MATHEMATICAL OLYMPIAD
&
OTHER SCHOLARSHIPS, RESEARCH PROGRAMMES

INFORMATION BROCHURE

2015-2016

ABEL
PRISEN

PRINCIPIA
MATHEMATICA
TO *56

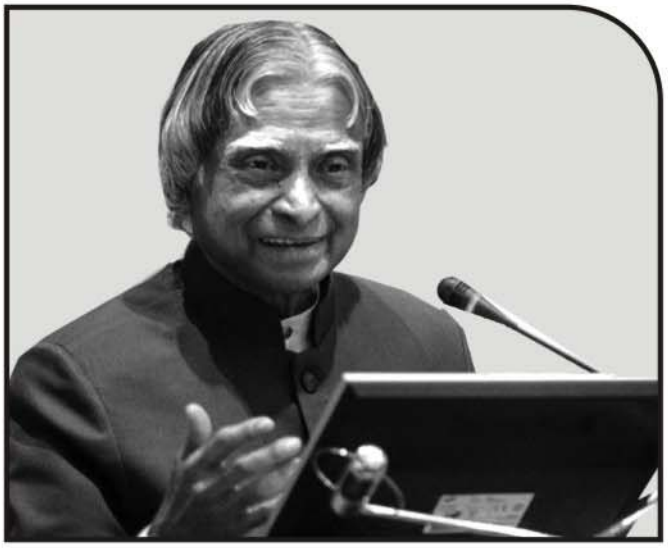
BY
ALFRED NORTH WHITEHEAD
AND
BERTRAND RUSSELL, F.R.S.

CAMBRIDGE
AT THE UNIVERSITY PRESS

Dedicated to

Dr. A. P. J. Abdul Kalam

(1931-2015)



Dream, Dream, Dream...
Dreams transform into thoughts and thoughts result in action....

Confidence and Hard-work is the best medicine to kill the disease called failure. It will make us a successful person...

DEPARTMENT OF MATHEMATICS

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COCHIN - 682 022

The erstwhile University of Cochin founded in 1971 was reorganised and converted into a full fledged University of Science and Technology in 1986 for the promotion of Graduate and Post Graduate studies and advanced research in Applied Sciences, Technology, Commerce, Management and Social Sciences.

The combined Department of Mathematics and Statistics came into existence in 1976, which was bifurcated to form the Department of Mathematics in 1996. Apart from offering M.Sc, and M. Phil. degree courses in Mathematics, it has active research programmes in Algebra, Operations Research, Stochastic Processes, Graph Theory, Wavelet Analysis and Operator Theory.

The Department has been coordinating the Mathematical olympiad - a talent search programme for high school students since 1990. It also organizes mathematical enrichment programmes for students and teachers to promote the cause of mathematics and attract young minds to choose a career in mathematics. It also co-ordinates the national level tests of NBHM for M.Sc and Ph.D scholarships. The department is funded by DST-FIST programme.

The department also organized the 'International Conference on Recent Trends in Graph Theory and Combinatorics' as a satellite conference of the International Congress of Mathematicians (ICM) during August 2010.

"Tejasvinavadhithamastu"

May learning illumine us both,

The teacher and the taught.

The department conducted a Re-Union of INMO awardees during 1991-2014, on 31st January 2015. Those who could not participate may please contact the Regional Co-ordinator (vambat@gmail.com).

PREFACE

This brochure contains information on various talent search and research programmes in basic sciences, in general and mathematics in particular and is meant for the students of Xth standard and above. It will give an exposure to the very many avenues available to those who enjoy the beauty of science and have the real potential to be an academician and a researcher. The Government of India through the Departments of Science and Technology, Human Resource Development, Atomic Energy and many other non governmental organizations also have launched several innovative programmes such as science olympiads, KVPY etc. to spot and nurture scientific talents in the country. We have compiled some of these information and it is hoped that it will be a source of inspiration for the students to choose a career in science and mathematics-the mother of all knowledge and the queen of all sciences.

This edition of the brochure is dedicated to the visionary GuRu.Dr. A. P. J. Abdul Kalam, former President of India, who passed away on 27th July 2015, who had taken initiative to start some of the scholarship programmes mentioned in this brochure.

A. VIJAYAKUMAR
(vambat@gmail.com)

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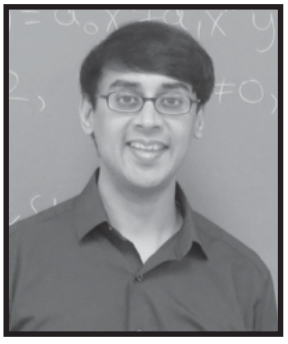
Congratulations.....



Manjul Bhargava
Fields Medalist (2014)

Subhash Khot
Nevanlinna Prize Winner (2014)

MATHEMATICAL OLYMPIAD
&
OTHER SCHOLARSHIPS, RESEARCH PROGRAMMES

Letter by Ramanujan

Madras

5th Aug. 1913.

From S. Ramanujan, Scholarshipholder in Mathematics.

To The Board of Studies in Mathematics.

Through The Registrar, University of Madras.

Gentlemen,

With reference to para. 2 of the University Registrar's letter no. 1631 dated the 9th April, 1913, I beg to submit herewith my quarterly Progress Report for the quarter ended the 31st July, 1913.

The Progress Report is merely the exposition of a new theorem I have discovered in Integral Calculus. At present there are many definite integrals the values of which we know to be finite but still not possible of evaluation by the present known methods. This theorem will be an instrument by which at least some of the definite integrals whose values are at present not known can be evaluated. For instance, The integral treated in Ex.(v) note Art. 5 in the paper, Mr. G. H. Hardy, M.A., F.R.S., of Trinity College, Cambridge, considers to be "new and interesting" Similarly the integral connected with the Bessel's

Function of the n^{th} order which at present requires many complicated manipulations to evaluate can be readily inferred from the theorem given in the paper. I have also utilised this theorem in definite integrals for the expansion of functions which can now be ordinarily done by Lagrange's, Bürmann's, or Abel's theorems. For instance, the expansions marked as examples nos. (3) and (4) Art. 6, in the second part of the paper.

The investigations I have made on the basis of this theorem are not all contained in the attached paper. There is ample scope for new and interesting results out of this theorem. This paper may be considered the first instalment of the results I have got out of the theorem. Other new results based on the theorem I shall communicate in my later reports.

I beg to submit this, my maiden attempt, and I humbly request that the Members of the Board will make allowance for any defect which they may notice to my want of usual training which is now undergone by College Students and view sympathetically my humble effort in the attached paper.

I beg to remain,
Gentlemen,
Your obedient servant,
S. Ramanujan.

NATIONAL BOARD FOR HIGHER MATHEMATICS (NBHM)

This is a unit of the Department of Atomic Energy, Govt. of India, which funds various academic programmes related to Mathematics.

Scholarships for post graduate studies in Mathematics :

NBHM awards scholarships for pursuing studies for MSc degree in Mathematics. Final year BSc students and those who have joined for MSc degree course are eligible to apply. Selection is based on a written test usually held in September at several centres in India including **Cochin**, followed by an interview. The present scholarship amount is Rs. 6000/- per month.

Research awards for Ph.D in Mathematics:

These awards are meant for motivated students with an M.Sc. degree in Mathematics. Selection is made on the basis of a written test usually held in January followed by interviews. The scholarship amount is Rs. 16,000/- per month for first two years and Rs. 18,000/- for next 3 years.

NBHM also provides financial assistance for organising seminars, workshops and for the development of libraries.

The present chairman of NBHM is **Prof. V. Srinivas, School of Mathematics, Tata Institute of Fundamental Research, Homi Bhabha Road ,Colaba, Mumbai - 400 005.**
Contact:

Member Secretary
NBHM
Department of Atomic Energy
Ist Floor, O.Y.C. Building, C.S.M. Marg, Mumbai - 400 001, Maharashtra, India
E-mail: nbhm@math.tifr.res.in / msnbhm@dae.gov.in, Ph: 022-22022533 (O)
Website: www.nbhm.dae.gov.in

1. MATHEMATICAL OLYMPIAD:

'Mathematical Olympiad' is a talent search programme of international significance for students who have not entered a university. In India this is organised by the **National Board for Higher Mathematics (NBHM),** since 1988. This is conducted in three stages, the **Regional Mathematical Olympiad (RMO)** usually held during October-December in 18 regions, the **Indian National Mathematical Olympiad (INMO)** held in February and then an **International Mathematical Olympiad (IMO)** Training Camp in May-June, from where a six-member team is selected to represent India in the IMO, held in July in different countries. Academic coordination is mainly done by the MO Cell in the Department of Mathematics, IISc, Bangalore.

IMO started in 1959 in Romania with the participation from just 7 countries. Even though the IMO is of comparatively recent origin, National Mathematical Olympiads have a long history. It was Hungary, which in the year 1894 started what is known as Eotvos Mathematical Competition. Though during the first few years the IMO was confined to the countries like Poland, Russia and Bulgaria, other western countries also started to participate during sixties. At present this mega event of the mind has a truly international character and has a participation from more than 100 countries. The questions asked in the olympiads are really challenging and it measures the student's capacity for original and critical thinking.

The performance of Indian team in IMO

Year	Host Country	No. of Medals	Rank (Unofficial)	No. of Countries
1989	Germany	4 Bronze	25	50
1990	China	1 Gold, 1 Silver, 2 Bronze	17	54
1991	Sweden	3 Silver, 3 Bronze	10	56
1992	U.S.S.R.	1 Silver, 4 Bronze	22	60
1993	Turkey	4 Silver, 1 Bronze	15	73
1994	Hong Kong	3 Silver, 3 Bronze	16	69
1995	Canada	3 Silver, 3 Bronze	14	73
1996	India	1 Gold, 3 Silver, 1 Bronze	14	75
1997	Argentina	3 Silver, 3 Bronze	15	82
1998	Taiwan	3 Gold, 3 Silver	10	79
1999	Romania	3 Silver, 3 Bronze	17	79
2000	South Korea	5 Silver, 1 Bronze	14	82
2001	United States	2 Gold, 2 Silver, 2 Bronze	7	83
2002	United Kingdom	1 Gold, 3 Silver, 2 Bronze	9	84
2003	Japan	4 Silver, 1 Bronze	15	82
2004	Greece	4 Silver, 2 Bronze	14	85
2005	Mexico	1 Silver, 1 Bronze	32	92
2006	Slovenia	5 Bronze	35	90
2007	Vietnam	3 Silver	25	94
2008	Spain	5 Bronze	31	97
2009	Germany	3 Silver, 2 Bronze	28	108
2010	Kazakhstan	2 Silver, 1 Bronze	36	96
2011	Holland	1 Gold, 1 Silver, 2 Bronze	23	
2012	Argentina	2 Gold, 3 Silver	11	
2013	Colombia	2 Silver, 3 Bronze	29	97
2014	South Africa	1 Silver, 3 Bronze	39	
2015	Thailand	1 Silver, 2 Bronze	37	104
2016	Honkong			
2017	Brazil			
2018	Romania			
2019	United Kingdom			

The present **National Coordinator** is,

Dr. Vinayak Sholapurkar
Head, Centre for Post-Graduate Studies in Mathematics
S. P. College, Tilak Road, Pune - 411 030
E-mail: vmshola@gmail.com

The National Board for Higher Mathematics (NBHM), a unit of Department of Atomic Energy (DAE), Government of India has been organising Mathematical Olympiads in our country, first at the regional level and then at the national and international levels, since 1988. In Kerala, this event is being co-ordinated by us since 1990.

OBJECTIVES: To spot talented students who have the capacity for original and critical thinking and encourage them to choose a career in mathematics and also to select an Indian team for the International Mathematical Olympiad.

ELIGIBILITY: Students of standard X/XI only.

SYLLABUS: Roughly of the plus two level. Thrust areas will be Geometry, Number Theory, Algebra and Combinatorics. The questions will be quite challenging. There is no prescribed syllabus.

REGIONAL MATHEMATICAL OLYMPIAD: (R.M.O.): RMO-2015 will be held on Sunday, 6th December, between 1 p.m. and 4 p.m. at Trivandrum, Quilon, Pathanamthitta, Kottayam, Aleppey, Changanassery, Kottarakkara, Ernakulam, Kothamangalam, Irinjalakkuda, Kodakara, Trichur, Palghat, Calicut, Malappuram, Kannur and Kasargod. Proposals for new centres will be considered.

INDIAN NATIONAL MATHEMATICAL OLYMPIAD (I.N.M.O.): About 30 students will be selected for INMO, to be held on 17th January 2016 at Cochin University Campus. There will be an additional quota of 5 for girls.

INTERNATIONAL MATHEMATICAL OLYMPIAD (I.M.O.): About 30 toppers of INMO-INMO awardees will be invited for a training camp to select an Indian team for IMO-2016 to be held in Hongkong. IMO 2015 was held in Thailand where India, secured 1 Silver and 2 Bronze Medals.

PRIZES, SCHOLARSHIPS AND FOLLOWUP PROGRAMMES

Five toppers of RMO will be awarded a cash prize of Rs. 5000/- each sponsored by the Kerala State Council for Science, Technology and Enviornment (KSCSTE).

Five toppers of RMO will be awarded 'Professor C.S. Venkataraman Memorial Prizes'.

Five Toppers of RMO will be awarded 'Professor Wazir Hasan Abdi Memorial Prizes'.

INMO awardees are eligible for participation in Asia Pacific Mathematical Olympiad (APMO).

INMO awardees who are girls are eligible to participate in the European girls Mathematical Olympiad (EGMO).

INMO awardees are eligible for NBHM scholarships for higher studies.

All students selected for INMO will be given merit certificates.

HOW TO APPLY: There is no prescribed application form. Principals of recognised schools shall forward the list of participants indicating their names, class, residential address, phone numbers, e-mails and the centre along with a registration fee of Rs. 50/- each by D.D. (drawn in favour of Regional Co-ordinator, INMO payable at SBT CUSAT Campus branch only).

This programme is funded by the DAE, CUSAT and KSCSTE.

REVALUATION OF RMO ANSWER SCRIPTS

Provisional result of RMO-2015 will be published in CUSAT website www.cusat.ac.in, latest by 25th December 2015. Those who wish to apply for revaluation may apply with a fee of Rs. 500/- by a DD to the Regional Co-ordinator, INMO, CUSAT with in a week. A list of students selected for INMO-2016 will be published accordingly.

2. HOMI BHABHA CENTRE FOR SCIENCE EDUCATION (HBCSE)

Homi Bhabha Centre for Science Education (HBCSE) is a National Centre of the Tata Institute of Fundamental Research, Mumbai. The broad goals of the Centre are to promote equity and excellence in science and mathematical education from primary school to undergraduate college level, and encourage the growth of scientific literacy in the country. To these ends it carries out a wide spectrum of inter-related activities, which may be viewed under three broad categories: (a) Research and Development, (b) Teacher Orientation and Science Popularisation, and (c) Olympiads and other Students' Nurturing Programmes. **It is India's nodal centre for Olympiad programmes in Mathematics, Physics, Chemistry, Biology and Astronomy.**

Contact:

The Director
HBCSE
V. N. Purav Marg, Mumbai-400088
Website : www.hbcse.tifr.res.in
www.iabt.org.in

For National Science Olympiad

Contact : Prof. M.L. Ogalapurkar
IAPT Office, 61, Sheela Vihar Colony
Karve Road, Kothrud, Pune - 411 038
(Tel: 020-25420163, 020-20252754)
E-mail: iaptpune@gmail.com

The Indian Computing Olympiad is a nationwide competition organized annually by Indian Association for Research in Computer Science in coordination with CBSE. The goal of the competition is to identify school students with outstanding skills in algorithms and computer programming.

Website: www.iarcs.org.in/inoi

The **Astronomy Olympiad** is coordinated in Kerala by Regional Science Centre, Calicut.
Website: www.rscpcalicut.8m.com

3. KISHORE VAIGYANIK PROTSAHAN YOJANA (KVPY)

KVPY is a programme initiated by the Department of Science and Technology (DST), Government of India to encourage highly motivated students of Basic Sciences (Mathematics, Physics, Chemistry and Biology), Engineering and Medicine to take up careers in research in these areas. This programme hopes not only to assist the students to realise their potential, but also ensure that the best scientific talent is tapped for research and development in the country. Scholarship ranging from Rs. 4000 - Rs. 7000 per month will be provided (up to the Pre - Ph.D level) to the selected students. In addition to fellowships, KVPY fellows will have access to facilities in research Institutions and attend summer camps.

Entry points for Basic Sciences are, students completing X standard, students joining / completing I year B.Sc degree course in any subject. Detailed advertisement inviting applications for these scholarship will appear in all important dailys on the National Science Day (28th February) and the National Technology day (11th May) every year. Usually aptitude tests are held at various centres all over India including **Cochin**, in November.

Contact:

Convener
KVPY, Indian Institute of Science
Bangalore - 560 012. **Website : iisc.ernet.in**

4 (a). MATHEMATICS TRAINING AND TALENT SEARCH (MT & TS)

The aim of this programme is to expose bright students to the excitements of doing mathematics and to promote independent mathematical thinking. This is organised at three levels.

Level O	:	Second year undergraduate (B.Sc./B.Stat./B.Tech etc) students with Mathematics as one of their subjects.
Level I	:	Final Year undergraduate students with Mathematics as one of their subjects.
Level II	:	First year postgraduate students with Mathematics main.

This programme is conducted at different centres in India during May-June, since 1993 and is funded by the NBHM. A new programme for college teachers-**pedagogical Training for Mathematics Teachers (PTMT) has been started in 2012.**

(b). PEDAGOGICAL TRAINING FOR MATHEMATICS TEACHERS (PTMT)

PTMT attempts to familiarize mathematics teachers, teaching at undergraduate and postgraduate levels with the methods followed in MTTS Programme. Faculty well-versed with MTTS programme will share the pedagogy of teaching mathematics with participants.

Home page: http://ptmt.mtts.org.in/

Contact:
Prof. S. Kumaresan
Programme Director, MTTS
Dept. of Mathematics and Statistics
University of Hyderabad
Gachibowli, Central University P.O.
Hyderabad - 500 046, India.
Email: kumaresa@gmail.com
Home page: www.mtts.org.in

5. THE NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING (NCERT)

NATIONAL TALENT SEARCH SCHEME

The National Council of Educational Research and Training (NCERT) was established by the Government of India in the year 1961 with a view to bringing about qualitative improvement in school education in the country. National Talent Search Scheme (NTSS) is open to the students of Classes X, XI and XII. There will be two objective type written tests, the Mental Ability Test (MAT) and the Scholastic Aptitude Test (SAT). All students studying in Class X in any type of recognized school including Kendriya Vidyalaya, Navodaya Vidyalaya, Sainik School etc. will be eligible to appear at the State Level Examination conducted by SCERT. The second level test is conducted by NCERT.

SCERT is concerned with the academic aspects of school education including formulation of curriculum, preparation of textbooks, teachers' handbooks and teacher training. It advises the Government on policy matters relating to school education . SCERT (Kerala) functions as an R&D institute at the state level by providing guidance, support and assistance to the State Education Department in its endeavour to improve the quality of elementary, secondary and teacher education. **A new talent search programme for school children-NuMATS has been launched since 2012.**

Contact :

Director
State Council of Educational Research & Training (SCERT)
(Vidyabhavan), Poojappura PO
Thiruvananthapuram, PIN: 695 012

Phone: 0471-2341883 / 2340323
e mail : scertkerala@asianetindia.com website : www.scert.kerala.gov.in

6 (a) Kerala State Council for Science, Technology and Environment (KSCSTE)

The Kerala State Council for Science, Technology and Environment (KSCSTE) was constituted as an autonomous body under the Science, Technology and Environment Department, Government of Kerala in November 2002.

KSCSTE will outline supplementary programmes and policies with special reference to the natural endowments, geographic features and unique socio-economic situations of the State. Also responsible for the promotion of administrative autonomy for the State owned Research Laboratories and Research Institutions, with a view to making research efforts free from administrative procedures and ensure that they are directed only by those who understand their importance and significance.

The key strategy of the Council is to identify programmes in focussed areas and target groups to ensure the maximum benefits to the Society. Some of the main programmes currently available are

- KSCSTE Research Fellowship
- Sastraposhini
- Science Research Scheme
- Student Projects and Young Scientist Awards.
- STARS (Students with Talent and Aptitude for Research in Science)

The present Executive Vice President is Dr. Suresh Das.

Srinivasa Ramanujan Institute for Basic Sciences (SRIBS)

This is a capacity building initiative of KSCSTE in basic sciences. The institute was created in 2012 to commemorate the 125th birth anniversary of Srinivasa Ramanujan the legendary Indian mathematician. It is temporarily functioning in the Rajiv Gandhi Institute of Technology Campus, Pampady, Kottayam.

Contact:

The Director
KSCSTE
Sastra Bhavan
Pattom, Thiruvananthapuram-695004 **Website: ww.kscste.kerala.govt.in**

(b). The Kerala State Higher Education Council

The council was constituted by the Government of Kerala in 2007.

(The Council have the following general responsibilities and functions:)

(a) to render advice to the Government, Universities and other institutions of higher education in the State;

(b) to coordinate the roles of the Government, Universities and apex regulatory agencies in higher education within the State;

(c) to evolve new concepts and programmes in higher education;

(d) to provide common facilities in higher education without impinging upon the autonomy of other institutions of higher education.

A 'Scholar in Residence Programme' called 'Erudite Scheme'was introduced to enable the academic community to interact with outstanding Scholars. Around 200 national and international scholars,including nobel laureates ,have taken part in the programmes, so far organized by various university departments and colleges.

The present Vice Chairman is Ambassador (Rtd.) T. P. Sreenivasan.

Contact:

The Kerala State Higher Education Council
Science and Technology Museum Campus
Vikas Bhavan P.O., PMG,Thiruvananthapuram-695033, Kerala, India
Phone: 0471 2301290, 2301291, 2301292, 2301293, 2301297, 2301298
Fax : 0471 2301290

Email: heckerala@gmail.com; www.kshec.kerala.gov.in

7. HOMI BHABHA NATIONAL INSTITUTE Website: www.hbni.ac.in/

The Homi Bhabha National Institute (Hbni) established in 2005 is a prestigeous Indian deemed university, which unifies ten Constituent Institution (CIs) : 4 premier centers and 6 premier autonomous institutes, each with a well established history of excellence, under a single research-driven framework. It is named after the late Indian physicist, Homi J. Bhabha.

R & D Centres
Bhabha Atomic Research Centre, Mumbai
Indira Gandhi Centre for Atomic Research, Kalpakkam, Chennai
Raja Ramanna Centre for Advanced Technology, Indore
Variable Energy Cyclotron Centre, Kolkata

Institutes
Saha Institute of Nuclear Physics, Kolkata
Institute for Plasma Research, Gandhinagar
Harishchandra Research Institute, Allahabad
Tata Memorial Centre, Mumbai
Institute of Mathematical Sciences, Chennai
Institute of Physics, Bhubaneshwar

8 (a). INDIA MATH EDUCATION NETWORK

This is a major network aimed to connect mathematicians, mathematics educators, teachers (all levels), students and all math enthusiasts, to exchange views on mathematics teaching, announce mathematical activities, initiate group discussions etc.

Contact: **Website : http://india-men.ning.com**

Prof. I. K. Rana
Department of Mathematics
I.I.T., Powai, Mumbai-400076
E-mail: ikrana@iitb.ac.in
Ph: 022 25767462

8 (b). TIME

Technology and Innovations in Mathematics Education, Seventh National conference, TIME -2015 will be held from December 4-7, at Baramati. Contact: Prof. I. K. Rana. For details contact: hiwarekaranil@gmail.com or ikrana@gmail.com

8 (c). KERALA MATH FORUM

A blog titled keralamathforum has been created at the link http://keralamathforum.blogspot.in / http://keralamathforum.e-lokam.com. It will hopefully serve as a meeting/discussion place for all the math teachers/math lovers. One can become an author/contributor in this blog via invitation from the forum moderator (keralamathforum@gmail.com). Contact: nkvishnu@gmail.com

9. ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA (AMTI)

This association was started in 1965 for promotion of efforts to improve Mathematics education at all levels. Its major aims are to assist school teachers to improve their expertise and professional skills, spot and foster mathematical talents, organize orientation courses, summer courses and workshops for teachers and talented students. A national conference is held annually in different parts of the country for teachers to meet and deliberate on important issues of mathematics education. It also holds "Inter State Mathematical Talent Search Competition" annually named **NMTC** (**N**ational **M**athematics **T**alents **C**ontests) from **class V** onwards.

"The Mathematics Teacher" is the official journal of the AMTI. **AMTI celebrates its Golden Jubilee during Decemer 2015 at Chennai.**

Contact:

The General Secretary
AMTI, B-19, Vijay Avenue, 85/37, Venkatarangam Street
Triplicane, Chennai - 600 005.
e-mail: amti@vsnl.com; support@amtionline.com
Phone : 044-28441523.
Website : amtionline.com

10. KERALA MATHEMATICS TEACHERS ASSOCIATION (KMTA)

KMTA was formed in 2001 for the benefit of school students and teachers. It is a forum, for discussing all aspects of Mathematics Education, to help and foster mathematics clubs for students and offer guidance to choose a career in mathematics. It will also organise workshops, orientation programmes and seminars on all aspects of mathematics in different parts of the state. For membership and other details-

Contact:

R. Ramanujan (Mob: 9447237113) / K. Suresh (Mob: 9447767496)

Email: rramanuja@gmail.com, kullathsuresh@gmail.com

11. SOME RESEARCH INSTITUTES IN MATHEMATICS:

a) **Tata Institute of Fundamental Research (TIFR)**

TIFR, the National Centre of the Government of India for Nuclear Science & Mathematics was founded in 1945. It has now three major schools: The School of Mathematics, The School of Natural Sciences and The School of Technology and Computer Science. Research in frontier areas of these disciplines are carried out by these schools. TIFR has three national centres: National Centre for Radio Astrophysics, Pune; Homi Bhabha Centre for Science Education, Mumbai; National Centre for Biological Sciences, Bangalore. The School of Mathematics has a research Centre at the Indian Institute of Science, Bangalore. The institute has acquired the status of a Deemed University in 2002.

Contact:

Chairman
School of Mathematics
T.I.F.R., Homi Bhabha Road
Mumbai - 400 005 **Website: http://www.tifr.res.in**

b) **The Institute of Mathematical Sciences (IMSc)**

IMSc is a National Institute of higher learning, devoted to fundamental research in the frontier areas of mathematical sciences. The three major groups of research areas are Mathematics, Theoretical Physics and Theoretical Computer Science. The institute which is an autonomous body is funded by the Department of Atomic Energy and the Govt. of Tamil Nadu.

Contact:

Director
IMSc
CIT Campus, Taramani, Chennai - 600 113 **Website: www.imsc.res.in**

c) **Indian Statistical Institute (ISI)**

ISI is a unique institution devoted to research, teaching and application of statistics, natural sciences and social sciences. Founded by Prof. P.C. Mahalanobis in Calcultta in 1931, the institute gained the status of an Institution of National Importance in 1959. The Institute has a 3 year B-Stat (Hons), M.Stat, M.Math. and M.Tech Courses.

Contact:

Director
ISI, 203, B.T. Road
Calcutta - 700 108 **Website: http://www.isical.ac.in**

ISI Bangalore Centre has started a three year B.Math (Hons.) Programme from the year 2000. The selection is through a written test at various centres all over India followed by an interview. The B.Math programme includes some courses on Computer Science, Physics etc. which will enable the students to take up these fields later if they so desire. It also offers a Master of Statistics (M.Stat) course and also an M. Math Course since 2003. This centre has active research groups in many areas of mathematics and statistics.

Contact:

Head
ISI Bangalore Centre
8th Mile, Mysore Road
R. V. College P. O.
Bangalore - 560 059 **Website: http://www.isibang.ac.in**

The Chennai Centre is actively involved in research in areas of Statistics, Game Theory, Graph Theory, Logic, Cryptography, Physics and Mathematics. We offer a master's programme in Statistics and Doctoral programs in Statistics, Computer Science, Mathematics and Statistical Quality Control.

Indian Statistical Institute (ISI), Chennai Centre
SETS (Society for Electronic Transactions and Security)
MGR Knowledge City, CIT Campus, Taramani,
Chennai, 600 113. **Website: http://www.isichennai.res.in**

ISI, Delhi centre has an M.Stat Programme and active research groups in Mathematics, Operations Research and Theoretical Statistics.

Contact:

Head
ISI
7, S.J.S. Sansanwal Marg
New Delhi - 110 016 **Website: http://www.isid.ac.in**

d) **Harish Chandra Research Institute (HRI)**

The Harish-Chandra Research Institute (HRI) is an institution dedicated to research in mathematics, and in theoretical physics. It is located in Allahabad, India, and is funded by the Department of Atomic Energy, Government of India.

HRI conducts a regular PhD. as well as an integrated M.Sc.-PhD. program in mathematics, in collaboration with Homi Bhaba National Institute (HBNI) and the University of Allahabad.

Contact:

Director
Harish - Chandra Research Institute
Chattnag Road, Jhunsi
Allahabad - 211 019, India
Phone : +91 (532) 2569 509, 2569 578, 2569 318
Fax : +91 (532) 2567 748, 2567 444 **website : www.hri.res.in**

e) **Indian Institute of Science (IISc.)**

IISc is a premier institution founded in 1909 for research and advanced instruction in almost all frontier areas of Science and Technology and has a very high international standing in the academic world.

It has integrated Ph.D Programmes in all areas of Basic Sciences.

The Department of Mathematics has research groups in many areas of pure and applied Mathematics.

Contact:

Chairman
Dept. of Mathematics
I.I.Sc., Bangalore - 560 012 **Website: http://www.iisc.ernet.in**

(f) **Chennai Mathematical Institute (CMI)**

Chennai Mathematical Institute is a centre of excellence for teaching and research in the mathematical sciences. Founded in 1989 as part of the SPIC Science Foundation, it has been an autonomous institute since 1996.

The research groups in Mathematics and Computer Science at CMI are among the best known in the country.

In 1998, CMI took the initiative to bridge the gap between teaching and research in India by starting BSc and MSc programmes in Mathematics and allied subjects. Students who have graduated from CMI have gone on to join leading institutions throughout the world.

CMI occupies a unique position in Indian academia, attracting substantial funding from both corporate and government sources. In 2006, CMI was recognized by the Government of India as a University under Section 3 of the UGC Act, 1956.

Contact:

The Director, Chennai Mathematical Institute
Plot H1, SIPCOT IT Park
Padur P.O., Siruseri - 603103
Website: www.cmi.ac.in (Phone : 044-32983441)

g) **The Kerala School of Mathematics (KSOM) Calicut**

The Kerala School of Mathematics (KSOM) is a new R&D institution established as a joint venture of KSCSTE and Department of Atomic Energy (DAE) at Kunnamangalam, Kozhikode, with the objective of promoting quality education and research in mathematical sciences in the country and in particular in Kerala.

Contact:

The Director
Kerala School of Mathematics
Kunnamangalam P.O., Calicut-673571
E-mail: director.ksom@gmail.com **website : www.ksom.res.in**

12. INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER)

An exciting opportunity in science for inquisitive young minds.

Scientific and technological innovations are the key drivers for growth and economic prosperity of a nation. In the 21st century, as basic and applied sciences converge, there is an immediate need to train competent researchers. Towards this, the Ministry of Human Resource Development (MHRD), Government of India has set up 5 Indian Institutes of Science Education and Research (IISER) at **Bhopal, Kolkata, Mohali, Pune and Thiruvananthapuram.**

IISER will be devoted to teaching of 5-year integrated Masters and post-bachelors and post-Masters Ph.D. programmes in integrative sciences in an intellectually vibrant atmosphere of research. One of the objectives of IISER is to make education and career in basic sciences more attractive by providing opportunities in integrated learning of sciences and break the barriers of traditional disciplines. Therefore, IISER will promote a flexible and borderless curriculum in all disciplines of basic sciences. Consequently, all students of the integrated Master's programme will be required to take courses in Mathematics, Physics, Chemistry and Biology for the first two years of the curriculum. **Website : www.iisertvm.ac.in/**

13. NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (NISER)

The National Institute of Science Education and Research (NISER) is envisioned to be a unique institution of its kind in India. **It is the first institution of its kind set up by the Department of Atomic Energy.** It will strive to be recognized as a centre of excellence in science education and research in four basic sciences viz. Biology, Chemistry, Mathematics and Physics. At a later stage activities will expand to include Earth and Planetary sciences, Engineering sciences and Computer science.

NISER is affiliated to the **Homi Bhabha National Institute** (HBNI), a Deemed University within the DAE umbrella.

Contact :

Director
National Institute of Science Education & Research
Institute of Physics Campus, Sainik School P. O.
Sachivalaya Marg
Bhubaneswar - 751 005, Orissa.
Tel:0674-2304000 E-mail: director@niser.ac.in Website : www.niser.ac.in

14. DEPARTMENT OF SCIENCE & TECHNOLOGY, GOVERNMENT OF INDIA

"**Innovation in Science Pursuit for Inspired Research (INSPIRE)**" is an innovative programme sponsored and managed by the Department of Science & Technology for attraction of talent to Science. The basic objective of INSPIRE is to communicate to the youth of the country the excitements of creative pursuit of science, attract talent to the study of science at an early age and thus build the required critical human resource pool for strengthening and expanding the Science & Technology system and R&D base. **Scheme for Early Attraction of Talent (SEATS)** aims at attracting talented youth to study science by providing INSPIRE Award, to experience the joy of innovations, of Rs.5,000/- to one million young learners in the age group 10-15 years. There shall be annual Summer/Winter Camps for toppers in Class X board examinations for exposure with global leaders in Science, through **INSPIRE Internship**. In order to seed and experience the joy of innovation, every year two lakh school children in 6th to 10th standards are being identified for the **INSPIRE Award**. Each INSPIRE Award envisions an investment of Rs.5,000/- per child. The scheme plans to reach at least two students per secondary school during the next five years. **Scholarship for Higher Education (SHE)** aims at attracting talented youth into undertaking higher education in science intensive programmes, by providing scholarships and mentoring through 'summer attachment' to performing researchers. The scheme offers 10,000 scholarships for undertaking Bachelor and Masters level education in Natural and Basic sciences. **INSPIRE fellowship** aims at enhancing research fellowships for doctoral studies and opening up partnerships with private sector for topping the Government's efforts in nurturing talents for scientific research. This scheme is applicable to Basic and Applied sciences as well as Medicine, Agriculture etc. with provision of multiple entries. The fellowship will be offered to (1) University 1st Ranker in a particular subject at PG level examination in Basic and Applied Science courses as well as (2) INSPIRE scholar, who have secured aggregate marks of 65 % are above at the 2 year MSc or 5 year Integrated MSc/MS. **INSPIRE Faculty Scheme** opens up an 'Assured Opportunity for Research Career (AORC)' for young researchers in the age group of 27-32 years. It is expected to augment high quality scientific manpower in scientific and educational institutions.

Website : http://www.inspire-dst.gov.in/

15. SOME WEB RESOURCES IN MATHEMATICS

1. http://www.math.duke.edu/education/ccp/index.html
2. http://mathforum.org/
3. http://wise.cgu.edu.
4. http://archives.math.utk.edu/visual.calculus/
5. http://www.history.mcs.st-andrews.ac.uk/history/mathematics
6. http://www.ams.org/employment/highschool **(Attention High School Students and Teachers)**
7. http://www.mathworld.wolfram.com
8. www.mathcounts.org
9. www.artofproblemsolving.com
10. Joyofpi.com

11 www.sitesforteachers.com
12. www.cut-the-knot.org
13. www.paperfolding.com
14. www.mathlinks.robtw
15. www.ams.org
16. http://world.mathigon.org/
17. www.mathscore.com
18. http://plus.maths.org
19. www.nctm.org

16. LIST OF BOOKS FOR MATH. OLYMPIADS:

1.	Klamkin M.S.	U.S.A. Maths Olympiad, 1972 - 1986
2.	Yaglom I. M.	The USSR Olympiad Problem Book (Dover)
3.	Sierpenski W. (Elsevier)	250 Problems in Elementary Number Theory
4.	Niven & Zukerman	An Introduction to the theory of Numbers (Wiley)
5.	Coxeter H. S. M.	Geometry Revisited (MAA)
6.	Larson L. C.	Problem Solving through Problems (Springer)
7.	Bottema O.	Geometric Inequalities (MAA)
8.	V. Krishnamoorthy Etal (New Age Publ.)	Challenges and thrill of Precollege Mathematics
9.	Pranesachar C. R. Publ)	Mathematical challenges from Olympiads. (Interline
10.	Lozansky E., Rousseau C.	Winning Solutions (Springer)
11.	M. K. Singal, A.R. Singal	Olympiad Mathematics (Pitambar Publ.)
12.	S. A. Katre	An excursion in Mathematics
13.	V. Seshan	Mastering Olympiad Mathematics (Frank Brothers)
14.	Engel A.	Problem Solving Strategies (Springer)
15.	Shirali S. A.	First steps in Number Theory (Universities Press)
16.	Shirali S. A.	Adventures in Problem Solving ,, ,,
17.	Steven G. Krantz	Techniques of Problem Solving ,, ,,
18.	Titu Andreescu & Razvan Gelca	Mathematical Olympiad Challenges (Universities Press)
19.	Burton	Elementary Number Theory (UBS)
20.	Venkatachala B. J.	Functional Equations. A problem solving approach
21.	Durrell C. V.	Geometry
22.	Bonnie Averback and Oria Chein	Problem solving through recreational Mathematics (Dover)
23.	Alfred Posamentiar and Charles T. Salkind	Challenging Problems in Geometry (Dover)
24.	Beiler A. H.	Recreations in the theory of numbers (Dover)
25.	A. Gardiner	The Mathematical Olympiad Hand book OUP (2000)
26.	T. Andreesan R. Gelca	Mathematical Olympiad Challenges Birkhauser (2000)
27.	S. Muralidharan G. R. Vijayakumar	Gems from the Mathematics Teacher, AMTI (1997)
28.	V. K. Krishnan (Ed.)	Non-routine problems in Mathematics, AMTI (2000)

29.	R. Roy Choudhary	501 Difficult problems in Mathematics, BM Pub (2000)
30.	T. Andreescu	Mathematical Olympiad Treasures, Birkhauser (2004)
31.	Bernard and Child	Higher Algebra (Mc Millan)
32.	Stein haus	One Hundred Problems in Elementary Mathematics (Dover)
33.	Eves H.	College Geometry (Narosa) (1995)
34.	Williams K.S., Hardy K.	The red book of mathematical problems (Dover)
35.	I. Reiman	International Mathematics Olympiad Vol. I-III (Anthem Press)
36.	Tao T.	Solving Mathematical Problems, OUP (2008)

All these books are with the Regional Co-ordinator for reference and are also available in leading bookstalls.

17. International Congress of Mathematicians-Fields Medal, Nevanlinna Prize, Gauss Prize and Chern Medal

The **International Congress of Mathematicians** (ICM) is the largest congress in the mathematics community. It is held once every four years under the auspices of the **International Mathematical Union** (IMU). **ICM-2010 was held at Hyderabad, India during 19-27, August 2010. (www.icm 2010.in)**

During the congress, the **Fields Medal**, the **Nevanlinna prize and Gauss Prize**, are awarded. The Fields Medal recognizes outstanding mathematical achievement and is popularly known as the Nobel Prize in Mathematics. The Rolf Nevanlinna Prize honors distinguished achievements in mathematical aspects of information science. The Carl Friedrich Gauss Prize is awarded for outstanding mathematical contributions that have found significant applications outside of mathematics. The Fields Medal was first awarded in 1936, the Rolf Nevanlinna Prize in 1982.

During the 1900 congress in Paris, David Hilbert announced his famous list of 23 open problems in mathematics, now called Hilbert's problems. During the 1912 congress in Cambridge, Edmund Landau listed four basic problems about primes, now called Landau's problems. The 1924 congress at Toronto was organized by John Charles Fields.

The ICM-2014 was held at Seoul, S.Korea during 13-21, August 2014 (http://www.icm2014.org/).

An important feature of ICM-2014 was the **MENAO (Mathematics in Emerging Nations: Achievements and Opportunities)** Symposium held on 12th August.

18. International Commission on Mathematical Instruction

The International Commission on Mathematical Instruction, ICMI, was first established at the International Congress of Mathematicians held in Rome, in 1908, on the suggestion of the American mathematician and historian of mathematics, David Eugene Smith. The International Commission on Mathematical Instruction (ICMI) has decided in 2000 to create two prizes recognizing *outstanding achievement in mathematics education research*:

- The **Felix Klein Award**, named for the first president of ICMI (1908-1920), honours a lifetime achievement.
- The **Hans Freudenthal Award**, named for the eighth president of ICMI (1967-1970), recognizes a major cumulative program of research.
- The **Kenneth O. May** Prize instituted by The International Commission on the History of Mathematics (ICHM) was awarded to Prof. R. C. Gupta during ICM-2010

19. List of Fields Medalists and venue of ICM

Year	Venue	Medalists
2014	**Seoul, S. Korea**	**Manjul Bhargava (US), Artur Avila (Brazil), Martin Hairer (Austria), Maryam Mirzakhani (Iran)**
2010	Hyderabad, India	E. Lindenstrauss (Jerusalem), Ngo Bau Chau (Vietnam), S. Smirnov (Russia), Cedric Villani (France)
2006	Madrid, Spain	Andrei Okounkov (Russia), Grigori Perelman (Russia) (declined), Terence Tao (Australia), Wendelin Werner (France)
2002	Beijing, China	Laurent Lafforgue (France) Vladimir Voevodsky (Russia/US)
1998	Berlin, Germany	Richard Ewen Borcherds (GB) William Timothy Gowers (GB) Maxim Kontsevich (Russia) Curtis T. Mcmullen (US)
1994	Zurich, Switzerland	Efim Isakovich Zelmanov (Russia) Pierre-Louis Lions (France) Jean Bourgain (Belgium) Jean-Christophe Yaccoz (France)
1990	Kyoto, Japan	Vladimir Drinfeld (USSR) Vaughan Frederick Randal Jones (New Zealand) Shigefumi Mori (Japan), Edward Witten (US)
1986	Berkeley, California United States	Simon Donaldson (GB) Gerd Faltings (West Germany) Michael Freedman (US)
1982 (Held in 1983)	Warszawa, Poland	Alian Connes (France), Willam Thurston (US) Shing-Tung Yau (US)
1978	Helsinki, Finland	Pierre Deligne (Belgium), Charles Fefferman (US) Grigory Margulis (USSR), Daniel Quillen (US)
1974	Vancouver, Canada	Enrico Bombieri (Italy), David Mumford (US)

1970	Nice, France	Alan Baker (GB), Heisuke Hironaka (Japan)
		Sergei Petrovich Novikov (USSR)
		John Griggs Thompson (GB)
1966	Moscow, Soviet Union	Michal Atiyah (GB), Paul Joseph Cohen (US)
		Alexander Grothendieck (France)
		Stephen Smale (US)
1962	Stockholm, Sweden	Lars Hormander (Sweden), **John Milnor (US)**
1958	Edinburgh,	Klaus Roth (GB)
	United Kingdom	Rene Thom (France)
1954	Amsterdam, Netherlands	Kunihiko Kodaira (Japan)
		Jean-Pierre Serre (France)
1950	Cambridge, Massachusetts,	laurent Schwartz (France)
	United States	Atle Selberg (Norway)
1936	**Oslo, Norway**	**Lars Ahlfors (Finland), Jesse Douglas (US)**
1932	Zurich, Switzerland	
1928	Bologna, Italy	
1924	Toronto, Canada	
1920	Strasbourg, France	
1912	Cambridge, United Kingdom	
1908	Rome, Italy - Felix Klein was a Chairman	
1904	Heidelberg, Germany	
1900	Paris, France - Hilbert's Problems	
1897	Zurich, Switzerland	

20. Some other prizes :

a) Abel Prize

The **Abel Prize** is an international prize presented by the King of Norway to one or more outstanding mathematicians. Named after Norwegian mathematician Niels Henrik Abel (1802–1829), the award was established in 2001 by the Government of Norway and complements the Holberg Prize in the humanities.

The prize board has also established an Abel symposium, administered by the Norwegian Mathematical Society. The award ceremony takes place in the Atrium of the University of Oslo Faculty of Law, where the Nobel Peace Prize was formerly awarded between 1947 and 1989.

A prize in honour of Abel was first proposed by Sophus Lie (1842–1899).

Awardees

Year	Laureate(s)	Citizenship	Institution
2003	Jean-Pierre Serre	French	Collège de France
2004	Michael Atiyah; Isadore Singer	British; American	University of Edinburgh; Massachusetts Institute of Technology
2005	Peter Lax	American	Courant Institute
2006	Lennart Carleson	Swedish	Royal Institute of Technology
2007	**S. R. Srinivasa Varadhan**	**Indian/American**	**Courant Institute**
2008	John G. Thompson; Jacques Tits	American; Belgian/French	University of Florida; Collège de France
2009	Mikhail Gromov	Russian/French	Institut des Hautes Études Scientifiques Courant Institute
2010	John Tate	American	University of Texas at Austin
2011	John Milnor	American	Stony Brook University
2012	Endre Szemerédi	Hungarian/ American	Alfréd Rényi Institute and Rutgers University
2013	Pierre Deligne	Belgian	Institute for Advanced Study
2014	Yakov Sinai	Russian/American	Landau Institute for Theoretical Physics and Princeton University
2015	John F. Nash Louis Nirenberg	American Canadian	Massachusetts Institute of Technology;New York University (Courant Institute of Mathematical Sciences)

b) Rolf Nevanlinna Prize

The **Rolf Nevanlinna Prize** is awarded once every 4 years at the International Congress of Mathematicians, for outstanding contributions in mathematical aspects of Information Sciences including:

1. All mathematical aspects of computer science, including complexity theory, logic of programming languages, analysis of algorithms, cryptography, computer vision, pattern recognition, information processing and modelling of intelligence.

2. Scientific computing and numerical analysis. Computational aspects of optimization and control theory. Computer algebra.

The prize was established in 1981 by the Executive Committee of the International Mathematical Union IMU and named to honour the Finnish mathematician, Rolf Nevanlinna.

Awardees

Year	Laureate	Nationality
1982	Robert Tarjan	United States
1986	Leslie Valiant	United Kingdom
1990	Alexander Razborov	Russia
1994	Avi Wigderson	Israel
1998	Peter Shor	United States
2002	**Madhu Sudan**	**India/ United States**
2006	Jon Kleinberg	United States
2010	Daniel Spielman	United States
2014	**Subhash Khot**	**India/ United States**

c) Carl Friedrich Gauss Prize

The **Carl Friedrich Gauss Prize for Applications of Mathematics** is a mathematics award, granted jointly by the International Mathematical Union and the German Mathematical Society for "outstanding mathematical contributions that have found significant applications outside **mathematical".** The award receives its name from the German mathematician Carl Friedrich Gauss. With its premiere in 2006, it is to be awarded every four years, at the International Congress of Mathematicians.The official announcement of the prize took place on 30 April 2002, the 225th anniversary of the birth of Gauss. The prize aims to honour those who have made contributions and impacts in the fields of business, technology, or even day-to-day life.

Awardees: 2006 - Kiyoshi Itô , 2010 - Yves Meyer, 2014 - Stanley Osher.

d) Chern Medal Prize

The **Chern Medal** is an international award recognizing outstanding lifelong achievement of the highest level in the field of mathematics. The prize is given at the International Congress of Mathematicians (ICM).It is named in honor of the late Chinese mathematician, Shiing-Shen Chern. The award is a joint effort of the International Mathematical Union (IMU) and the **Chern Medal Foundation** (CMF)

Laureates : 2010- Louis Nirenberg, 2014 - Phillip Griffiths

e) Leelavati Award

The **Leelavati Award** is an award for outstanding contribution to public outreach in mathematics. It is named after the 12th-century mathematical treatise "Lilavati" devoted to arithmetic and algebra written by the **Indian mathematician, Bhâskara II,** also known as Bhaskara Achârya. In the book the author posed, in verse form, a series of problems in (elementary) arithmetic to one Leelavati (perhaps his daughter) and followed them up with hints to solutions. This work appears to have been the main source of learning arithmetic and algebra in medieval India. The work was also translated into Persian and was influential in West Asia.

The Leelavati Prize was handed out for the first time at the closing ceremony of the International Congress of Mathematicians (ICM) 2010 in Hyderabad, India. Established by the Executive Organising Committee (EOC) of the ICM with the endorsement of the IMU Executive Committee (EC), the Leelavati Prize started out to be a one-time international award for outstanding public outreach work for mathematics.The Leelavati prize is not intended to reward mathematical research but rather outreach activities in the broadest possible sense**. The cash prize is sponsored by Infosys**.

Winners: Simon Singh- 2010 , Adrián Paenza - 2014

f) Ramanujan Prize

Ramanujan Prize, instituted by The Abdus Salam International Centre for Theoretical Physics (ICTP) is for young mathematicians from developing countries and funded by the Abel Memorial Fund. Maredo Viana (IMPA, Brazil) won the first Ramanujan prize in 2005 and **R. Sujatha (TIFR, Mumbai)**- 2006 , J. Laurent (Argentina)-2007, E.R. Pujals (Brazil)-2008, E-Lupercio (Mexico-2009), Yuguang Shi (2010), Philibert Nang (Gabon)-2011, Fernando Coda Marques (Brazil)-2012, Ye Tian 2013., Miguel Walsh (2014), Amalendu Krishna (India) 2015.

Millenium Prize Problems

In order to celebrate mathematics in the new millennium, the Clay Mathematics Institute of Cambridge, Massachusetts (CMI), an institute dedicated to increasing and disseminating mathematical knowledge, has named Seven Prize Problems. The Scientific Advisory Board of CMI selected these problems, focusing on important classic questions that have resisted solution over the years. The Board of Directors of CMI designated a $7 million prize fund for the solution to these problems, with $1 million allocated to each. Grigory Perelman of St. Peterburg, Russia is the recipient of the prize for resolution of the Poincare conjecture.

Many other prizes are awarded for outstanding contributions in Mathematics such as **Wolf Prize, Cole Prize** etc.

Websites :www.mathunion.org ; www.mathworld.wolfram.com;

21. SCHOOL MATHEMATICS PROJECTS AND OTHER EDUCATIONAL TOYS

1. Mr. L. Sudhakaran, 36, AGRA, Bhavani, Nalanchira, Trivandrum-695 015. (Tel: 0471-2530812, 2530601)
2. Dynam Educational Materials, No. 2, Venkataswamy Layout, Bangalore-560 084
3. Ace Enterprises, Plot No. 27, Electronic Co-opstate Ltd., Pune-411009.
4. Centre for Realistic Education
   E-mail: abhayecoart@yahoo.co.in
5. Navanirmiti, Priyadarsini Apts, (Opp) IIT Market Gate, Powai, Mumbai - 400016
   Ph : 022-25773215
6. Jodogyan Educational Services
   E/12-13, Shakurpus, Delhi-110034, E-mail: jodogyandel@yahoo.com

22. JOURNALS / EDUCATIONAL CDs

1. **Mathematics Teacher**, **Junior mathematician, Published by AMTI**
2. **Resonance,** published by Indian Academy of Sciences (for copies write to Indian Academy of Sciences, C.V. Raman Avenue, PB No. 8005, Bangalore - 560080).
3. **Science India,** Sasthra Bhavan, B-4, 4th Floor, Mather Square, Town Railway Station Road, Cochin-682018 (Ph: 0484-2393242, www.scienceindia.net)
4. **TATVA** - Internet software collection in Mathematics and **Charithra** - a collection of biographies of mathematicians (Contact: P. Vinodkumar, Department of Mathematics, Payyanur College, Edat P.O., Kannur-670 327, e-mail: pvinodkumar@gmail.com)
5. **Mathematics Software** - Resonance Internet Software collection in Mathematics (www.ias.ac.in)
6. **At Right Angles** - A resource for School Mathematics published by Azim Premji Foundation. (shailesh.shirali@gmail.com, snehatitus@azimpremjifoundation.org).

Notable achievements in IMOs

China and Russia are the only nations that have achieved an all-members-gold IMO multiple times (China: 10 times in total, including years 1992, 1993, 1997, 2000, 2001, 2002, 2004, 2006, 2009, 2010; Russia: 2 times in 2002 and 2008). Bulgaria is the nation with the smallest population to have won IMO and it is one of four countries (with USA, China, Russia) to have won IMO by having all of its team members finish with gold medals (in 2003). The only countries to have their entire teams score perfectly on the IMO were the United States, which won IMO 1994 when it accomplished this, coached by Paul Zeitz, and Luxembourg, whose 1-member team got a perfect score in IMO 1981. This accomplishment has only been achieved twice, and the USA's success earned a mention in *TIME Magazine*. Hungary won IMO 1975 in an unorthodox way when none of the eight team members received a gold medal (five silver, three bronze). Second place team East Germany also did not have a single gold medal winner (four silver, four bronze).

Several individuals have consistently scored highly and/or earned medals on the IMO: Reid Barton (USA) was the first participant to win a gold medal four times (1998, 1999, 2000, 2001). Barton is also one of only seven four-time Putnam Fellow (2001, 2002, 2003, 2004). In addition, he is the only person to have won both the IMO and the International Olympiad in Informatics (IOI). Christian Reiher (Germany) is the only other participant to have won four gold medals (2000, 2001, 2002, 2003); Reiher also received a bronze medal (1999). Wolfgang Burmeister (East Germany), Martin Härterich (West Germany) and Iurie Boreico (Moldova) are the only other participants besides Reiher to win five Medals with at least three of them gold. Ciprian Manolescu (Romania) managed to write a perfect paper (42 points) for gold medal more times than anybody else in history of competition, doing it all three times he participated in IMO (1995, 1996, 1997). Manolescu is also a three-time Putnam Fellow (1997, 1998, 2000). Eugenia Malinnikova (USSR) is the highest-scoring female contestant in IMO history. She has 3 gold medals in IMO 1989 (41 points), IMO 1990 (42) and IMO 1991 (42), missing only 1 point in 1989 to precede Manolescu's achievement. Oleg Golberg (Russia/USA) is the only participant in IMO history to win gold medals for different countries: he won two for Russia in 2002 and 2003, then one for USA in 2004.

Terence Tao (Australia), a Fields Medalist (2006) participated in IMO 1986, 1987 and 1988, winning bronze, silver and gold medals respectively. **He won a gold medal at the age of thirteen in IMO 1988, becoming the youngest person to receive a gold medal. Tao also holds the distinction of being the youngest medalist with his 1986 bronze medal, alongside 2009 bronze medalist Raúl Chávez Sarmiento (Peru), both at the age of 11**. Representing the Soviet Union, Vladimir Drinfel'd won a gold medal with a perfect paper at the age of 15 in 1969. Note that both Drinfel'd and Tao could have participated in the IMO multiple times following their success, but entered university and therefore became ineligible.

23. MADHAVA MATHEMATICS COMPETITION

Organized by:
Department of Mathematics, S. P. College, Pune &
Homi Bhabha Centre for Science Education (TIFR), Mumbai
Under the aegis of: National Board for Higher Mathematics

This competition is named after **Mâdhava of Sañgamâgrama** (c. 1350 – c. 1425), a prominent Kerala mathematician-astronomer from the town of Iriñjâlakkuda near Cochin, Kerala, India. He is considered as the founder of the Kerala School of Astronomy and Mathematics. He was the first to have developed infinite series approximations for a range of trigonometric functions, which has been called the "decisive step onward from the finite procedures of ancient mathematics to treat their limit-passage to infinity". His discoveries opened the doors to what has today come to be known as Mathematical

Analysis. One of the greatest mathematician-astronomers of the Middle Ages, Mâdhavan made pioneering contributions to the study of infinite series, calculus, trigonometry, geometry and algebra.

Students of B.Sc. Mathematics are eligible to apply for this competition, Chief Coordinator: Prof. V. M. Sholapurkar

S. P. College, Pune, Email : vmshola@gmail.com
Coordinator for Kerala :
Dr. Aparna S. Lakshmanan, Department of Mathematics
St. Xavier's College, Aluva - 683 101
Email: aparna_ren@yahoo.com **Website : http:www.spcollegepune.ac.in**

24. ADVANCED TRAINING IN MATHEMATICS SCHOOLS

ATM School and ATML are organised for the benefit of research Scholars, University and College teachers with the main objective of offering integrated training programme in inter-related areas of algebra, analysis, discrete mathematics, geometry etc

For details Contact :
Prof. Jugal K. Verma
Department of Mathematics, IIT, Mumbai-400 076
E-mail: verma.jugal@gmail.com

25. NATIONAL CENTRE FOR MATHEMATICS (A JOINT CENTER OF TIFR AND IIT MUMBAI)

The NCM is planned to be a major centre for organizations, throughout the year, of short term courses, workshops, national and international conferences for researchers in mathematics and its applications. Its programmes will give a major boost to training researchers in all age groups in frontier areas of mathematics. **The current Head of the Centre is Prof. M. S. Raghunathan (msr@math.iitb.ac.in), Chairman: Prof. R. Balasubrmanian.**

Compiled by: **Dr. A. Vijayakumar**
Regional Coordinator, INMO
Professor, Department of Mathematics
Cochin University of Science and Technology
Cochin - 682 022, Tel: 0484 - 2577518, 2862462 (O)
e-mail: vambat@gmail.com, Website: cusat.ac.in

Contact for RMO: **Dr. P. M. Mathew**
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Calicut-673 008, Tel: 0495-2287789, 09495205226
e-mail: mathewdevagiri@gmail.com

26 List of Regional Coordinators

Sl. No.	Region	Co ordinator
		North Region
1	Delhi	Prof. Amitabha Tripathi Dept of Mathematics IIT Hauz Khas, New Delhi 110 016 Ph. : (011) 26896831 (R) Mob : (0)9968280833 e-mail : at1089@gmail.com
2	Uttar Pradesh	Prof. D. P. Shukla Dept of Mathematics & Astronomy Lucknow University Lucknow 226 007 Ph. : (0522) 2740 019 (O) (0522) 2732 823 (R) Mob. : (0)9450366085 e-mail : dpshukla3@gmail.com
3	Uttarakhand	Dr. Mahesh C. Joshi Department of Mathematics Kumaun University, DSB Campus Nainital 263 001, Uttarakhand Ph. : (05942) 238978 (R) Mob. : (0)94124 38601 e-mail : mcjoshi69@gmail.com
4	North Western States	Dr. V. K. Grover Dept of Mathematics Punjab University Chandigarh 160 014 Ph. : (0172) 2534510 (O) (0172) 2632479 (R) e-mail : grovervk@pu.ac.in vk_gvr@yahoo.com
		Dr. Suman Bala Asst. Professor, Department of Mathematics Punjab University Mob : 09417018749 email : sumanl-75@pu.ac.in
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6	Kashmir	Prof. Bashir A. Zargar Department of Mathematics University of Kashmir, Srinagar-190006 Ph. : (0952) 257347 Mob. : (0)9906936392 e-mail : zargarba3@yahoo.co.in bazargar@gmail.com
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		South Zone
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27	NVS	Shri. G. Arumugam Deputy Commissioner Navodaya Vidyalaya Samiti B-15, Institutional Area, Sector-62, Nodia, Pin - 201 309 G. B. Nagar District, Uttar Pradesh Mob : 09868252576 Email : dcacadnvs@gmail.com
28	KVS	Shri. Jagat Singh PGT Maths KVS Mathematical Olympiad Kendriya Vidyalaya NTPC Badarpur, New Delhi 110 044 Mob. : (0)9891426013 e-mail : gslawania@rediffmail.com

I had a feeling once about Mathematics - that I saw it all. Depth beyond depth was revealed to me - the Byss and Abyss. I saw - as one might see the transit of Venus or even the Lord Mayor's Show - a quantity passing through infinity and changing its sign from plus to minus. I saw exactly why it happened and why the tergiversation was inevitable but it was after dinner and I let it go.
- Sir Winston Spencer Churchill

In science one tries to tell people, in such a way as to be understood by everyone, something that no one ever knew before. But in poetry, it's the exact opposite.
- P A M Dirac

There are three kinds of lies: lies, damned lies, and statistics. *- Mark Twain*

Imagination is more important than knowledge. *Albert Einstein*

It is not knowledge, but the act of learning, not possession but the act of getting there, which grants the greatest enjoyment. When I have clarified and exhausted a subject, then I turn away from it, in order to go into darkness again; the never-satisfied man is so strange if he has completed a structure, then it is not in order to dwell in it peacefully, but in order to begin another. I imagine the world conqueror must feel thus, who, after one kingdom is scarcely conquered, stretches out his arms for others. *Karl Friedrich Gauss*

I am interested in mathematics only as a creative art. *G.H. Hardy*

The real danger is not that computers will begin to think like men, but that men will begin to think like computers. *Sydney J. Harris*

It is India that gave us the ingenious method of expressing all numbers by means of ten symbols, each symbol receiving a value of position as well as an absolute value; a profound and important idea which appears so simple to us now that we ignore its true merit. But its very simplicity and the great ease which it has lent to computations put our arithmetic in the first rank of useful inventions; and we shall appreciate the grandeur of the achievement the more when we remember that it escaped the genius of Archimedes and Apollonius, two of the greatest men produced by antiquity.
Pierre-Simon de Laplace

No human investigation can be called real science if it cannot be demonstrated mathematically. — *Leonardo da Vinci*

Education is for improving the lives of others and for leaving your community and world better than you found it. — *Marian Wright Edelman*

To repeat what others have said, requires education, to challenge it, requires brains. — *Mary Pettibone Poole*

Failure will never overtake me if my determination to succeed is strong enough — *Dr. A. P. J. Abdul Kalam*

All models are wrong, but some models are useful. — *G. E. P. Box*

There is no branch of mathematics, however abstract which may not one day be applied to phenomena of the real world. — *Nikolai Lobachevsky*

So God does play dice with the universe. All the evidence points to him being an inveterate gambler, who throws the dice on every possible occasio. — *Stephen Hawking*

"If your heart acquires strength, you will be able to remove blemishes from others without thinking evil of them." — *-Mahatma Gandhi*

"If a country neglects basic research it is doomed to be always a follower and not a leader, and it will lose its most talented young scientists who will go elsewhere. Healthy science is like a healthy tree: you cannot destroy the roots and hope that the branches will flourish." — *David Gross, 2004 Nobel Laureate in Physics*

"When, however, with much effort I reached the thirteenth proposition of Euclid, the utter simplicity of the subject was suddenly revealed to me. A subject which only required a pure and simple use of one's reasoning powers could not be difficult. Ever since that time, Geometry has been both easy and interesting for me".
Extracted from - The Story of My Experiments with Truth - Mahatma Gandhi

Don't take rest after your first victory because if you fail in second, more lips are waiting to say that your first victory was just luck,

Dr. A. P. J. Abdul Kalam

All Birds find shelter during a rain. But Eagle avoids rain by flying above the Clouds.

Dr. A. P. J. Abdul Kalam

Man needs difficulties in life because they are necessary to enjoy the success.

Dr. A. P. J. Abdul Kalam

If you want to shine like a sun. First burn like a sun.

Dr. A. P. J. Abdul Kalam

All of us do not have equal talent. But, all of us have an equal opportunity to develop our talents. *Dr. A. P. J. Abdul Kalam*

Be more dedicated to making solid achievements than in running after swift but synthetic happiness. *Dr. A. P. J. Abdul Kalam*

Thinking should become your capital asset, no matter whatever ups and downs you come across in your *Dr. A. P. J. Abdul Kalam*

Without your involvement you can't succeed. With your involvement you can't fail. *Dr. A. P. J. Abdul Kalam*

Take up one idea. Make that one idea your life - think of it, dream of it, live on that idea. Let the brain, muscles, nerves, every part of your body, be full of that idea, and just leave every other idea alone. This is the way to success

Swami Vivekananda

You have to grow from the inside out. None can teach you, none can make you spiritual. There is no other teacher byt your own soul.

Swami Vivekananda

You cannot believe in God until you believe in yourself.

Swami Vivekananda

Arise ! Awake ! and stop not until the goal is reached.

Swami Vivekananda

We are what our thoughts have made us; so take care about what you think. Words are secondary. Thoughts live; they travel far.

Swami Vivekananda

Nations, like individuals, are made, not only by what they acquire, but by what they resign.

Dr. S. Radhakrishnan

Reading a book gives us the habit of solitary reflection and true enjoyment.

Dr. S. Radhakrishnan

Books are the means by which we build bridges between cultures.

Dr. S. Radhakrishnan

A life of joy and happiness is possible only on the basis of knowledge and science.

Dr. S. Radhakrishnan

The prophets of spirit make history just by standing outside history.

Dr. Radhakrishnan

The roots of education are bitter, but the fruit is sweet.

Aristotle

It is the mark of an educated mind to be able to entertain a thought without accepting it. *Aristotle*

Quality is not an act, it is a habit. *Aristotle*

The energy of the mind is the essence of life. *Aristotle*

There is no great genius without some touch of madness.

Aristotle

To know, is to know that you know nothing. That is the meaning of true knowledge.

Socrates

TEACHING IS A LIFE TIME MISSION

To enable development of youth first and foremost, the teacher's love for teaching is essential, with teaching as the soul of the teacher. The teacher must realize that they are responsible for shaping not just students but ignited youth who are the most powerful resource under the earth, on the earth and above the earth. With their full commitment to the great mission of teaching, the teacher transforms himself or herself as a great teacher only when he or she is capable of elevating the average student to high performance. The teacher conducting himself or herself in a noble way itself is a lifetime message for students. They should encourage the students and children to ask questions and develop the spirit of enquiry, so that they blossom into creative enlightened citizens. They should treat all the students equally and should not support any differentiation on account of religion, community or language and continuously upgrade the capacities in teaching so that they can impart quality education to the students. They should realize by being a teacher, they are making an important contribution to the efforts of national development. The teachers must constantly endeavour to fill their mind, with great thoughts and spread the nobility in thinking and action among the students. Teacher should celebrate the success of the students.

Dr. A. P. J. Abdul Kalam
Former President of India
(15 October 1931-27 July 2015)

We are proud of.....

C. R. RAO
(1920)

SARVADAMAN CHAWLA
(1907-1995)

PRASANTA CHANDRA MAHALANOBIS
(1893-1972)

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R. C. BOSE
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S.S. PILLAI
(1901-1950)

R. VAIDYANATHASWAMY
(1894-1960)

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(1940)

T. VIJAYARAGHAVAN
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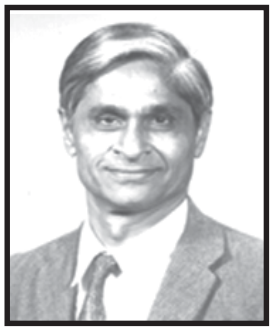
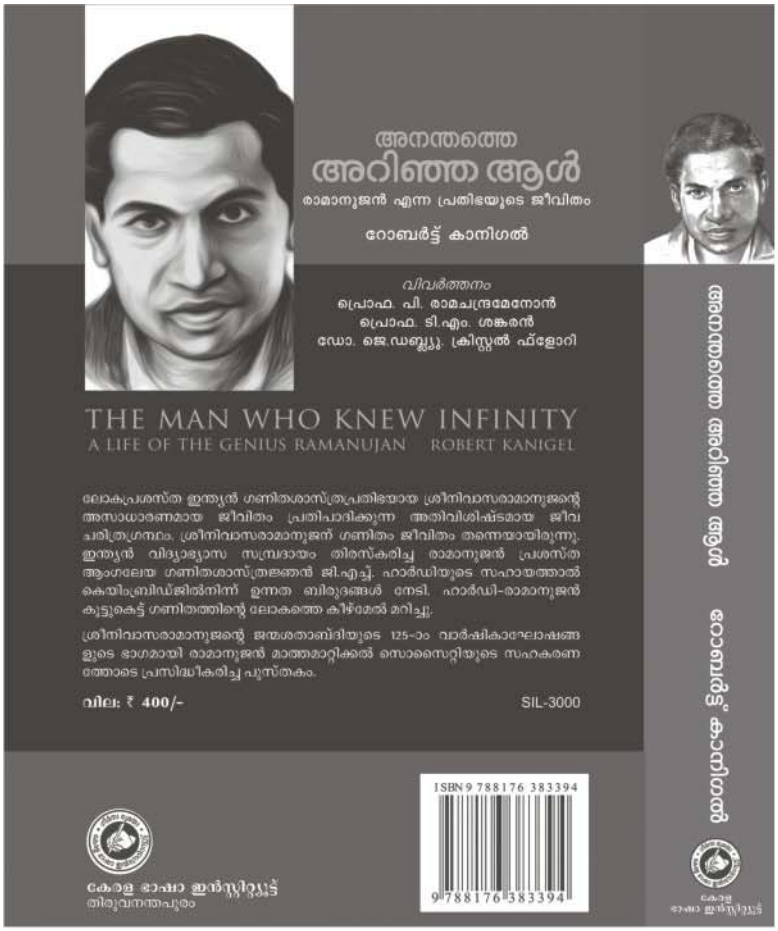
(1945-1976)



S. S. SHRIKHANDE
(1917)



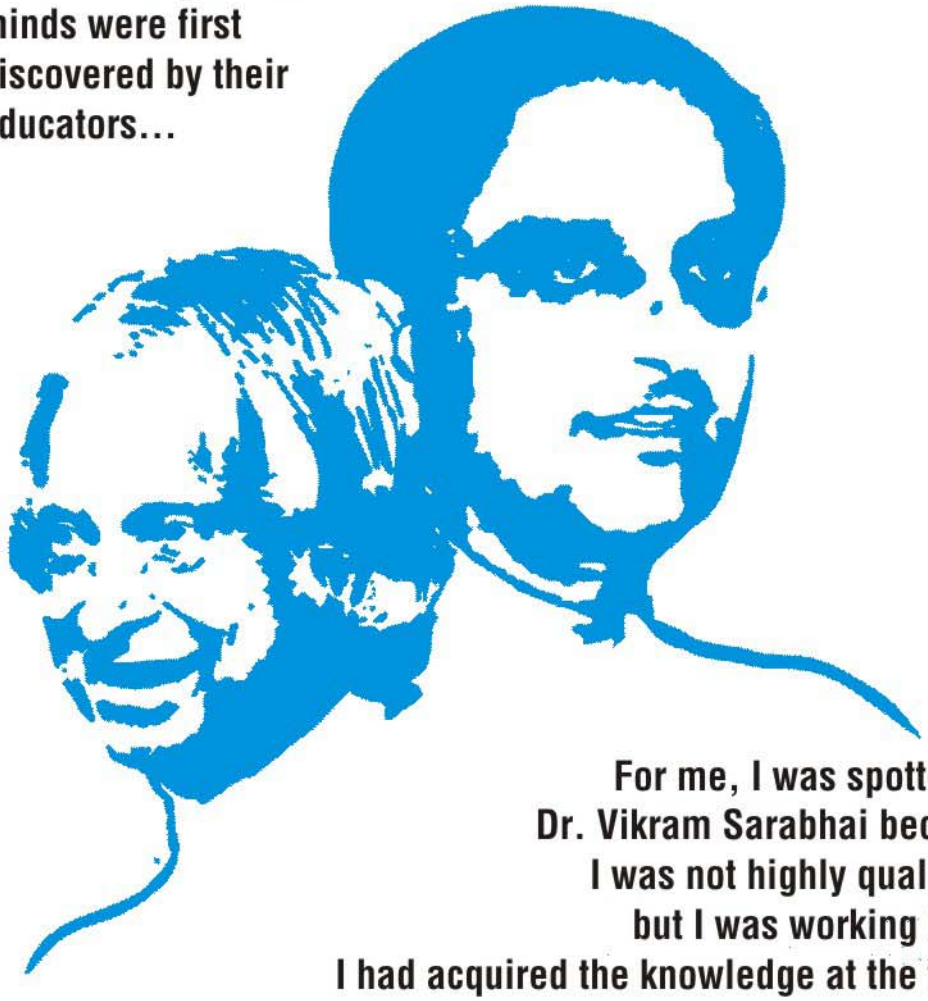
SRINIVASA RAMANUJAN
(1887 - 1920)

National Mathematics Day
22nd December

MATHEMATICAL OLYMPIAD SILVER JUBILEE (1990-2014) REUNION AND MERIT EVENING

31st January, 2015

The world's greatest minds were first discovered by their educators...



For me, I was spotted by
Dr. Vikram Sarabhai because
I was not highly qualified,
but I was working hard,
I had acquired the knowledge at the time,
when he spotted me as a young scientist.
The he gave me full resposibiliy to grow,
not only he seleced me when I was in the lower bottom,
but he gave me responsibility to grow and ensured that
I succeed and if I failed, he was by my side.

Dr. APJ Abdul Kalam on his mentor Dr. Vikram Sarabhai

Educational Initiatives (EI) salutes these extraordinary individual who shape the future of millions.