MATHEMATICAL OLYMPIAD
&
OTHER SCHOLARSHIP, RESEARCH PROGRAMMES

INFORMATION BROCHURE


INSTITVTIONVM
CALCVLI INTEGRALIS
VOLVMEN SECVNDVM
LEONHARDO EVLERO
PETROPOLI

SILVER JUBILEE YEAR (2014-2015)

ॐ पूर्णमदः पूर्णमिदम
पूर्णात् पूर्णमुदच्यते
पूर्णस्य पूर्णमादाय
पूर्णमेवावशिष्यते ।
ॐ शान्तिः शान्तिः शान्तिः ।

(ईशावास्योपनिषद)

यथा शिखा मयूराणां नागानां मणयो यथा ।
तद्वद्वेदाङ्गशास्त्राणां गणितं मूर्धनि स्थितम् ॥

Like the crest of a peacock and the head-jewel of the cobra, so does Mathematics stand at the top of the Vedic Sciences.

-Vedanga Jyotisha of Lagadha (ca 1400 BC)

Don't take a course of action that is dangerous and don't make the same mistake twice. Don't be too sure of yourself even when the way looks easy. Always watch where you are going. Whatever you do be careful.

-Holy Bible 32:20 (SIRACH)

The mediocre teacher tells.
The good teacher explains.
The superior teacher demonstrates.
The great teacher inspires.

William A. Ward

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 Mathematics 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 scholarship.

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.

In the 'SILVER JUBILEE YEAR' of the RMO Co-ordination, we plan a reunion of the 'INMO Awardees' during 1991-2014. 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 X^{th} 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 academic 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.

A. VIJAYAKUMAR
(vambat@gmail.com)

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Congratulations

Manjul Bhargava
Fields Medalist (2014)

Subhash Khot
Nevanlinna Prize Winner (2014)

MATHEMATICAL OLYMPIAD
&
OTHER SCHOLARSHIP, 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, Büermann'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 a MSc 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.

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

The present Chairman of NBHM is **Prof. R. Balasubramanian, Director, The Institute of Mathematical Sciences, Chennai - 600 113.**

Contact:

Member Secretary
NBHM
Department of Atomic Energy
Anusakthi Bhavan, CSM Marg, Mumbai-400 039
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 80 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			

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

REGIONAL MATHEMATICAL OLYMPIAD: (R.M.O.): RMO-2014 will be held on Sunday, **7th December**, between 1 p.m. and 4 p.m. at **Trivandrum, Quilon, Pathanamthitta, Kottayam, Aleppey, Changanassery, Kottarakkara, Ernakulam, Kothamangalam, Irinjalakkuda, Trichur, Palghat, Calicut, Malappuram and Cannanore. Proposals for new centres will be considered.**

In Kerala, this event is being coordinated since 1990. **Students of class X / XI** only are eligible **There is no prescribed syllabus.** But questions are usually from Algebra, Geometry, Number Theory and Combinatorics and will be of exceptionally high level in difficulty and sophistication. **For old question papers contact the Joint coordinator / Regional coordinator or down load from www.hbcse.tifr.res.in/olympiads.**

INDIAN NATIONAL MATHEMATICAL OLYMPIAD (I.N.M.O.) : About 20 students will be selected for INMO, to be held in February 2015 at Cochin University Campus.

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-2015 to be held in Thailand. IMO 2014 was held in South Africa where India, secured 1 Silver and 3 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),** Government of Kerala.
- **Five toppers** of RMO will be awarded **Professor C.S. Venkataraman Memorial Prizes and many other attractive prizes.**
- Special prizes to a selected few to celebrate the **'Silver Jubilee'** of RMO co-ordination
- All students selected for INMO will be given merit certificates.
- INMO awardees are eligible for NBHM scholarships for higher studies.

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 a D.D. (drawn in favour of Regional Co-ordinator, INMO) payable at SBT CUSAT Campus Branch only.

Applications endorsed by the authorities should reach the Joint Coordinator, latest by 20th October 2014.

This programme is funded by the **NBHM, CUSAT** and **KSCSTE.**

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 mathematics 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' Nurture 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 dailies 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) was 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 Prof. V. N. Rajasekharan Pillai.

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 enthusiastics, 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). 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.

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

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 3 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**

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 (KSM) Calicut**

The Kerala School of Mathematics (KSM) 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/

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.	250 Problems in Elementary Number Theory (Elsevier)
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	Challenges and thrill of Precollege Mathematics (New Age Publ.)
9.	Pranesachar C. R.	Mathematical challenges from Olympiads. (Interline Publ)
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.

At the 1900 congress in Paris, David Hilbert announced his famous list of 23 open problems in mathematics, now called Hilbert's problems. At 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.

Over 400 attendees were invited to discuss the progress made in developing nations in mathematics, mathematics education and its implications to their societies. The goals of the MENAO event are

- To listen to the voices of mathematicians and aspiring advanced students of mathematics from the developing world,
- To share success stories of development via partnerships between the local mathematical communities, their governments, and international agencies and foundations,
- To review the current status of those efforts and future needs, and
- To bring together promising individuals and institutions in the developing world with inter- national partners interested in supporting their efforts.

The Fields Medals were awarded to,

Artur Avila (CNRS, France & IMPA, Brazil) . Artur Avila was awarded a Fields Medal for his profound contributions to dynamical systems theory that has changed the face of the field, using the powerful idea of renormalization as a unifying principle. **He is the first Latin American to win such an award.**

Manjul Bhargava (Princeton University, USA) is awarded a Fields Medal for developing powerful new methods in the geometry of numbers and applied them to count rings of small rank and to bound the average rank of elliptic curves.

Martin Hairer (University of Warwick, UK) is awarded a Fields Medal for his outstanding contributions to the theory of stochastic partial differential equations, and in particular created a theory of regularity structures for such equations.

Maryam Mirzakhani (Stanford University, USA) is awarded the Fields Medal] for her outstanding contributions to the dynamics and geometry of Riemann surfaces and their moduli spaces.**She became the first woman mathematician and the first Iranian to get the Fields Medal.**

Subhash Khot- an alumni of IIT, Bombay became the Second Indian to win the coveted Nevanlinna Prize**. Madhu Sudan**, currently a Professor at MIT won this award in 2002.

Manjul Bhargava (born 8 August 1974) is a Canadian-American mathematician of Indian origin. He is the R. Brandon Fradd Professor of Mathematics at Princeton University and is known primarily for his contributions to number theory.

Bhargava was born in Hamilton, Ontario of parents who had immigrated from Jaipur, India. He grew up primarily in Long Island, New York. He completed all of his high school math and computer courses by age 14.[He obtained his B.A. from Harvard University in 1996. For his research as an undergraduate, he was awarded the 1996 Morgan Prize. Bhargava went on to receive his doctorate from Princeton in 2001, supervised by Andrew Wiles. He was a visiting scholar at the Institute for Advanced Study in 2001-02. Princeton hired him at the rank of tenured full professor within only two years of finishing graduate school, which is considered a record in the Ivy League.

Bhargava is also an accomplished tabla player, having studied under gurus such as Zakir Hussain. He also studied Sanskrit from his grandfather Purushottam Lal Bhargava, a well-known scholar of Sanskrit and ancient Indian history.

His PhD thesis generalized Gauss's classical law for composition of binary quadratic forms to many other situations. One major use of his results is the parametrization of quartic and quintic orders in number fields, thus allowing the study of asymptotic behavior of arithmetic properties of these orders and fields.

His research also includes fundamental contributions to the representation theory of quadratic forms, to interpolation problems and p-adic analysis, to the study of ideal class groups of algebraic number fields, and to the arithmetic theory of elliptic curves.In 2010 Manjul Bhargava and Arul Shankar proved the Birch and Swinnerton-Dyer conjecture for a positive proportion of elliptic curves.

Bhargava is the second youngest full professor in Princeton University's history, after Charles Fefferman (professor at Princeton at age 22).

In addition, he was won the Morgan Prize[in 1996, a Clay 5-year Research Fellowship, the Merten M. Hasse Prize from the MAA in 2003, the Clay Research Award in 2005, and the Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics in 2005.

He was named one of Popular Science Magazine's "Brilliant 10" in November 2002. He won the SASTRA Ramanujan Prize, shared with Kannan Soundararajan, awarded by SASTRA in 2005 at Tanjavur, India, for his outstanding contributions to number theory.

In 2008, Bhargava was awarded the American Mathematical Society's Cole Prize. In 2011, Bhargava was awarded the Fermat Prize. Bhargava is also a sought-after speaker, having given numerous public lectures around the world. In 2011, he delivered the prestigious Hedrick lectures of the MAA in Lexington, Kentucky. He was also the 2011 Simons Lecturer at MIT. In 2012, Bhargava was named an inaugural recipient of the Simons Investigator Award, and became a fellow of the American Mathematical Society in its inaugural class of fellows.

Subhash Khot (born June 10, 1978) is a theoretical computer scientist and Professor of Computer Science at the Courant Institute of Mathematical Sciences at New York University. He is best known for his unique games conjecture.

Khot obtained his bachelor's degree in computer science from the Indian Institute of Technology Bombay in 1999. He received his doctorate degree in computer science from Princeton University in 2003 under the supervision of Prof. Sanjeev Arora. He has made several contributions to computational complexity and his research work is an interdisciplinary area drawing connections from optimization, computer science and mathematics.

Khot was born in India and completed his undergraduate education at IIT Bombay. In 1995 he stood first in the IIT Joint Entrance Examination. In 2010, Khot received the prestigious Alan T. Waterman Award, which recognizes an early career scientist for their outstanding contributions in their respective field. In 2005, he received the Microsoft Research New Faculty Fellowship Award.

Khot is a two time silver medalist at the International Mathematical Olympiad in the years 1994 and 1995. He gave an invited talk at the International Congress of Mathematicians in 2010, on the topic of "Mathematical Aspects of Computer Science".**He received the 2014 Rolf Nevanlinna Prize, for his work related to the Unique Games Conjecture, as well as for posing the conjecture itself.**

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

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 of mathematics". The award receives its name from the German mathematician Carl Friedrich Gauss. With its premiere in 2006, it is to be awarded every Fourth year, 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 award was so well-received at the conference and in the mathematical press that the IMU EC decided to turn the prize into a recurring four-yearly award and the award ceremony a regular feature of every ICM closing ceremony. 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 .

Simon Lehna Singh, MBE (born 19 September 1964) is a British author who has specialised in writing about mathematical and scientific topics in an accessible manner. His written works include *Fermat's Last Theorem* (in the United States titled *Fermat's Enigma: The Epic Quest to Solve the World's Greatest Mathematical Problem*), *The Code Book*[4] (about cryptography and its history), *Big Bang*[5] (about the Big Bang theory and the origins of the universe), *Trick or Treatment? Alternative Medicine on Trial*[6] (about complementary and alternative medicine) and *The Simpsons and Their Mathematical Secrets* (about mathematical ideas and theorems hidden in episodes of *The Simpsons* and *Futurama*).[7]

Singh has also produced documentaries and works for television to accompany his books, is a trustee of NESTA, the National Museum of Science and Industry and co-founded the Undergraduate Ambassadors Scheme.

Adrián Arnoldo Paenza (born in Buenos Aires, 9 May, 1949) is a journalist and PhD in mathematical sciences from the University of Buenos Aires (UBA).

He currently serves as Associate Professor of the Department of Mathematics of the Faculty of Natural Sciences.He also is a journalist and worked in the major radio stations, in all five air channels in Argentina, he was a special editor of several journals, and a contributor to the three national newspapers: Clarín, Página/12 and La Nación.His children's series "Matemáticas, estás ahí?" has been a bestseller in Argentina, other Latin American countries, and also in Germany and Spain, where they have edited the first two episodes. Also, his books have been published (or will be soon) in Russia, Italy, Czech Republic, Brazil and Portugal.

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)

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

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 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 SCHOOL

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 center 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)**

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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

Mathematical discoveries, small or great are never born of spontaneous generation. They always presuppose a soil seeded with preliminary knowledge and well prepared by labour, both conscious and unconscious.
Henri Poincare

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

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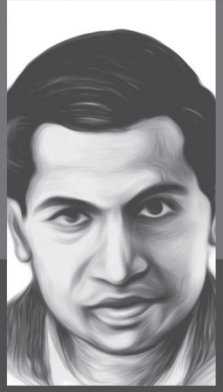

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THE MAN WHO KNEW INFINITY
A LIFE OF THE GENIUS RAMANUJAN ROBERT KANIGEL

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ISBN 9 788176 383394
9 788176 383394

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THE MAN WHO KNEW INFINITY
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കേരള ഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്

SRINIVASA RAMANUJAN
(1887 - 1920)

National Mathematics Day - 22nd December

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