (IMOTC). The INMO awardees are invited to a month long training camp in April-May each year at the Homi Bhabha Centre for Science Education (HBCSE), Mumbai. The INMO awardees of the previous years who are eligible for IMO 2014 and, in addition, who have satisfactorily gone through postal tuition throughout the year are invited to the training camp as senior students. The junior students will receive INMO certificate and a prize in the form of books. The senior students will receive a prize in the form of books and cash. On the basis of a number of selection tests during the Camp, a team of the best six students is selected from the combined pool of junior and senior batch participants.

Stage 4: Pre-Departure Training Camp for IMO. The selected team of six students goes through another round of training and orientation for about ten days prior to departure for IMO.

Stage 5: International Mathematical Olympiad (IMO). The six member team selected at the end of IMOTC accompanied by a leader, a deputy leader and an observer represents the country at the IMO, held in July each year in a different member country of the IMO. The IMO contest consists of two written tests held on two consecutive days. On each day of the contest the test consists of three problems and lasts for four and half hours. India has been participating in the IMO since 1989. Students of the Indian Team who receive gold, silver and bronze medals at the IMO receive a cash prize of Rs. 5000/-, Rs. 4000/- and Rs. 3000/- respectively at a formal ceremony at the end of the training camp during the following year.

The selection of the members of the Indian team for IMO will be subject to their fulfilling criteria such as age limit, medical fitness, parental consent, etc., as may be applicable. In particular, the selected students need to have a valid Indian passport meeting the visa regulations of the host country.

Ministry of Human Resource Development (MHRD) finances international travel of the team, the leader and the deputy leader, while NBHM (DAE) finances the other expenditures connected with the international participation and the entire in-country programme.

Students aiming to go through the Mathematical Olympiad programme leading to international participation (IMO) should note that RMO is the first essential step

for the programme. To appear for the RMO, the students should get in touch with the RMO coordinator of their region well in advance for enrollment and payment of stipulated (nominal) fees.

Syllabus for Mathematical Olympiad. The syllabus for Mathematical Olympiad (regional, national and international) is pre-degree college mathematics. The areas covered are arithmetic of integers, geometry, quadratic equations and expressions, trigonometry, co-ordinate geometry, system of linear equations, permutations and combination, factorisation of polynomial, inequalities, elementary combinatorics, probability theory and number theory, finite series and complex numbers and elementary graph theory. The syllabus does not include calculus and statistics. The major areas from which problems are given are algebra, combinatorics, geometry and number theory. The syllabus is in a sense spread over Class XI to Class XII levels, but the problems under each topic involve high level of difficulty and sophistication. The difficulty level increases from RMO to INMO to IMO.

A good idea of what is expected of students in mathematical Olympiad can be had from the question papers of earlier years (which are available at <http://olympiads.hbcse.tifr.res.in/subjects/mathematics/previous-question-papers-and-solutions>) and the following books:

1. Problem Primer for Olympiads

C R Pranesachar, B J Venkatachala and C S Yogananda (Prism Books Pvt. Ltd., Bangalore).

2. Challenge and Thrill of Pre-College Mathematics

V Krishnamurthy, C R Pranesachar, K N Ranganathan and B J Venkatachala (New Age International Publishers, New Delhi).

3. An Excursion in Mathematics

Editors: M R Modak, S A Katre and V V Acharya and V M Sholapurkar (Bhaskaracharya Pratishthana, Pune).

4. Problem Solving Strategies

A Engel (Springer-Verlag, Germany).

5. Functional Equations

B J Venkatachala (Prism Books Pvt. Ltd., Bangalore).

6. Mathematical Circles

Fomin and others (University Press, Hyderabad).

Many other interesting references may also be found in the book **An Excursion in Mathematics** mentioned above.

INMO Scholarship. The INMO awardees successfully completing IMOTC, who pursue B.Sc., or other courses adjudged by the Board to be on the same footing, with mathematics as one of the principal subjects of study, are eligible to receive a scholarship of NBHM, which is at present Rs. 4,000 per month, through the period of their undergraduate studies (subject to satisfactory progress). An enhanced scholarship would be available for pursuing masters studies in mathematics.

Nurture Programme. INMO awardees who pursue undergraduate studies in professional areas like engineering are eligible for a novel Nurture Programme of NBHM. Under this programme students are encouraged and enabled to study advanced mathematics, alongside their professional studies, through cash awards (annual), setting up contact with a suitable mathematical institution, opportunity to participate in summer workshops (covering expenses) etc. Students satisfactorily completing the contact programme and summer workshop of the first year will receive a cash award of Rs. 18,500/-, and similarly for the subsequent years a cash award of Rs. 20,000/- will be given.

Contact Addresses for inquiries about Mathematical Olympiad Programme

<p>Prof. J Ramadas Centre Director Homi Bhabha Centre for Science Education, Near Anushaktinagar Bus Depot, V. N. Purav Marg, Mankhurd, Mumbai – 400 088</p> <p>Ph.: (022) 2557 5622 (Telefax) (022) 2507 2207 e-mail: director@hbcse.tifr.res.in hbcpro@hbcse.tifr.res.in</p>	<p>Member Secretary National Board for Higher Mathematics Department of Atomic Energy Anushakti Bhavan, CSM Marg, Mumbai – 400 001</p> <p>Ph.: (022) 22022533 (O) Fax: (022) 22028972 e-mail: msnbhm@dae.gov.in</p>
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Mathematical Olympiad Programme

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List of Regional Co-ordinators

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2	Prof D.P.Shukla C-1/351 sector G Jankipuram Lucknow 226021 Mb 09450366085 email: dpshukla3@gmail.com	Uttar Pradesh

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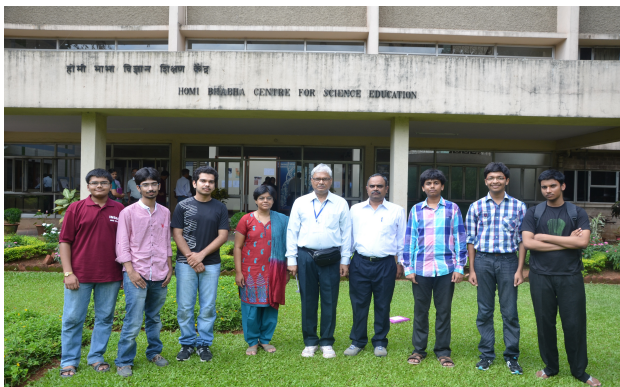
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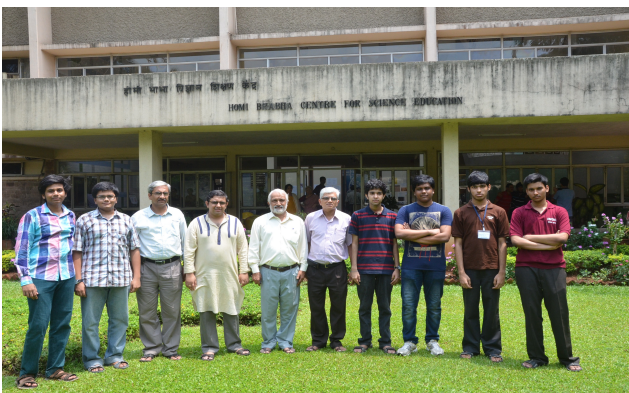
Other Centres		
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Indian Delegation for the 54th International Mathematical Olympiad (IMO) 2013



From Left to Right: Chaitanya Tappu, Pranav Nuti, Shubham Sinha, Dr. Aditi Phadke (Deputy Leader), Prof. C. R. Pranesachar (Leader), Dr. V. V. Acharya (Observer), Anish Sevekari, Pallav Goyal, Sagnik Saha.

Indian Delegation for the 55th International Mathematical Olympiad (IMO) 2014



From Left to Right: Anish Sevekari, Chaitanya Tappu, Prof. V. M. Sholapurkar (Observer), Dr. Prithwijit De (Observer), Prof. B. J. Venkatachala (Leader), Shri. Kiran Barve (Deputy Leader), Soumik Ghosh, Jeet Mohapatra, Supravat Sarkar, Sagnik Saha.

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is a major initiative undertaken
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Its main purpose is to spot and
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International Mathematical Olympiad.**

**This brochure gives the
necessary information to all the concerned
students, teachers, parents and others
regarding this programme**

Do India proud at the International Mathematical Olympiad 2015

Enroll for Regional Mathematical Olympiad (RMO) now