Pakistan Mathematical Society

Newsletter

Pak. Math. Soc. Newsl.
Issue No. 1, Vol No. 4, 2005

EDITORIAL

All mathematical people must realize the strength and benefits of being together in their academic pursuits. First of all their should be realization on the part of mathematics educators that a student of mathematics has the right to have access to quality mathematics education and they have the right to be taught by a 'highly qualified teacher'. Mathematics educators must work together to understand power of knowledge and the effect of qualitative instructional abilities.

The reality that mathematics educators by and large need general as well as mathematical knowledge permeate the vision of a few but must still come to the forefront for others. The real understanding of the true nature of mathematics has to be inculcated in the mathematics researchers and educators. There is a danger that the indigenous production of highly qualified researcher and teachers might create a class of mathematics educators who would have a myopic view of the world in general and the mathematical world in particular. Commercialization of the education sector on the one hand and the lack of realization of the professional ethics on the other hand has the potential of breading mediocrity. This will be fatal for a nation, especially in the competent world of today. Incompetence will bread incompetence and the standards for gauging competence will change. It will destructive for the future generations of a country.

In order to understand the gravity of the problem and overcome it, we need to develop some kind of infrastructure, which can broaden the horizon of our education. Internationalization of the mathematical culture will therefore be necessary, for example, interaction through conferences, short visits, and easy access of sources of mathematical knowledge with the mathematical developed cultures.

The Pakistan Mathematical Society, within its meagre sources, is playing its role towards achieving this objective. Its quarterly newsletter supplements this effort. We hope to make it more viable and effective. To this end, we need the support of our mathematical community in general and members of the Society in particular. It is therefore expected that readers of the newsletters not only read the newsletters regularly but also contribute towards growth and development.

MATHEMATICS IN THE MEDIA

This is an online magazine posted monthly on the AMS website. Its main aim is to inform and entertain both mathematicians and interested members of the general public, by highlighting coverage of mathematics in the mainstream media. Another offering on the AMS website is the monthly Feature Column, which provides exposition about mathematical topics accessible to the general public. This fall, the AMS inaugurated a snazzy new design for both mathematics in the media and the Feature Column that makes them even more fun and easier to use. The Feature Column contains informative and interesting essays on various topics of general interest of mathematicians. These essays can be profitably read by member of the general public, as well as by mathematicians interested in broadening their horizons or finding topics to awaken their students' interest.

ABEL PRIZE FOR 2004

The Abel Prize for 2004 has been awarded to Professor Sir Michael Atiyah and Isadore Singer for their celebrated work, commonly known as 'Atiyah- Singer Index Theorem'. It connects geometry and analysis in a surprising way and their outstanding role in building new bridges between mathematics and theoretical physics. Atiyah does not call it a theorem. He prefers to call it a theory. Actually they have worked on it and all the related topics for thirty years. Mathematics is always a continuum, linked to its history, the past - nothing comes out of zero. And certainly the Index Theorem is simply a continuation of work that, I would like to say, began with Abel. So, of course, there are precursors. A theorem is never arrived at in the way that logical thought would lead you to believe or that posterity thinks. It is usually much more accidental, some chance discovery in answer to some kind of question. Eventually you can rationalize it and say that this is how it fits. Discoveries never happened as neatly as that. You can rewrite history and make it look much more logical, but actually it happens quite differently.

SIR MICHAEL ATIYAH'S VISION

The passing of mathematics onto subsequent generations is essential for the future, and this is only possible if every generation of mathematicians understands what they are doing and distills it out in such a form that it is easily understood by the next generation. Many complicated things can become simple when you have the right point of view. The first proof of something maybe very complicated, but when one understands it well, one readdresses it, and eventually one can present it in a way that makes it look much more understandable- and that's they way one passes it on to the next generation! Without that, one could never make progress. Mathematics does depend on a sufficiently good grasp, on understanding of the fundamentals so that one passes it on in as simple a way as possible to the new generations. That has been done remarkably successfully for centuries. In the 19^{th} century, people said: "There is so much mathematics, how could anyone make any progress?" Well, we generalize and put all things together, we unify by new ideas, we simplify lots of the constructions- we are very successful in mathematics and have been so for several hundred years. There in no evidence that this has stooped: in

every new generation, there are mathematicians who make enormous progress. How do they learn it all? It must be because we have been successful in communicating it.

PRODUCTION OF DOCTORATES IN THE US: SOME HIGHLIGHTS

The following information is picked from the Notices of American Mathematical Sciences.

- There were 1,041 new doctoral recipients reported for 2003-04 by departments responding in time for the 2004 First Report.

- Only 441(42%) of the new doctoral recipients for 2003-04 are U.S citizens, a decrease of 48(10%) from 200-03 and down 145(25%) from 586 in 1997-98. The percentage of new doctoral recipients who are U.S. citizen is the lowest percentage observe in the past nine years.

- Based on responses from departments alone, the fall 2004 unemployment rate for the 914 new doctoral recipients whose employment statues is known is 5.7%, up form 5.1% for fall 2003.

- Fifty-eight new doctoral recipients hold positions at the institution that granted their degree, although not necessarily in the same department. This is 7% of the new doctoral recipients who are currently known to have jobs and 9% of those who have academic positions in the U.S Nineteen new doctoral recipients have part-time positions.

- The number of new doctoral recipients employed in the U.S. is 739, up 76 from last year. The number of new doctoral recipients employed in academies positions in the U.S. increased to 614 (a nine-year high) from 534 last year (a 15% increase); there were increases in the categories of the doctoral- employing institutions (combined), but the master's and bachelor's institutions hired 2 fewer new doctoral recipients than last year.

- Of the 739 new doctoral recipients taking positions in the U.S., 99(13%) have jobs in business and industry; the number of new doctoral recipients taking jobs in business and industry, after oscillating in the late 1990s, declined three consecutive years by 38 in fall 2001, 45 in fall 2002, and 26 in fall 2003 before showing a slight increase of 2 in fall 2004. The number of new doctoral recipients taking jobs in government is down 6(19%) over fall 2003.

- Among the 739 new doctoral recipients having employment in the U.S., 338(46%) are U.S citizens (down form 376 (57%) last year). The number of non- U.S. citizens having employment in the U.S. is 401, up 40% form 287 last year.

- Among the 302 new doctoral recipients hired by U.S. doctoral granting departments, 38% are U.S. citizens (down from 52% last year). Among the 312 having other academic positions in the U.S., 53% are U.S. citizens.

- Of the 1041 new doctoral recipients, 315 (30%) are females, up just 11 from fall 2003. Of the 441 U.S. citizen new doctoral recipients, 145(33%) are females, down 12 from fall 2003. The all- time high was 187 in fall 1998.

- Among the 441 U.S. citizen new doctoral recipients, 5 are American Indian or Alaska native, 23 are Asian, 12 are Black or African American, 13 are Hispanic or Latino, 386 are whit and 2 are Native Hawaiian or Other pacific Islander.

- Three hundred and eighteen new doctorates had a dissertation in statistics/biostatistics (289) and probability (29). The next highest number was in algebra and number theory with 144. Those with dissertation in statistics/biostatistics and probability accounted for 31% of the new doctorates in 2003-04.

SEX & CITIZENSHIP OF 2003-04 NEW DOCTORAL PRECIPIENTS

Citizenship	**Total**	
	Male	Female
U.S.	279	144
Non-U.S.	429	171
Total	**726**	**315**

U.S. CITIZEN DOCTORAL RECIPIENTS

Year	Total Doctorates Granted by US Institutions	Total US Citizens Doctoral Recipients	%
1980-81	839	567	68
1985-86	755	386	51
1990-91	1061	461	43
1996-97	1158	516	45
1997-98	1216	586	48
1998-99	1133	554	49
1999-00	1119	537	48
2000-01	1008	494	49
2001-02	948	418	44
2002-03	1017	489	48
2003-04	1041	441	42

PURE MATHEMATICS CONFERENCE

The Pure Mathematics Conference is a unique event that is organized every summer. The 1st Pure Mathematics Conference 2000 was held on 8th August 2000. It was a one-day activity convened by Professor Dr Qaiser Mushatq under the auspices of the Mathematics Department, Quaid-i-Azam University, Islamabad. Dr Tariq Siddiqui, the Vice Chancellor, Quaid-i-Azam University, was the chief guest. The speakers were form amongst the Pakistani mathematicians working in the Middle East, who visit Pakistan during their vacations in summer, as well as mathematicians from Islamabad and Rewalpindi. The response was encouraging. Some 40 pure mathematicians attended the first conferences. The total expenditure was about RS 15,000 and it was sponsored by Quaid-i-Azam University, Islamabad, and the Pakistan Mathematical Society.

The 2nd Pure Mathematics Conference 2001 was held for two days form 8th to 9th August 2001 at the Best Western Hotel. This time, some 50 participants attended the conference from all over Pakistan. The Quaid-i-Azam University, Islamabad, Pakistan Science Foundation (PSF) and the Pakistan Mathematical Society were the sponsors. The total expenditure was about Rs 67,000 of which the PSF paid Rs 25,000. Dr Shahzad A.Mufti, Chairman, Pakistan Science Foundation, was the chief guest.

Allama Iqbal Open University, Islamabad on the initiative of Dr Arshad Mahmood, Chairman, Department of Mathematics, Statistics and computer Science, hosted the 3rd Pure Mathematics Conference 2002. It was held from 9th to 10th August 2002. The activity received Rs 15,000 as financial assistance from the Pakistan Science Foundation, and Rs 10,000 from the Rector, COMSATS' Institute for Information & Technology. The

rest of the support came from Allama Iqbal Open University itself. Some 40 mathematician attended the conference. Dr Hameed Ahmad Khan, Executive Director, COMSATS was the chief guest.

The 4th International Pure Mathematics Conference 2003 consisted of deliberations for two days on 8th and 9th September 2003. It was held at the Best Western Hotel. Mr Shazad Hassan Pervez, the Federal Secretary, Ministry of Science and Technology, was the chief guest on this accasion. Some 84 mathematicians participated in the conference. A financial support of Rs 50,000 was provided by Quaid-i-Azam University, Rs 220,000 was provided by the Pakistan Science Foundation, and about Rs 31,000 by the Curruntage. Two foreign delegates, namely Professor K P Shum (Hong Kong) and Professor Xiong Jincheng (China) attended the conference.

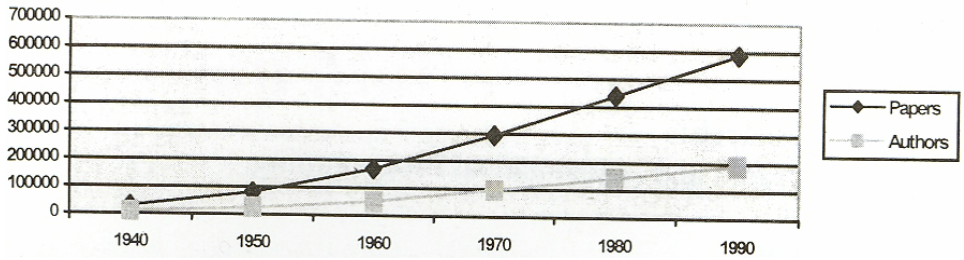
The 5th International Pure Mathematics Conference 2004 was held from 20th to 22nd August 2004 at the Best Western Hotel. Seven invited speakers, namely Professor S. Tariq Rizvi (USA), Professor Said Najati Sidki (Brazil), Professor K P Shum (Hong Kong), Professor Pawan K.Jain (India), Professor Bal Kishan Dass (India), Dr. R.S. Tyagi (India) and Professor Nanqing Ding (China) attended the conference. This is first time in the history of mathematics in Pakistan that so many invited speakers came from abroad. Some 120 mathematicians in total attended the conference. This time the chief guest was
the special Advisor to the Prime Minister and Eminent Scientist, Dr Ishfaq Ahamd Khan. The Pakistan Telecommunication Company Ltd (PTCL), the Higher Education commission (HEC), Air University and the Pakistan Mathematical Society supported the conference. The total expenditure was about Rs 851,165. The Air University hosted a lunch; HEC give Rs 150,000 and PTCL 750,000.

These conferences have provided a novel opportunity for researchers to meet and share their work. Many Ph.D. and M.Phil. students also attended the conference in order to update themselves to a level that is required to do original and better research.

The speakers consisted of experienced and reputable mathematicians working both outside and within the county. These conferences also provided an opportunity to develop collaboration in research between various mathematicians from different institutions and mathematical areas.

HOW MUCH RESEARCH IS GOING ON?

The American Mathematical Society's Mathematical Reviews (MR) currently catalogs about 86,000 published items per year that can generally be classified as research in the mathematical sciences. At the turn of the century, the database contained about 1.6 million papers (and books), produced by about 300,000 authors. The following graph



shows the growth rate of production of research papers and authors per year since MR started recording in 1940's. Not surprisingly, research productivity has increased over the years. The mean number of papers, according to AMS, within the given decade increased gradually, from 3.4 in the 1940s to 5.0 in the 199s.

The following table shows how much collaboration is going and in what branches of mathematics. According to the Mathematics Subject classification 2000, mathematics is divided into 61 branches. These branches are divided into the seven areas depicted in the following table.

Ser#	**Areas**	**Authors**
1	Science & Engineering	20%
2	Operations Research	4%
3	Computer Science	5%
4	Statistics	5%
5	Discrete Pure Mathematics	20%
6	Continuous Pure Mathematics	44%
7	Other	2%

These seven classes contain the following subjects.

Science & Engineering:
Mechanics of Particles & Systems, Mechanics of Solids, Fluid Mechanics, Optics & Electromagnetic Theory, Class, Thermodynamics, Heat Transfer, Quantum Theory, Statics, Mechanics, Structure of Matter, Relativity & Gravitational Theory, Astronomy & Astrophysics, Geophysics, Biology & other Natural Sciences.

Operations Research:
Operations Research and Mathematical Programming.

Computer science:
Computer science, Information, Circuits & Communication.

Statistics:
Statistics.

Discrete Pure Mathematics:
Logic, Set Theory & Foundation, Combinatorics, Order Lattices, Ordered Algebraic Structures, General Algebraic Systems, Number Theory, Field Theory & Polynomials, Commutative Rings & Algebra, Algebraic Geometry, Linear, Multilinear Algebra & Matrix Theory, Non-associative Ring & Algebras, Category Theory & Homological Algebra, K-theory, Group Theory & Generalizations, Geometry, Convex & Discrete Geometry.

Continuous Pure Mathematics:
Topological Groups & Lie Algebras, Real Functions, Measure & Integration, Functions of Complex Variables, Potential Theory, Several Complex Variables & Analytical Spaces, Special Functions, Ordinary Differential Equations, Difference & Functional Equations, Sequences, Series, Summations, Approx & Exponentials, Fourier Analysis, Abstract Harmonic Analysis, Integral Transformations, Operator Calculus, Integral Equations, Functional Analysis, Operator Theory, Calculus of Variations, Optimal Control, Differential Geometry, General Topology, Algebraic Topology, Manifolds and Cell Complexes, Global Analysis & Analysis on Manifolds, Probability Theory & Stochastic Procedures, Numerical Analysis

Other:
General History & Biography. (Courtesy AMS Notices)