INDIAN STATISTICAL INSTITUTE

Annual Report

April 2008 – March 2009

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(http//www.isical.ac.in)

INDIAN STATISTICAL INSTITUTE
SEVENTY SEVENTH ANNUAL REPORT
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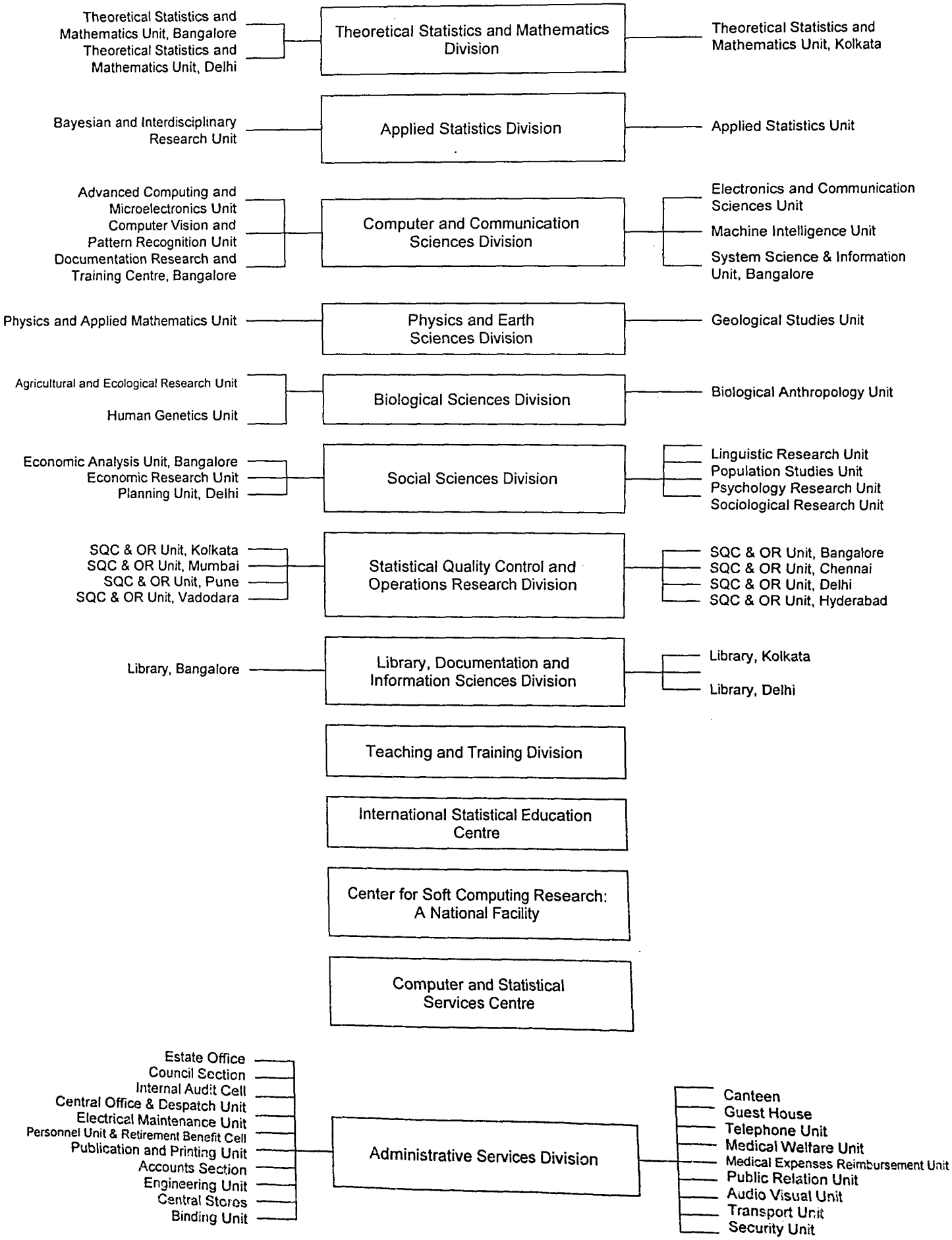
Organization of ISI by Divisions and Constituent Units



Director's Report

It is my proud privilege and pleasure to present the annual report of the Institute for the year 2008-09, which happens to be the fourth one after I assumed the post of the Director of the Institute on August 1, 2005. The Institute has its headquarters in Kolkata and three other centers at Delhi, Bangalore and Chennai besides a branch (field station) at Giridih and a network of service units under the Statistical Quality Control and Operations Research Division across the major cities in the country like Mumbai, Hyderabad, Pune and Vadodara.

True to the tradition of the Institute, a number of prestigious awards and honors have been received by some of our scientists in the last year for significant contributions in their respective fields. I mention a few of them: Prof. Arup Bose of the Stat-Math Unit of Kolkata and Prof. R.B. Bapat of the Stat-Math Unit of the Delhi Center have received the prestigious J.C. Bose Fellowship of the Government of India. Prof. Bidyut Baran Chowdhury of Computer Vision and Pattern Recognition Unit and Prof. Probal Chaudhuri of the Stat-Math Unit of Kolkata have been elected Fellows of the Indian National Science Academy. Prof. Ayanendranath Basu of Bayesian and Interdisciplinary Research Unit and Prof. Sushmita Mitra of Machine Intelligence Unit have been elected Fellows of the National Academy of Sciences, India, while Prof. Bhabatosh Chanda of Electronics and Communication Sciences Unit has been elected a Fellow of the International Association for Pattern Recognition (IAPR). Prof. Dilip Saha of Geological Studies Unit has been awarded the Mineral Award by the Ministry of Mines, Government of India, while Prof. Bhargab Bikram Bhattacharyya has received the Techno Mentor Award from the India Semiconductor Association. Among the young colleagues, Dr. Siva Atreya of the Stat-Math Unit of the Bangalore Center has received the Homi Bhaba Fellowsjhip and also the Scopus Young Scientist Award. Dr. Krishanu Maulik of the Stat-Math Unit of Kolkata bacame an Associate of the Indian Academy of Sciences. The Institute is proud of their achievements.

Apart from conducting high quality research by its faculty, the Institute is also renowned for a number of academic courses that are at par with the best in the world. These courses are updated from time to time along with introduction of new programs to cater to the needs of the students and the nation. In tune with this, a two-year Master degree program in Library and Information Science (MS (LIS)) has commenced at the Bangalore Center from the academic session of 2008. This will widen the opportunities available to the graduating students with respect to job markets, as well as for pursuing higher studies. In line with the 15-year vision document, the Institute has started a new Ph.D. program in Quality, Reliability and Operations Research, and Junior Research Fellows for this program are going to join from the academic session of 2009. This makes the activity in the discipline more academically oriented and focused, and will increase the number of disciplines to five, in which the Institute can offer PhD degree. The Institute has also decided to accommodate PhD theses in Applied Mathematics for awarding degree in Mathematics. In line with the vision documents, the Institute has opened a new unit called *"System Science and Informatics Unit (SSIU)"* in the Bangalore center. The activity of this new unit in conjunction with those of the DRTC, Stat-Math Unit and SQC-OR Unit, Bangalore would enrich the domain of research of the Institute, in general, and the Computer and Communication Sciences Division, in particular.

The "Center for Soft Computing Research: A National Facility" as funded by the Department of Science & Technology, Government of India under its IRHPA program, has been accorded the status of an Affiliated Institution of ISI by its Governing Council in accordance of the provision of sub-clause 14.1 of the Memorandum of Association of ISI. Among the new externally funded projects, that have come to the Institute last year, the project titled "Designing and studying mode of action and biosafety of nano-pesticides", funded by the Indian Council of Agricultural Research (ICAR), is the notable one in terms of subject area and research component. The major part of this project will be conducted at the Giridih branch of the Institute with Indian Agricultural Research Institute (IARI), New Delhi as consortium partner.

Regarding the development of ISI Giridih, Section 8(i) committee in a recent meeting examined the short term and long-term proposals for its development towards a full-fledged research and training

center offering degrees in Agricultural Statistics, providing consultancy on Statistical Quality Control, and undertaking externally funded research projects, among other activities. A small committee is further constituted to examine the proposals for finalization. The same committee will also examine the proposal of the Takdah Center for its possible development.

I am happy to inform that the council in its meeting held on 29th October, 2008 decided to introduce four Ph.D.-D.Sc. Committees in Statistics, Mathematics, Computer Science and Quantitative Economics instead of one Ph.D.-D.Sc. Committee. The council decision has also been approved by the Govt. of India and accepted by the Registrar of Firms, Societies & Non-Trading Corporations, West Bengal. This will facilitate independent functioning of the Ph.D.- D.Sc. Committees in the respective disciplines.

I am also glad to announce that the first issues of both series *Sankhyā* A and *Sankhyā* B, vol. 70, 2008 are available online. Next issues are also in the pipeline along with the correction for backlogs. A Co-publishing agreement for this journal with Springer Verlag, Heidelberg, has been made with the approval of the Council and our Administrative Ministry. This collaboration will definitely enhance the visibility of the journal to researchers in other disciplines too. As a part of the co-publishing agreement, *Sankhyā* will have a fully electronic editorial management system.

In connection with the Celebration of Platinum Jubilee of the Institute, as you know, the World Scientific Press, Singapore is in the process of bringing out a series of comprehensive volumes in different subjects, reflecting the significant contributions of ISI researchers, under the title "Statistical Science and Interdisciplinary Research". Among them eight books have already been published, and four are in press.

Three landmark achievements that the Institute had last year are:

1. Upgradation of the Chennai unit of ISI to a Center status as in Delhi and Bangalore.

2. Enhancement of retirement age of faculty members from 62 to 65, and most importantly.

3. Upgrading the pay scales of Assistant Professor, Associate Professor and Professor by de-linking from the present UGC pay scale structure and bringing them at par with those in the Indian Institute of Science (IISc), Bangalore subject to the modification of the recruitment rules at par with them.

Our Hon'ble Prime Minister, during his speech in the inaugural ceremony of Platinum Jubilee celebration of the Institute on Dec 24, 2006, mentioned the significance of statistical science in terms of research and teaching in national scenario and acknowledged the notable contributions of the Institute to economic planning in India both directly and through its large population of alumni. The need of such expertise in private industry and commerce is also increasing because of the emerging growth of IT industry and other public and private sectors. The outcome of these concepts was also reflected in the 15-year vision document and in the 10-year perspective plan of the Institute.

In tune with the aforesaid thought, the Institute upgraded the existing SQC & OR unit of ISI in Chennai to a full-fledged Center like those in Delhi and Bangalore for expanding its activities. The inaugural ceremony of the Opening of the Center was held on July 26, 2008 in the presence of Shri Pranab Mukherjee, Hon'ble Minister of External Affairs, Govt. of India, and Chairman of ISI Governing Council, Shri G.K. Vasan, Hon'ble Minister in Charge, Statistics & Program Implementation, Govt. of India and Dr. Pronab Sen, Chief Statistician of India and Secretary, Ministry of Statistics & Program Implementation, Govt. of India. The center started functioning, as per the Council decision, from the existing premises of the Institute and will continue until suitable land is obtained. The focus of the center is initially on teaching and research activities mostly on the *applied aspects* of different disciplines like Statistics, SQC & OR, Economics, Mathematics and Computer Science, which will work synergistically for the growth of each other.

I believe, the strong quantitative and mathematical ground of the educational system in the state of Tamil Nadu with many national institutes of excellence like Madras Institutes of Development studies, Madras School of Economics, Institute of Mathematical Sciences, and Indian Institute of Technology will help growing this ISI center in synergy.

It may be mentioned here that this is the 3rd center of ISI after Delhi and Bangalore. The Delhi center with multi-disciplinary activities was started in December 1974 and the Bangalore Center was started in 1978, though its formal status as Center came in September 1996.

Since our 5 acres of land, given by the Govt. of Tamil Nadu in 1969, has been occupied by local dwellers and the same could not be recovered by ISI, we have requested our Ministry to take initiative, as per the Council decision, to procure an alternative piece of land from the Govt. of Tamil Nadu as expeditiously as possible.

For good research output, one needs mainly good faculty and good academic environment. For attracting bright and scholastic minds as faculty, we need to provide competitive salary and other opportunities at par with the other national institutes of similar stature. Accordingly, the issue of up-gradation of the present structure of faculty pay scales to those of Indian Institute of Science, Bangalore was initiated from Sec 8(i) meeting in Dec 2005 under the Chairmanship of late Dr. A.P. Mitra. I am pleased to mention that the cabinet has approved recently our long-standing desire, and the Council has approved the implementation of the said up-gradation for Assistant Professors, Associate Professors and Professors from February 22, 2009.

The Cabinet of Govt. of India has also approved the enhancement of retirement age of ISI faculty members from 62 to 65 with effect from September 1, 2008 keeping analogy with other comparable premier Institutes and central universities in the country. These two decisions will certainly help the Institute to be in a much favourable position to compete with other national premier Institutes of excellence. The first decision will enable us in retaining the excellent and experienced teachers or scientists for a longer period, while the second decision will help us in attracting young scholastic minds to join as new faculty. In this endeavor the Institute acknowledges the strong support given by the Administrative Ministry, in general, and our Hon'ble Chairman, Shri Pranab Mukherjee, in particular; without which it would have been extremely difficult to achieve.

With these two achievements, now it is up to the different units to provide healthy and competitive academic environment and to increase the quality research output.

Among other important things, 6th Pay Commission report has been implemented for the non-faculty. UGC revised pay scales for faculty and equivalents, wherever applicable, and librarians were in the process of implementation. Faculty promotion review process effective from June 2009 has started. Recruitment of new faculty continues to have high priority. Enhancement of regular fellowships and special fellowships for our Junior and Senior Research Fellows (JRFs and SRFs) has been made as per CSIR norm, with the approval of our administrative ministry. Preparatory work for celebrating the Diamond Jubilee of the ISEC in a befitting manner has started.

Construction of the Platinum Jubilee Academic building and Subway between the main and north campuses in Kolkata, and the Auditorium in Bangalore, which were started as a part of the infrastructural development under Platinum Jubilee celebration program, are almost completed. A part of the hostel in Delhi is complete and is being used by students. Other construction work initiated similarly, viz., the ISEC Center in Kolkata is in full swing.

The Institute is in the process of implementing its perspective plan effectively both from academic and administrative points of view. With implementation of the 6th pay commission and new faculty pay structure, I earnestly request the fullest cooperation from all workers, scientific and non-scientific, of

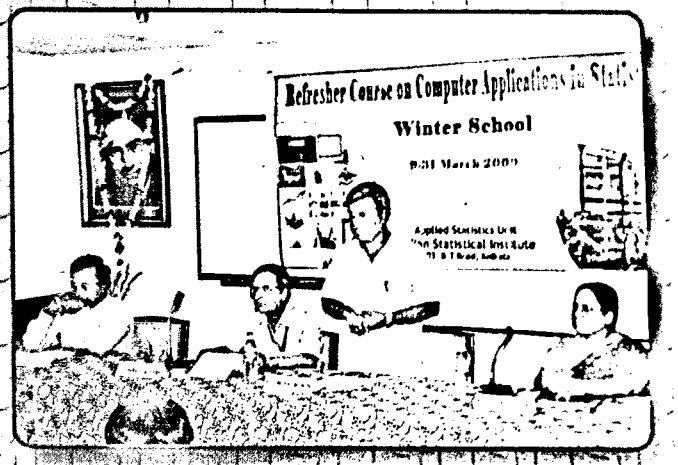
our different campuses in their respective domains of activity to fulfill the mission. There is also an urgent need to adapt our work culture to the rapid advances in technology in the current scenario of globalization and knowledge explosion.

I am extremely grateful to Prof. M.G.K. Menon, President of the Institute, and to Shri Pranab Mukherjee, Chairman of the Institute and Hon'ble Minister of Finance, Government of India for their valuable advice at various stages for the smooth functioning of the Institute. I thank Dr. Pronab Sen, Chief Statistician of India; the officials of the Ministry of Statistics & Programme Implementation, Government of India; and the members of the Section 8(I) Committee and the ISI Council for their support; and last, but not the least, all the workers of the Institute for their cooperation in respective sectors.

March 31, 2009

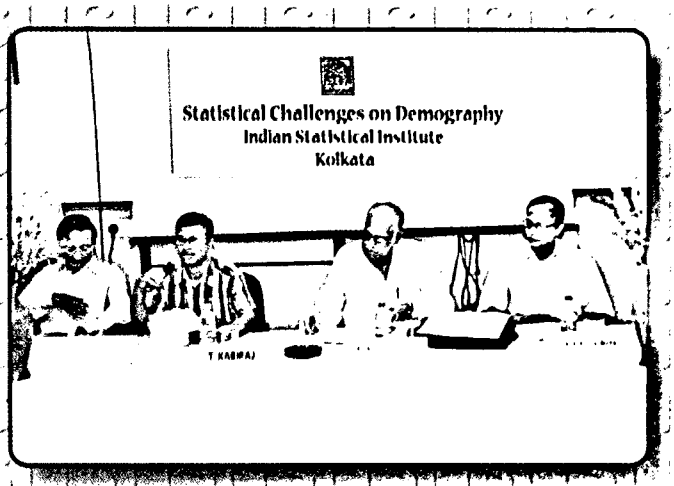
Sankar K. Pal

Address by Shri Debesh Das, Hon'ble Minister-in-charge, Deptt. of Information Technology, Govt. of West Bengal at The 7th International Conference on Advances in Pattern Recognition, 3-6 February, 2009

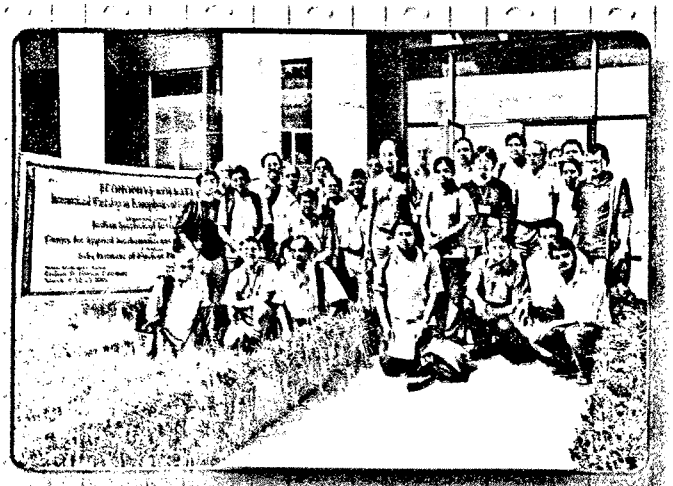


Valedictory session of Refersher Coruse on Computer Applications in Statistics - Winter School, 9-31 March 2009

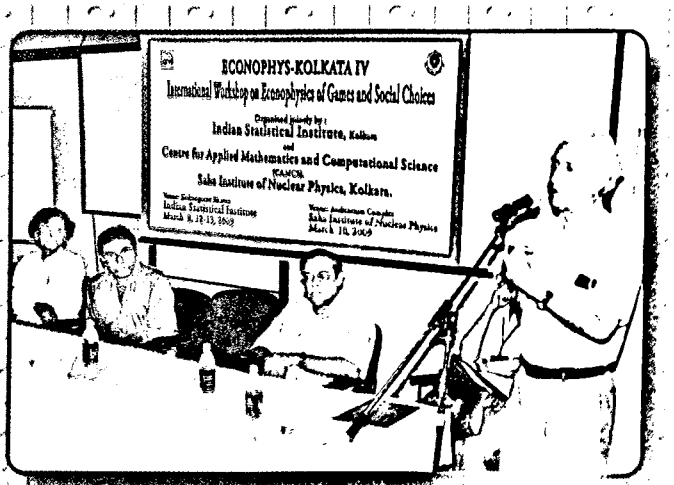
Workshop on Psycho-social Support for Disaster Survivors, 30 March 2009



Seminar on Statistical Challenges on Demography, 04 July, 2008



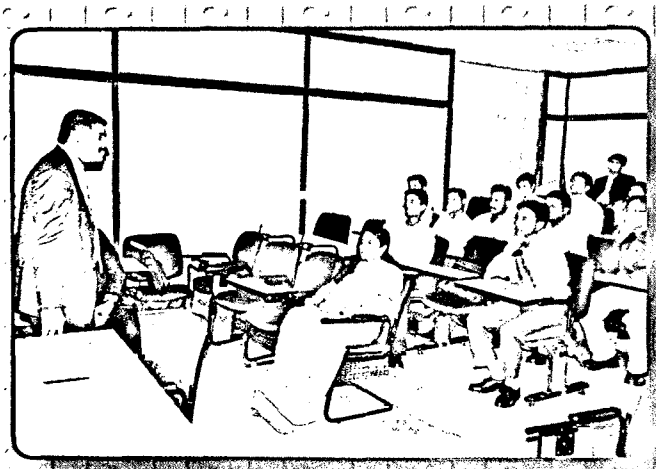
Group photo at the International Workshop on Econophysics of Games and Social Choices, 9, 12-13 March, 2009



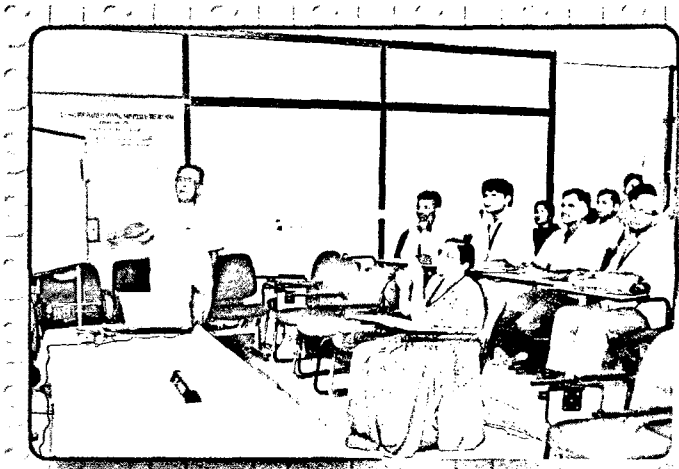
International Workshop on Econophysics of Games and Social Choices, 9, 12-13 March, 2009

"Launch Workshop" of National Agricultural Innovative Project (NAIP), 16 March, 2009

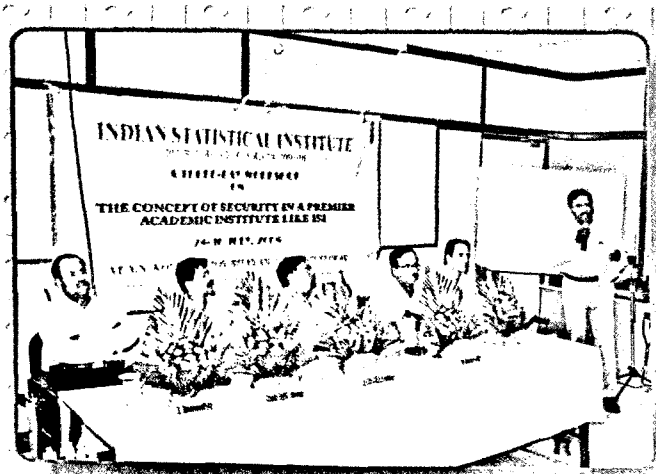
Shri Pranab Mukherjee, Hon'ble Minister for External Affairs, Govt. of India, Chairman, ISI Council at ISI Delhi centre, 29 October, 2008



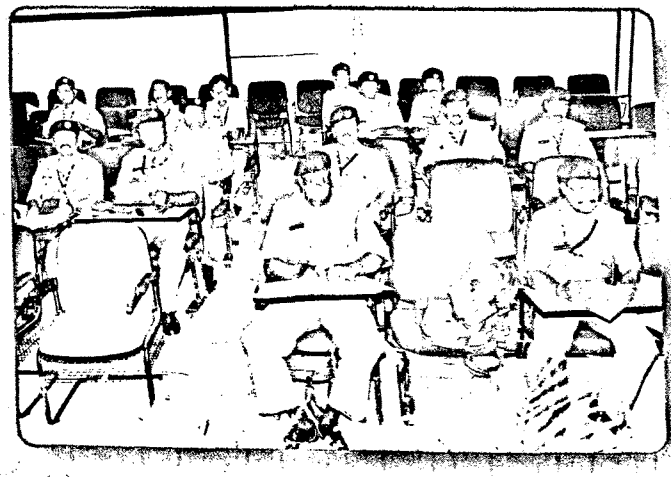
Placement workshop, 19 August, 2008



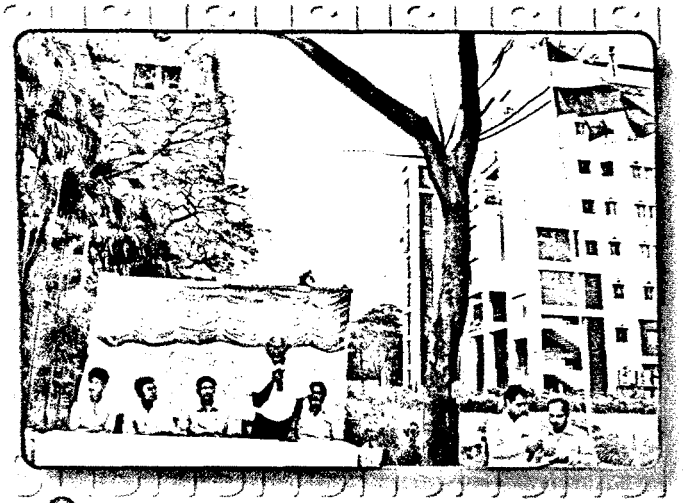
Workshop on Data Mining and Data Warehousing, 15-20 September, 2008



Workshop on The concept of security in a premier academic institute like ISI, 28-30 July, 2008



Workshop on The concept of security in a premier academic institute like ISI, 28-30, 2008



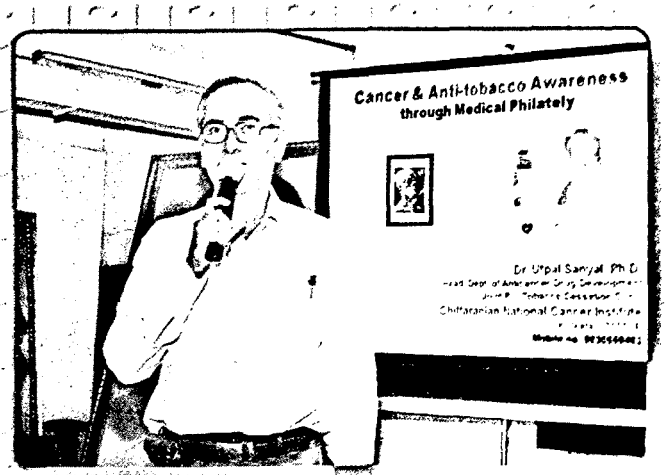
Independence day celebration - 15 August, 2008

115th Birth Anniversary Celebration of Professor P. C. Mahalanobis, 29 June, 2008

Annual Convocation of the Institute, 24 March, 2009

Annual Convocation of the Institute, 24 March, 2009

Blood donation camp, organised by ISI club, 15 May, 2008



Seminar on Cancer & Anti-tobacco Awareness through Medical Philately, organised by ISI Club, 24 February, 2009

Annual Sports - organised by ISI Club, 13 February, 2009

Annual Sports - organised by ISI Club, 13 February, 2009

Republic Day Celebration, 26 January, 2009

Republic Day Celebration, 26 January, 2009

Audio Drama - organised by ISI Club, 01 April, 2008

Dance Movement Therapy for Trauma Survivors in India and USA - organised by Psychology Research Unit, 09 January, 2009

A BRIEF HISTORY OF THE INSTITUTE

In the 1920's, Prasanta Chandra Mahalanobis, then a Professor at Presidency College, Calcutta conducted several studies employing statistical methods with results that vindicated his ideas about the efficacy and possibilities of the emerging science of Statistics. In a meeting on 17th December 1931 presided by Sir R. N. Mukherjee, the first President of the Institute, the Indian Statistical Institute (ISI) was formally established and Prasanta Chandra Mahalanobis was appointed the honorary Secretary. The Indian Statistical Institute was registered on 28th April, 1932, as a non-government and non-profit distributing learned society under the Societies' Registration Act No. XXI of 1860. The Institute is now registered under the West Bengal Societies Registration Act XXVI of 1961, amended in 1964. It has the following objectives:

(i) To promote the study and dissemination of knowledge of Statistics, to develop statistical theory and methods, and their use in research and practical applications generally, with special reference to problems of planning for national development and social welfare;

(ii) To undertake research in various fields of natural and social sciences with a view to the mutual development of Statistics and these sciences;

(iii) To provide for, and undertake, the collection of information, investigations, projects, and operational research for purposes of planning and the improvement of efficiency of management and production.

(iv) To undertake any other ancillary activities in fulfillment of the objectives (i), (ii) and (iii).

The Institute started functioning initially from a room of the Presidency College with enduring support from a number of distinguished personalities and devoted scholars in Kolkata. Over the first two decades, which turned out to be a glorious chapter in the annals of Indian science and institution building, the ISI embarked upon a series of pioneering programmes involving the application of Statistics in search of solution of the urgent and live problems of the country. Such programmes included innovative projects on sample surveys of yield and land utilisation of crops, socio-economic after-effects of Bengal famine and problems of flood research. These innovations and methodological research have since become classics in Statistics. At the same time, the training of scientific personnel began to grow. This also encouraged high level research and brought into focus the need for publication of the research results, for which *Sankhyā* , the first international journal of the country in Statistics, came into being in 1933.

Apart from the impact made in the world of Statistics, earning for the Institute the patronage of Sir Ronald A. Fisher, the brilliant choice of the area of surveys, their social and national relevance held secured the Institute to a pivotal place in the task of nation-building when India became independent. Led by Professor Mahalanobis and a very able group of younger statisticians including R.C. Bose, S. N. Roy and C. R. Rao, the Institute was poised to take on the larger role. The institute is proud to have C.R. Rao, who is among the world leaders in statistical science over the last six decades and still active at the age of 88 as the Director of the Center for Multivariate Analysis at Pennsylvania State University, USA, in its list of alumni.

The 1950s saw the Institute establishing (i) a full fledged research and training school in Statistics and Probability, with its application in natural and social sciences, (ii) a planning wing entrusted with the formulation of the Second Five-Year Plan of India, (iii) publication of Sankhya, (iv) the National Sample Survey wing engaging in comprehensive socio-economic data collection for the nation, (v) a string of Statistical Quality Control units for promoting the quality movement at various industrial centres in the country, (vi) a collaboration with the International Statistical Institute to train Government statisticians from Asia and Africa, and (vii) an Electronic Computer Laboratory that was responsible for developing (a) the 1st mechanical hand computing machine, (b) the 1st Analog computer, (c) the 1st Punched Card storing machine and (d) the 1st Solid State Computer in India, to name some of the

principal activities. In 1954 Pandit Jawaharlal Nehru, the then Prime Minister of India, entrusted Professor Mahalanobis and ISI with the responsibility of preparing the draft Second Five-Year Plan for the country. The draft submitted by Prasanta Chandra Mahalanobis and the planning models formulated by him and his colleagues have since been regarded as major contributions to economic planning in India. In 1956, the Institute installed the first electronic computer in the country. In 1961, the ISI, in collaboration with Jadavpur University, undertook the design, development and fabrication of a fully transistorized digital computer, called ISI-JU-1, which was commissioned in 1966. The Institute, from its formative period till present times, received as guests eminent scientists, some of whom were Nobel Laureates. Besides Ronald A. Fisher, J.B.S. Haldane and Walter A. Shewhart, the luminaries included Frederic and Irene Curie, Neils Bohr, A.N. Kolmogorov, P.M.S. Blackett, J.D. Bernal, Joan Robinson and Genedi Taguchi. In recent times, the visit of Amartya K. Sen, Robert Aumann, Lotfi A. Zadeh and S.R.S. Varadhan, 2007 Abel Prize winner for his contributions to probability theory and an alumnus of the institute, may be specially mentioned.

The formal recognition came in December 1959, when Pandit Jawaharlal Nehru piloted in the Parliament the enactment of the Indian Statistical Institute Act of 1959, which designated ISI as an 'Institution of national importance'. The activities steadily grew, existing interests became more broad-based and a number of science units were created in the interest of live interaction between Statistics and Natural and Social Sciences. Empowered by the Act to award degrees, the Institute started the B.Stat. and M.Stat. courses. An excellent library was founded at Kolkata and the Documentation Research and Training Centre began functioning in Bangalore. Other developments in infrastructure also began.

During 1971-72, two decisions of the Government of India produced serious repercussions on the functioning of the ISI. One was de-linking of the Institute from the Perspective Planning Division of the Planning Commission in 1971, while the other was the separation of National Sample Survey from the ISI and its take-over by the Central Government in 1972. Professor Mahalanobis passed away on 28th June, 1972. It was a critical period for the Institute. To overcome the problem, the ISI sought to strike a judicious balance between the individual academic work on truly fundamental problems and the work that called for a greater engagement with the social and economic problems of the country. The members of the Institute, under the Chairmanship of Shri P. N. Haksar, held a Special General Body Meeting on 26th July, 1974 and amended the Memorandum of Association and the Regulations of the Institute, encouraging more inter-disciplinary research and enhancing active participation of the scientists of the ISI in decision-making process of the Institute. The organisational amendments were implemented, with the concurrence of Government of India, in August, 1976. The various research units in natural, social and computer sciences were grouped under a number of scientific Divisions. The present structure of eight divisions has been arrived at through some further changes. Over the next two decades diversity in research thrusts began to grow manifold, with emphasis on Computer Science and application of Statistics in the new areas of research in natural and social sciences and the creation of the two centres at Delhi and Bangalore with full-fledged research and teaching programmes. The newly created Chennai centre of the Institute, which came into being on 26th July, 2008, is also expected to focus on such diversity of research. The Indian Statistical Institute Act of 1959 was amended by the Parliament in 1995 to empower the Institute to award Degrees/Diplomas not only in Statistics, but also in Mathematics, Quantitative Economics, Computer Science and such other subjects related to Statistics as may be determined by the Institute from time to time. Several new courses have also been added since: M. Tech. in Computer Science, M.Tech. in Quality, Reliability and Operations Research, M.S. in Quantitative Economics, B. Math. and M. Math.

In conclusion, a list of the distinguished scientists and statesmen who have served the Institute during the 77 years of its existence in the capacities of President, Chairman or Director is presented. A list of recipients of the honorary D.Sc. degree given by the Institute is also provided.

Presidents of the Institute

1	Sir Rajendra Nath Mookerjee	1932-35
2	Shri E. C. Benthall	1936-37
3	Shri James Reid-Kay	1938
4	Shri Badridas Goenka	1939-41
5	Dr. Nalini Ranjan Sarkar	1942-43
6	Dr. Chintaman D. Deshmukh	1944-1963
7	Shri Y. B. Chavan	1964-66
8	Prof. Satyendra Nath Bose	1967-75
9	Shri Subimal Dutt	1976-89
10	Prof. M.G.K. Menon	1990-till date

Chairmen of the Institute

1	Shri B. Rama Rao	1954
2	Shri D. N. Mitra	1955-63
3	Shri K. P. S. Menon	1964-70
4	Shri S. C. Roy	1971
5	Dr. Atma Ram	1972
6	Shri. P. N. Haksar	1973-97
7	Dr. Bimal Jalan	1998-2001
8	Dr. N. R. Madhava Menon	2002-03
9	Shri Pranab Mukherjee	2004-till date

Directors of the Institute

1	Prof. P. C. Mahalanobis	Dec	1931	-	June	1972
2	Prof. C. R. Rao	July	1972	-	June	1976
3	Prof. G. Kallianpur	July	1976	-	Sept	1978
4	Prof. B. P. Adhikari	Aug	1979	-	Oct	1983
5	Prof. Ashok Maitra	April	1984	-	Jan	1987
6	Prof. J. K. Ghosh	Jan	1987	-	Jan	1992
7	Prof. B. L. S. Prakasa Rao	Jun	1992	-	Feb	1995
8	Prof. S. B. Rao	July	1995	-	July	2000
9	Prof. K. B. Sinha	Aug	2000	-	July	2005
10	Prof. S. K. Pal	Aug	2005	-	Till date	

List of persons awarded the D.Sc. (Honoris Causa) by the Institute

February 1962	Prof. Satyendra Nath Bose, Prof. Ronald A. Fisher, Pandit Jawaharlal Nehru, Dr. Walter A. Shewhart
April 1962	Prof. A. N. Kolmogorov
May 1965	Dr. Chintaman Dwarkanath Deshmukh
December 1974	Prof. Raj Chandra Bose, Dr. M. V. Keldysh, Prof. Jerzy Neyman
February 1977	Prof. Harald Cramer
February 1978	Shri Morarji Desai, Prof. L. V. Kantorovich
December 1989	Prof. C. R. Rao
January 2001	Prof. Gopinath Kallianpur
February 2004	Prof. S. R. Srinivasa Varadhan
March 2006	Prof. L. A. Zadeh
December 2006	Dr. Manmohan Singh

1. TEACHING AND TRAINING

A brief account of teaching and training activities of the Teaching and Training Division during the academic session 2008-2009 is given below.

Degree, Associateship and Training Courses

During the academic session 2008-2009 a total of 7360 candidates applied for admission and were called for written selection tests for various courses offered by the Institute, viz., B. Stat. (Hons.), B. Math. (Hons.), M. Stat., M. Math., Master of Science (M.S.) in Quantitative Economics, M. Tech. in Computer Science, M. Tech. in Quality, Reliability and Operations Research, M.S. in library and Information Science, Research Fellowships in Statistics, Mathematics, Quantitative Economics, Computer Sciences, Biological Anthropology, Physics and Applied Mathematics, Sociology, Geology, Agriculture & Ecology, Psychology, Human Genetics, Demography and Library and Information Science. Admission tests were conducted at 22 different centres all over the country. A total of 5700 candidates finally appeared for admission tests and a total of 594 candidates qualified in the written tests, and were called for interviews. Based on the performance in the written tests, interview and the academic records, 266 candidates were offered admission to various courses during the academic session under review.

The annual examinations for all the regular courses during 2007-2008 academic session were held during May 2008. The 2008-09 academic session commenced on 14.7.2008.

The number of candidates admitted to the different degree programmes and in Junior Research Fellowship during 2008-2009 and the number of students passed the annual examinations in 2008, are given in Table 1.

Till 31st March, 2009, 270 trainees of Engineering and Technology courses from various Universities/Institutions (A. K. Choudhury School of Information Technology, Ajay Kumar Garg Engineering College - Gaziabad, B. P. Poddar Institute of Management and Technology, Banaras Hindu University, Banasthali Vidyapith – Rajasthan, Bangabasi College, Barrackpore Rastraguru Surendranath College, Bengal Engineering & Science University- Shibpur, Bengal Institute of Technology, Bharath Institute of Science & Technology - Chennai, Birbhum Institute of Engineering & Technology, College of Engineering & Management – Kolaghat, Department of Geological Sciences - Jadavpur University, Dr. D. Y. Patil Institute for Biotechnology & Bioinformatics – Mumbai, Dumkal Institute of Ingineering & Technology, Durgapur Institute of Advanced Technology & Management, Forest Research Institute - Dehradun, Globsyn Business School, Haldia Institute of Technology, Heritage Institute of Technology, Hooghly Engineering & Technology College, Indian Institute of Technology – Kanpur, Indian Institute of Technology - Kharagpur, Indian Institute of Technology - Mumbai, Indian Institute of Technology – Guwahati, Indian School of Mines University - Dhanbad, Indian School of Mines - Dhanbad, Indira Gandhi National Open University, Institute of Engineering & Management Trust, Institute of Engineering & Management - Salt Lake, Institute of Post-Graduate Medical Education and Research, Institute of Radio Physics & Electronics, Integral University – Lucknow, Jadavpur University, Kalinga Institute of Industrial Technology, Kalyani Government Engineering College, Manipal Institute of Technology, MCKV Institute of Engineering, Narula Institute of Technology, National Institute of Cholera and Enteric Diseases, National Institute of Technology - Durgapur, National Institute of Technology- Tiruchirapalli, Netaji Subhas Engineering College, NIT-Rourkela, Oriental Institute of Science and Technology, Pailan College of Management & Technology, RCC Institute of Information Technology, Ramakrishna Misson Vidyamandir - Belur Math, Rashtriya Sanskrit Vidyapeetha - Tirupati, Saroj Mohan Institute of Technology, Seacom Engineering College, Sikkim-Manipal Institute of Technology, St. Thomas' College of Engineering & Technology, Symbiosis Institute of Geoinformatics – Pune, Techno India, Techno India College of Technology, University College of Technology, University Institute of Technology - Burdwan University, University of Calcutta, University of Hyderabad, University of Kalyani, University Science Instrumentation Centre, Vellore Institute of Technology, Vidyasagar University- Midnapore, Visva-Bharati – Santiniketan, VIT University, West Bengal University of Technology- Salt Lake.) received two weeks/six weeks/two

months/three months/four months and six months Project training in different Units of the Institute, viz., ACMU, AERU, ASU, BAU, BIRU, CSSC, CVPRU, DEAN'S OFFICE, ECSU, ERU, GSU, LRU, MIU, PSU, PRU and SQC & OR under the guidance of different faculty of the Institute.

Convocation

The 43rd Convocation of the Indian Statistical Institute was held on 24th March, 2009, at 3.30 P.M. It was started with Vedic Hymn by ISI Club, followed by a welcome address by Prof. M.G.K. Menon, President, ISI, and annual review by Prof. Sankar K. Pal, Director, ISI. The degrees and associateships were awarded to students by Prof. M.G.K. Menon, President, ISI. This was followed by a Convocation Address by Prof. Mriganka Sur, Massachusetts Institute of Technology, USA. The Convocation was closed by Prof. M.G.K. Menon, President, ISI, after a vote of thanks by Dr. Aditya Bagchi, Dean of Studies, ISI, and National Anthem by ISI Club.

The Gold Medal for ***Mahalanobis International Symposium on Statistics*** for ***M.Stat*** students was given to:

Anirban Bhattacharya

ISI Alumni Association ***Mrs. M.R. Iyer Memorial Medals*** for outstanding performances were given to:

***B. Stat. (Hons.)*:**	Sanchayan Sen	***M. Stat.*:**	Sharmodeep Bhattacharyya
***M. S. (QE)*:**	Kaustav Das	***M. Tech. (QR & OR)*:**	Saddam Hossain

ISI Alumni Association ***Rashi Ray Memorial Medals*** for outstanding performance in ***M. Tech. (CS)*** was given to:

Megha Sangtani

ISI Alumni Association ***P.C. Panesar Gold Medal*** for outstanding performance in ***M. Math.*** was given to:

Neena Gupta

Sunity Kumar Pal Gold Medal for best dissertation in ***M. Tech. (CS)*** was given to:

Tapas Pandit

S.H. Arvind Gold Medal for outstanding performance in ***B. Math. (Hons.)*** was given to:

Thatte Vaidehee Madhav

Professor J.M. Sengupta Gold Medal for outstanding performance in ***B. Stat. (Hons.)*** was given to:

Sanchayan Sen

TCS award for best application oriented dissertation in ***M. Tech. (CS)- II yr.*** was given to:

Onkar Nath Tiwari

TCS award for best dissertation in ***M. Tech. (QR & OR)- II yr.*** was given to:

Saddam Hossain

TCS award for best project work in ***M. Stat.- II yr.*** was given to:

T.S. Vignesh

Table 1

Number of students passed during 2008 and number of existing students/fellows during 2008-2009.

Sl. No.	Courses		Number of Students	
			Passed in the Annual Exam. in 2008	During the year 2008-09
01.	**B.Stat. (Hons.)**	1st year	09	44
		2nd year	26	09
		3rd year	34	26
02.	**B.Math. (Hons.)**	1st year	11	02
		2nd year	11	11
		3rd year	07	12
03.	**M.Math.**	1st year	06	07
		2nd year	07	06
04.	**M.Stat.**	1st year	35	55
		2nd year	51	35
05.	**M.Stat. (Applications)**	1st year	13	-
		2nd year	-	13
06.	**M.S. (QE)**	1st year	33*(18+15)	40*(23+17)
		2nd year	26	34*(19+15)
07.	**M.Tech. (CS)**	1st year	27	16
		2nd year	19	27
08.	**M.Tech. (QROR)**	1st year	09	04
		2nd year	19	09
09.	**M.S. (Library & Information Science)**	1st year	-	07
		2nd year	-	-
10.	**Junior & Senior Research fellows & Research Associates**		12	106
11.	**Associateship in Documentation & Information Science (Bangalore)**	1st year	05	-
		2nd year	07	05
Grand Total			**367**	**468**

* Total number, including Kolkata and Delhi.

Table 2

Ph.D. Degree awarded by the Institute in the 43rd Convocation held on 24th March, 2008

Sl. No	Name of the Fellow	Title of the Thesis	Subject	University /Institute	Name of the Supervisor(s)
1.	Debabrata Mukhopadhyay, M. Sc. (Economics) (University of Calcutta)	Predictability in the Indian Stock Market: A Study from an Econometric Perspective	Quantitative Economics	ISI	Prof. Nityananda Sarkar, ERU, ISI, Kolkata
2.	Gautam Kumar Das, M. Tech. (CS) (Indian Statistical Institute)	Placement and Range Assignment in Power-Aware Radio Networks	Computer Science	ISI	Prof. Subhas Chandra Nandy, ACMU, ISI, Kolkata.

Teaching and Training

3.	Bibhas Chandra Dhara, M. Tech. (CS) (Indian Statistical Institute)	Image and Video Compression using Block Truncation Coding and Pattern Fitting for Fast Decoding	Computer Science	ISI	Prof. Bhabatosh Chanda, ECSU ISI, Kolkata.
4.	Debasis Mondal, M. S. (Q.E.) (Indian Statistical Institute)	Innovation, Imitation and North South Trade: Economic Theory and Policy	Quantitative Economics	ISI	Prof. Manash Ranjan Gupta, ERU, ISI, Kolkata
5.	Bidisha Chakraborty, M. A. (Economics) (J. N. University, Delhi)	Human Capital and Economic Growth: Theory and Policy	Quantitative Economics	ISI	Prof. Manash Ranjan Gupta, ERU, ISI, Kolkata
6.	Ashis Mandal, M. Sc. (Math.) (University of Calcutta)	Versal Deformations of Leibniz Algebras	Mathematics	ISI	Prof. Goutam Mukherjee, SMU, ISI, Kolkata
7.	Dibyendu Chakrabarti, M. Tech. (CS) (Indian Statistical Institute)	Applications of Combinatorial Designs in Key Pre-Distribution in Sensor Networks	Computer Science	ISI	Prof. Bimal Roy, ASU, ISI, Kolkata
8.	Subrata Shyam Roy, M. Stat. (ISI)	Homogeneous Operators in the Cowen-Douglas Class	Mathematics	ISI	Prof. Gadadhar Misra, Dept. of Math. I.I.Sc., Bangalore
9.	Durga Prasad Muni, M. E. (Regional College of Engg., Rourkela)	Certain Pattern Recognition Tasks using Genetic Programming	Computer Science	ISI	Prof. Jyotirmoy Das, CCSD (formerly), ISI, Kolkata
10.	Rituparna Kar, M. Sc. (Economics) (University of Calcutta)	Empirical Determination and Forecastability of Foreign Exchange Rate of India	Quantitative Economics	ISI	Prof. Nityananda Sarkar, ERU, ISI, Kolkata
11.	Arnab Bhattacharjee, Ph.D. (Economics) University of Mumbai	Order-Restricted Covariate Effects and Hazard Regression Models.	Statistics	ISI	Prof. Debasis Sengupta, ASU, ISI, Kolkata.
12.	Joydip Jana, M. Sc. (Pure Mathematics) University of Calcutta	Isomorphism of Schwartz spaces under Fourier Transform.	Mathematics	ISI	Prof. Somesh C. Bagchi, SMU, ISI, Kolkata.

Table 3

Research Fellows of ISI who have been awarded Ph.D. degree by Academic Bodies other than ISI during 2008- 09 for work done in the ISI

Sl. No	Name of the Fellow	Title of the Thesis	University	Name of the Supervisor
1.	Bornali Bhattacharjee	Study of Host-Virus Interactions at the Genetic and Epigenetic Level in Human Papillomavirus Related Cervical Neoplasia in Indian Women.	University of Calcutta	Dr. Sharmila Sengupta, HGU, ISI
2.	Laikangbam Premi	Human Papillomavirus (HPV) infection and uterine cervical cancer: disease pathogenesis in northeastern states of India.	Jadavpur University	Dr. Sharmila Sengupta, HGU, ISI
3.	Kaushik Roy	On the Development of an Optical Character Recognition system for Indian postal Automation.	Jadavpur University	Dr. Umapada Pal, CVPRU, ISI & Mrs. Chitrita Chaudhuri (Jadavpur University)
4.	Goutam Garai	On some cascaded Genetic Algorithms for data clustering, Function optimization and shape recognition.	Jadavpur University	Prof. B. B. Chaudhuri, CVPRU, ISI & R. Dutta Gupta (Jadavpur University)
5.	Tapan Kumar Bhowmik	An efficient Scheme for Recognition of Bangla handwritten words.	Visva Bharati	Prof S. K. Parui, CVPRU, ISI & Utpal Roy (Visva-Bharati)
6.	Monika Sharma	Team Efficient: Impact of Individual, Group and Environmental level Variables on Different Work Teams.	University of Calcutta	Dr. Anjali Ghosh, PRU, ISI
7.	Sumanta Sarkar	Combinatorial Aspects in Construction of Cryptographically Significant Boolean function under different Symmetry Condition	Jadavpur University	Dr. Subhamoy Maitra, ASU, ISI
8.	Md. Amir Hossain	Evaluation of Arsenic Plants, Daily Water Intake Trends & A Follow Up Study of Some Arsenic Affected Villages in W.B.	Jadavpur University	Prof. Bimal Kr. Roy, ASU, ISI, & Prof. Dipankar Chakraborti, J.U.
9.	Bidyut Santra	Some Problems on Thin Liquid Film Flow	University of Calcutta	Prof. B. S. Dandapat, PAMU, ISI

Teaching and Training

10.	Samir Kunkri	Cloning & Entanglement in Quantum Information Theory	Jadavpur University	Dr. Guruprasad Kar, PAMU, ISI
11.	Samrat Chatterjee	The role of migratory bird populations in eco-epidemiological scenarios-deterministic and stochastic approach.	Jadavpur University	Dr. Joydev Chattopadhyay, AERU, ISI
12.	Minakshi Banerjee	On Feature Extraction and its Application to Content Based Image Retrieval	Jadavpur University	Prof. M. K. Kundu, MIU, ISI
13.	Subhra Sankar Roy	New Computational Methods for Gene Analysis from Microarray Data	Jadavpur University	Prof. S.K. Pal & Prof. Sanghamitra Bandyopadhyay, MIU, ISI
14.	Haider Banka	Soft Computing in Machine Learning and Bioinformatics	Jadavpur University	Prof. Susmita Mitra, MIU, ISI

Number of candidates awarded degrees/ associatiships in the 43rd Convocation of the Institute held on 24th March, 2008

	Degree / Associateship	Number of candidates
1.	**Doctor of Philosophy (Ph. D)**	**12**
2.	**Master of Technology (M.Tech.) in Computer Science**	**19**
3.	**Master of Technology (M.Tech.) in Quality, Reliability and Operations Research**	**19**
4.	**Master of Statistics (M.Stat.)**	**51**
5.	**Master of Mathematics (M.Math.)**	**07**
6.	**Master of Science (M.S.) in Quantitative Economics**	**26**
7.	**Bachelor of Statistics (Honours) [B.Stat. (Hons.)]**	**34**
8.	**Bachelor of Mathematics (Honours) [B.Math. (Hons.)]**	**07**
9.	**Associateship in Documentation and Information Science**	**07**
	Total	**182**

INTERNATIONAL STATISTICAL EDUCATION CENTRE (ISEC)

The International Statistical Education Centre (ISEC), Kolkata, was founded in 1950 through the initiative of Professor P. C. Mahalanobis. ISEC was opened in Kolkata by the agreement between the International Statistical Institute and the Indian Statistical Institute. At present the Centre is run by the

Indian Statistical Institute (ISI) under the auspices of Government of India. The Centre functions under a joint Board of Directors under the Chairmanship of Professor C.R. Rao. The Board of Directors consists of members from Government of India and Indian Statistical Institute.

Since inception, the Centre has been providing training in theoretical and applied statistics at various levels to selected participants from the countries in the Middle-East, South and South-East Asia, the Far-East and the Commonwealth countries in Africa. A major training programme of the Centre is a 10-month regular course in Statistics leading to Statistical Training Diploma. In addition, special courses on different topics of varying duration are also organized.

The announcement of the 62nd term Regular course was issued from the Centre at Kolkata. Prospectus and application forms were distributed from Kolkata. A number of prospectus and application forms were also distributed through ITEC, Ministry of External Affairs, Government of India. The governments of different countries were invited to nominate suitable candidates for training at the Centre. The applications for admission were forwarded to the Centre through the respective Indian Missions. On behalf of the Board of Directors, the Member-Secretary shouldered the responsibilities of selecting the candidates for the 62nd Term ISEC regular Course. This year 19 trainees from 9 different countries, namely Afghanistan (4), Mongolia (4), Sri Lanka (3), Myanmar (2), Uganda (2), Gambia (1), Grenada (1), Uzbekistan (1) and Seychelles (1) joined the Course. Of these 19 trainees, 4 trainees from Afghanistan were supported by fellowship of Asian Development Bank (ADB), the Central Bank of Sri Lanka supported two trainees from Sri Lanka, T.C.S. of Colombo Plan supported two trainees from Mongolia and the Government of India awarded other 11 trainees ITEC/SCAAP fellowships.

Beside Regular Course ISEC also conducts special courses of various durations. This year we have completed a special course of 8-month duration on "Basic Statistics", which started from 1 December 2007 for a batch of 14 trainees from Ministry of Atolls Development of Maldives. The Valedictory session was held on 25 July 2008 and Professor S. P. Mukherjee, Ex-Faculty, Department of Statistics, University of Calcutta delivered the valedictory address. There were two more special courses held during the year under review. The first one was a three-week course on "Sampling and Survey Methods" for 4 participants from National Statistics Bureau, Bhutan, which started from 12 June 2008 and the second one was a two-month course on "Econometrics and Sample Surveys" for 7 participants from NSO, Mongolia. This course started from 22 September, 2008.

Professor Rabindra Nath Shil from Chittagong Univerity, Bangladesh visited ISEC during 23 November 2008 to 22 January 2009. He taught Descriptive Statistics to the 62nd Term ISEC Regular Course and had academic interactions with some faculty of ISI.

The trainees were provided with computer facilities and Internet connections in the ISEC PC room and in the ISEC hostel. They had access to the books of our ISI library.

Professor S. K. Pal, the Director of Indian Statistical Institute, took special interest in the development of the ISEC, formed a committee for upgrading the infra-structural facilities of the ISEC and sanctioned sufficient amount of fund for this purpose.

In addition to the above reconstruction and renovation, construction work has already started for a new international building at the 202 B.T. Road campus of the ISI, which will include the ISEC hostel, class rooms, offices, etc. Professor C. R. Rao was also very keen to see that the ISEC trainees enjoy a comfortable stay in the hostel and get state-of-the-art training here.

2. RESEARCH AND OTHER SCIENTIFIC ACTIVITIES

The major thrust of the Institute is on research in various disciplines comprising Theoretical and Applied Statistics, Mathematics, Computer Sciences, Biological Sciences, Economics and other Social Sciences, Physics and Earth Sciences, Statistical Quality Control and Operations Research, and Library and Information Sciences. Scientists of the Institute carry out independent research in their own basic discipline and also undertake interdisciplinary research in collaboration with other units within the Institute and also with outside organizations. The Institute also takes up various internally and externally funded projects in diverse fields on challenging live problems of national and international importance. As a part of research activities, scientists of the Institute are involved in consultancy work as well. This section gives a brief account of the principal areas of work over the past year of the scientific divisions of the Institute, namely, the Divisions of:

Theoretical Statistics and Mathematics

Applied Statistics

Computer and Communication Sciences

Physics and Earth Sciences

Biological Sciences

Social Sciences

Statistical Quality Control and Operations Research

Library, Documentation and information Sciences

In addition, there is a report each from the 'Center for Soft Computing Research: A National Facility' and the 'Computer and Statistical Services Centre'.

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Affine Fibrations: Conditions for flatness of R-algebras locally A1 in codimension-one over a Noetherian analytically irreducible normal local domain R was given. Embedding of such algebras in the completion of R was investigated. The results have been applied to show the existence of intricate examples of Noetherian faithfully flat R-algebras, which are locally A1in codimension-one but cannot be expressed as direct limit of polynomial algebras.

S.M. Bhatwadekar, Amartya K. Dutta and Nobuharu Onoda

Our work on pairing-free Identity-Based Encryption (IBE) system was continued. An improvement of the Boneh-Hamburg- Gentry IBE at the cost of a moderate increase in the ciphertext length was obtained. As a consequence of our investigation of BGH IBE, the number of solutions of the equation $R x^2 + S y^2 = 1 \pmod N$, where N is a product of two primes, was obtained by elementary method.

Rana Barua and M. Jhanwar

A characterization of the Coleman index using a minimal set of axioms was obtained. This characterization also yields a characterization of the Banzhaf index using a minimal number of axioms.
Rana Barua, Satya R. Chakravarty and Palash Sarkar

Algebraic Deformation Theory: Deformation of Leibniz algebra homomorphism over a commutative local algebra base was studied. A concrete construction of versal deformation for Leibniz algebras was given. As an application, new deformatios of three dimensional Heisenberg group were obtained.
Goutam Mukherjee, Ashis Mandal and Alice Fialowski

Deformation of algebras over a quadratic operad with commutative local algebra base was studied.
Goutam Mukherjee, Anita Naolekar and Alice Fialowski

Equivariant simplicial cohomology with local coeffcients for a simplicial set with a group action and established its connection with equivariant twisted cohomology was introduced. Cohomology operations in local coefficients in the equivariant context has been constructed.
Goutam Mukherjee and Debasis Sen

Multicolour urn models with reducible replacement matrices were studied. Interesting results, including strong/weak laws were obtained regarding the asymptotics of number of balls of each colour. The asymptotic behaviours of number of balls of each colour were completely classified when the replacement matrix was triangular.
Arup Bose, Amites Dasgupta and Krishanu Maulik

Products of conditionally tail dependent random variables were studied and the tail behaviour of the product was obtained.
Rajat Subhra Hazra and Krishanu Maulik

Stat-Math Unit, Delhi

Learning from Neighbors

A special Markov Chain on the infinite binary space, which mimics a "technology diffusion model" studied by economists earlier, was studied. The model with two competing technologies has the dynamics that success leads to retention of the technology but failure leads to change. It is based on whether proportion of success of the technology is higher to the competing technology among the neighbors. It was shown that if the success probability of the two competing technologies are same then starting with any i.i.d. distribution of the technologies on the integer line the limit distribution has no coexistence of both the technologies. But the probability that a particular technology prevails is higher than its density at the starting when the density is small. In other words the model at the limit gives some privilege to an "underdog" technology.
Antar Bandyopadhyay, Rahul Roy, Anish Sarkar

Annealed and Quenched Invariance Principles for Dynamic RWRE

A model, introduced first by Boldrighini, Minlos and Pellegrinotti (1997, 2000) of discrete time random walks in dynamical random environments on the integer lattice in d-dimension. In this model, the environment changes over time in a Markovian manner, independently across sites, while the walker uses the environment at its current location in order to make the next transition. Boldrighini, Minlos and Pellegrinotti (2000) used cluster expansions approach to establish quenched CLT when dimension $d > 2$. In an earlier work (2006) jointly with Ofer Zeitouni a probabilistic argument based on regeneration times was given. Annealed SLLN and invariance principle (IP) for any dimension was proved, and a quenched IP for dimension $d > 7$ was provided which gave for $d > 7$ an alternative to the analytical approach of the earlier works, with the added benefit that it was valid under weaker assumptions. In this work a different "regeneration time" which is more intuitive and can prove all the

results (annealed SLLN, annealed and quenched IP) in any dimension d under the same weaker assumptions is proposed. In particular this provides new results for dimensions $d = 1$ and $d = 2$ when the environment chain is a non-trivial Markov chain.

Antar Bandyopadhyay and Ofer Zeitouni

On Standard Deviation Estimates for Tree Order Restricted Models

In some problems of sample survey the data comes with a natural "tree order" restriction on the population means. In this work such models were studied. It was shown under fairly minimal condition that a consistent estimate of the unknown variance can be produced. In almost all the cases asymptotic normality for such an estimate was also proved.

Antar Bandyopadhyay and Sanjay Chaudhuri

A Simple Virus Propagation Model on Large Networks

A simple virus propagation model on a large network starting with one infected site was considered. The total number of population was studied and it was shown that if the network converges to a limiting graph in sense of "local weak convergence" then an efficient estimate can be found for the expected value of the total infection through "breadth-first-search" algorithm!

Antar Bandyopadhyay and Farkhondeh Sajadi

Resistance distance in some special graphs

The notion of resistance distance between two vertices in a graph is of theoretical and practical importance. The resistance distance in some special graphs such as the wheel and the fan were studied. The resistances in such graphs are related to the Fibonacci numbers and their generalizations. The proof techniques are based on evaluation of determinants as well as combinatorial arguments. (This work was carried out jointly with Somit Gupta, NIT, Surathkal).

R. B. Bapat

Operator Inequalities

A new characterisation of operator convex functions, supplementing the celebrated Loewner theorem was obtained.

Rajendra Bhatia

Stochastic Filtering Theory

In recent years, Stochastic Filtering theory when the noise is not a standard Brownian motion (SBM) has been the subject of study of various authors. A special case when the observation noise is an Ornstein-Ulhenbeck (OU) Process was studied. The corresponding filter was shown to converge to the classical filter when the OU parameter goes to infinity. Robustness of the filter in the sense of continuous dependence of the filter on the coefficients in the signal-observation model was shown. Further, robustness results in the case when the coefficients converge simultaneously with the OU noise converging to SBM, were shown to hold.

Abhay G. Bhatt and Aurelie Sotura

Martingale Problems and Markov Processes

Necessary and Sufficient Conditions, on the lines of the classical Hille-Yossida Theorem, were derived for an operator A to uniquely determine a Markov process via Martingale Problems.

Abhay G. Bhatt

Inference in Reliability and Survival Analysis

Tests for testing independence of failure time and cause of failure using counting processes have been developed. The study on reliability of complex systems have been done and algorithms have been developed to find the reliability of a system which is a combination of a series and parallel.

Isha Dewan

Smooth estimation of survival function for stationary associated processes

The empirical survival function as studied in Bagai and Prakasa Rao (1991) was considered and the technique in Chaubey and Sen (1996) was used in proposing smooth estimator of the survival function for stationary associated processes. It was shown that the large sample properties embedded in the empirical survival function carry through for the smooth estimator. The smooth estimator proposed here is amenable to provide smooth estimators of the derived functionals, such as the density, hazard rate and mean residual life.

Isha Dewan and Y. Chaubey

A class of general tests for testing independence of failure time and cause of failure in a competing risks model

A class of tests for testing independence of failure time and cause of failure for competing risks data was introduced. A class of tests using martingale approach was derived. A test statistic using likelihood ratio procedure was also developed. Asymptotic distributions of the proposed test statistics were derived. The procedures were illustrated using two real life data sets. A simulation study was carried out to assess the power of the tests.

Isha Dewan and P.G. Sankaran

An algorithm to find reliability of phased systems of dependent components

Phased systems where the components need not be independent were considered. An algorithm to find the reliabilty of a complex system which consists of phases which are series-parallel systems was found. A simple multivariate bernoulli model was proposed for such a system.

Isha Dewan, Kanchan Jain and Monika Rani

Load sharing systems

Kolmogrov-Smirnov type Tests have been proposed to test the hypothesis that components are from i.i.d structure against the alternative that they are from non i.i.d set up.

Isha Dewan and U.V. Nimbalkar

Random Censoring in Marshall-Olkin Bivariate weibull distribution

The problem of estimation of unknown parameters in Marshall-Olkin bivariate weibull distribution in case of random censoring was studied. Stepwise EM algorithm to compute maximum likelihood estimators was used. The properties of the estimators were studied.

Isha Dewan and Swagata Nandi

Super-Efficient Frequency Estimation

The sinusoidal frequency model is considered and an algorithm is proposed such that the proposed frequency estimator has the same rate of convergence as the least squares estimator (LSE) and has smaller asymptotic variance than the LSE.

Debasis Kundu, Zhi-dong Bai, Swagata Nandi and Li Bai

Research Activities

Burst-type Signal in i.i.d. error

A model related to the sinusoidal model has been considered to analyse data having burst-like features. In this case, the amplitudes take a certain deterministic function involving other parameters. Theoretical properties of the least squares estimators are studied when the errors are independent and identically distributed. Some numerical results based on simulations results are reported for illustrative purposes.

Swagata Nandi and Debasis Kundu

Burst-type Signal in stationary error

The problem of estimating parameters of burst-type signal with stationary error has been considered. The error random variables satisfy the assumption of a stationary linear process. The asymptotic properties of the least squares estimators were studied. It is observed that the least squares estimators are strongly consistent and distributed as asymptotically normal. Numerical experiments are being performed to check whether asymptotic results are useful for small and moderate size samples.

Swagata Nandi

Asymptotic Properties of least squares estimators a chirp rate signal

A chirp signal model when the initial frequency is zero and the effective frequency is changing at a linear rate is considered. The asymptotic properties of the least squares estimators are obtained. The proposed estimators are strongly consistent and asymptotically normal having a closed form covariance structure. A function similar to the periodogram for initial estimation of chirp rate is proposed.

Swagata Nandi

Partially sinusoidal model

A modification of the multiple sinusoidal model such that periodic data observed with the presence of a trend component can be analyzed, has been proposed. A linear trend model has been developed. The problem of estimation of frequency and amplitude parameters observed with a linear trend and a stationary linear process is considered. It has been proved that the proposed estimators are strongly consistent and asymptotically normally distributed. Extensive simulations have been reported to justify the suitability of the model and the proposed method. One real data set, the monthly airline passenger data, has been analysed using the model.

Swagata Nandi and Debasis Kundu

Local index formula for quantum homogeneous spaces

One of the deepest results in Noncommutative geometry is the local index theorem due to Connes and Moscovici, which was originally proved in the context of transversal geometry of foliations. Later this was shown by Connes to be valid in a much more general setting. He proved that the local index theorem holds for the geometry of the quantum *SU(2)* group constructed by Chakraborty & Pal. Following this idea of Connes, and building on the subsequent work of Chakraborty & Pal where they constructed and characterized geometries for the odd dimensional quantum spheres equivariant with respect to the quantum *SU(n)* group, it was proved by Pal & Sundar that the equivariant spectral triple for the odd dimensional quantum spheres is regular. An invariant for this spectral triple, called the dimension spectrum was also computed. In particular, it was shown that the Connes-Moscovici local index theorem holds for this whole family of quantum homogeneous spaces.

Arup Kumar Pal

Drainage networks: random directed graphs

Drainage networks are examples of random directed graphs. It was shown that the behaviour of this dependent model of random graphs on the lattice is significantly different in 3 or higher dimensions than in 2 or smaller dimensions.

Siva Athreya, Rahul Roy and Anish Sarkar

Divergence in closely related genomes

The regions of divergence were studied statistically for closely related genomes. This study was conducted by developing a notion of random distance between genomes. On *E.coli* and tuberculosis genomes this method was studied.

Alok Bhattacharya, Rahul Roy and Anchal Vishnoi

Boolean models, coverage and percolation

The percolation and coverage properties of a Poisson Boolean model on a subset of the Euclidean plane was studied. It was shown that these propertioes are significantly different depending on whether the subset has a width, which is smaller or larger than logarithmic.

Amites Dasgupta, Rahul Roy and Anish Sarkar

Automorphisms of Albert algebras

The structure of automorphisms of Albert division algebras was studied and it was proved that any such automorphism is a product of automorphisms fixing 9 dimensional subalgebras pointwise. This has applications in understanding norm similitudes of the algebra and R-triviality for the automorphism group.

Maneesh Thakur

Stat-Math Unit, Bangalore

Research continues to be in the area of stochastic analysis. Specifically the completed projects included describing a boundary Harnack principle for a class of semilinear elliptic equations using probabilistic methods and a result on random oriented forests on the lattice. These were partly funded by the CSIR grant in aid scheme.

Siva Athreya

With F. Fagnola and M. Skeide got several examples and counter examples of CP maps and CP semigroups leaving maximal commutative algebras invariant. This has resulted in a paper. With V. Liebscher and M. Skeide the notion of Powers product of spatial product systems has been extended to Hilbert modules and some basic theorems for this construction have been proved.

B.V. Rajarama Bhat

Shifted convolution powers problem was solved for locally compact groups which was motivated by the convergence of corresponding Markov operators and Choquet-Deny Theorem

C.R.E. Raja and R. Shah

It is also proved that ergodic action of Z^d-action contains ergodic automorphisms if the center of the action has DCC and this result when considered in particular situations recovers the previously known results of this type.

C.R.E. Raja

Research Activities

During this period the main focus of the research was the `Martingale representation theorem. In particular in developing a framework for the computation of the integrand of the Ito integral in the martingale representation theorem.

B. Rajeev

Ongoing work on insurance models was continued.

S. Ramasubramanian

For a Banach space X, a variation on the 3-space problem was considered. Banach spaces whose duals are isometric to L^1-spaces have been classified in the seminal work of Lindenstrauss and Wulbert. An interesting question then is to consider a M-ideal Y of X, such that both Y and the quotient space X/Y are in a specific class described by Lindenstrauss and Wulbert and ask if X itself is in that specified class. These questions have been answered in the affirmative for certain class of L^1-predual, under some additional hypothesis.

T.S.S.R.K. Rao

Studied the p-ranks of Lie incidence matrices. This is a part of monograph being planned on this topic.

N.S.N. Sastry

i) The Tits building was employed to study abstract central extensions of p-adic algebraic groups by finite p-groups.

ii) Some results on zero-sum problems were obtained where the weights come from subgroups.

iii) In collaboration with I.Erovenko & N.Nikolov, it was proved that a general wreath product is seldom boundedly generated.

iv) Some number-theoretic identities were derived naturally by using suitable group actions.

v) THREE notes to appear in The Mathematical Gazette contain some elementary results in group theory, linear algebra and number theory. ONE article was published in Resonance, a journal of science education. ONE article on Ramanujan's work on nested radicals was published in The Mathematics Newsletter of the Ramanujan Mathematical Society.

vi) (Research in progress) The problem of Kronecker conjugacy of polynomials over number fields, the problem of 2-element generation for various arithmetic groups and the problem of determining density of primes dividing certain recurrence sequences are being studied.

B. Sury

Applied Statistics Division

The Applied Statistics Division came into being in September 1996 in place of Applied Statistics, Surveys and Computing Division. The Computer Science Unit was renamed as the Applied Statistics Unit and the Biometry Unit was transferred to the Biological Sciences Division. Till 2005-2006, the Applied Statistics Division consisted solely of the Applied Statistics Unit. During the year 2006-2007, a new unit viz. Bayesian and Interdisciplinary Research Unit was created within this Division, which now comprises two units.

The following are the research and other activities of the Applied Statistics Division during the year.

Applied Statistics Unit

Sample Surveys

Several important problems in the area of surveys relating to sensitive/stigmatizing issues were studied and their solutions obtained. Implementing Warner's Randomized Response Technique (RRT), if RR's are gathered from people chosen by Simple Random Sampling with Replacement (SRSWR) with a pre-assigned number of draws, a number of new estimators were proposed. We compared the efficiencies of these estimators with certain traditional estimators and showed the new ones to be highly efficient. Kuk's and Christofides' models were also studied.

In the context of RR's the case of inverse sampling was studied where people are chosen by SRSWR till a fixed number of distinct persons are sampled. For this case, several efficient estimators were derived and studied.

Modifications were proposed for some traditional RR models, both for qualitative and quantitative stigmatizing variables. It was shown that these modifications lead to improved estimation over the original models.

An alternative to RR, called Item Counting technique has been developed; methods of protecting privacy in various RR techniques in case of unequal probability sampling have been developed.

Applying spatial smoothing, a new model-cum-design based estimator is developed for estimating the prevalence rate of disease. This has been applied to data obtained from a survey in Kolkata Municipal Area.

Arijit Chaudhuri, Mausumi Bose, Kajal Dihidar

Design of Experiments, Combinatorial Methods and their Applications

In experiments with crossover designs, sometimes the experiment has to be truncated due to reasons unrelated to the outcome of the experiment. Such premature truncation leads to severe loss of efficiency and in some cases, the design becomes disconnected. The effect of premature truncation of a design on its efficiency was studied and the problem of finding robust designs, which remain robust under truncation, was studied. These designs were studied under several different models and some optimal designs were obtained.

In the context of visual cryptography, the use of combinatorial designs to develop useful schemes was explored. Some results have been obtained for (k,n) VCS for some values of k, The extension of these ideas to general k is being studied.

Mausumi Bose

Reliability and Survival Analysis

Non-parametric estimators of quality adjusted life distribution under some illness-death Models were obtained. In this context, the issue if induced dependence has been formally investigated. Semiparametric regression models for competing risks data with general missing pattern in failure mode were considered.

A discrete time software reliability growth model has been developed and analysed witl. real data. The modeling and analysis of software testing data with periodic debugging schedule have been considered.

Anup Dewanji & Debasis Sengupta

Some new parametric models and tests for Accelerated Life Testing have been developed based on conditional specifications.

Ashis SenGupta

Signal Processing

In the matter of selection of sample time points for the estimation of the power spectral density of a continuous time stationary stochastic process, irregular sampling schemes such as Poisson sampling are often preferred over regular (uniform) sampling. A major reason for this preference is the well-known problem of inconsistency of estimators based on regular sampling. Using the argument that the sampling rate should go to infinity as the sample size goes to infinity, it has been shown that the smoothed periodogram based on regularly spaced data is a consistent estimator of the spectral density. It transpires that, under similar assumptions, the estimators based on uniformly sampled and Poisson-sampled data have about the same rate of convergence. A guideline for appropriate choice of the sampling rate has also been provided.

Debasis Sengupta

Early detection problem in low SNR and with circular and multivariate observations have been considered.

Ashis SenGupta

Multivariate Methods

Properties of a new non-parametric tests for multidimensional scatter have been studied.

Ashis Sengupta

Response-adaptive designs in clinical trials

Response-adaptive designs are carried out in clinical trials to allocate a larger number of patients to the better treatment. This type of design results in ethical gain. Some works related to several response-adaptive designs in different set up were carried out. In particular, designs in the context of longitudinal responses, designs for survival responses, and some designs for cross over trials are theoretically and numerically studied. Different optimal response-adaptive designs are also studied in this context. Optimal response-adaptive designs with more than one constraint, and optimal response-adaptive design using ranks are also under study.

Atanu Biswas

Multivariate zero-inflated model

Sometimes excessive zeros in the data increase the variability. Such count data cannot be modeled using the standard Poisson or generalized Poisson model. A mixture distribution, called the zero-inflated model, is often used for such data. We studied such zero-inflated data in the multivariate set up. Several theoretical properties of the model is obtained. Some simulation studies and illustration with real data are carried out.

Atanu Biswas

Gene expression data

A generalized order-restricted inference methodology for selecting and clustering genes according to their time-course and dose-response profiles are carried out, in particular under the heteroscedasticity assumption, which often shown to be the real scenario. The methodology is applied to some real data set.

Atanu Biswas

Directional Data Analysis

Constructions of and inference for axial some new families of distributions, asymmetric circular distributions and multivariate directional distributions have been given. Models based clustering techniques rules for circular data have been studied. Bayesian inference for multivariate circular distributions with unknown normalizing constants has been studied. Bayesian methods for regression analysis of data on the focus and cylinder have been developed.

Ashis SenGupta

Cryptology

An ongoing theme is the study and cryptanalysis of stream ciphers based on the exchange-shuffle paradigm. New results have been obtained for RC4 and HC-128, which throw light on the internal combinatorial structure of these two stream ciphers. It should be noted that RC4 is the world's most popular stream cipher and HC-128 is one of the recommended candidates by the European Union initiative called Estream.

RSA is the oldest and most used public key cryptosystem. Development and extension of lattice based attacks to uncover new weak keys of RSA has been carried out.

Adhoc and sensor networks consist of low power devices with limited memory. Development and extension of combinatorial design techniques have been used to obtain new algorithms for key pre-distribution in such networks.

SHA-2 is a hash function which has been standardised by the NIST of USA. The best known reduced round cryptanalysis of SHA-2 has been obtained. Based on such cryptanalysis, a new hash function has been designed which resists known attacks without significant sacrifice in efficiency.

Universal hash functions are a fundamental primitive in cryptography and also in other areas of computer science. New design of universal hash functions has been reported. One such design is ideally suited for resource-constrained devices.

Disk encryption is an important practical problem. The currently best-known algorithm for disk encryption has been developed.

Bimal K. Roy, Palash Sarkar, Subhomoy Maitra

Environmental Statistics

Statistical methods have been employed to study severity of arsenic contamination in water in different parts of West Bengal. Also effectiveness of arsenic removal plants have been studied. The effect of noise pollution on school children with respect to different adverse health issues has been studied.

Anup Dewanji, Atanu Biswas

Bayesian & Interdisciplinary Research Unit

Scientists of Bayesian and Interdisciplinary Research Unit BIRU (BIRU) are involved in different kinds of research, training and development activities. The members of the faculty conduct research in different areas of statistics, applied and theoretical statistics. Some members collaborate with other units of ISI on joint projects and also with scientists from other Universities/Institutes. Currently, there are collaborative on-going projects with the Theoretical Statistics and Mathematics Division, Computer and Communication Sciences Division and the Biological Sciences Division.

Sample Survey

An attempt has been made to find a sufficient statistic to estimate the population total of a study variable in case of a randomized response survey assuming that the study variable is stigmatizing in nature so that no truthful response is likely to be available in direct surveys. Use of Rao-Blackwellization technique is recommended and also applied to improve upon the classical estimator available in the literature.

Arun Kumar Adhikary

Block and Factorial Design

Balanced array from association schemes and other methods, and their uses as block designs, weighing designs, rotatable designs etc. are studied. Also, methods of constructions of block designs for serological experiments are considered.

G. M. Saha

Contamination Envelopes in Minimum Distance Inference

The robustness of minimum disparity estimators has been characterized by upper and lower contamination envelopes as a function of the contaminating proportion in all conceivable mixture contaminations. The results have applications is many important problems; for example finding the power breakdown points of disparity tests follow immediately from the above envelopes.

Ayanendranath Basu

Optimal Design for Screening Experiments

Study of optimal designs for screening experiments, when the primary goal is to identify main effects of factors and the secondary goal is to detect potential two factor interactions have been undertaken. For 16 run designs, performance of several designs obtained via foldover technique, Placket –Burman designs, Margolin designs and Li-Natcheim designs have been compared.

Rita SahaRay

Study of minimum critical set in the context of Latin Square and F-square

The structural form of the minimum critical set which consists of minimum information to retrieve uniquely the combinatorial structure of a Latin square L representing the elementary abelian 2-group of order 8 has been identified. Critical sets for a pair of mutually orthogonal latin squares of order 11, 13 and 21 have been obtained. The problem to generalize the pattern of critical sets for a pair of mutually orthogonal latin squares of any composite odd order has been studied. The similar problem has been investigated for F squares, a natural generalization of latin squares. For some specific form of F- squares, a critical set has been identified. A study of critical sets in equiorthogonal F squares has also been made.

Rita SahaRay

Classification

Various approaches have been experimented with in the context of the ongoing speaker identification project. Different alternatives were tried to combine classifiers to improve accuracy in the noisy databases. Several transformations of the data were also explored in this connection. Significant improvement was achieved in some benchmark datasets.

Smarajit Bose

Development of a fully data-driven technique to identify the brain states using fMRI data

In the simplest fMRI experiments, defining the experimental conditions is straightforward, e.g., a block design alternating a motor condition and rest. In more complex situations, however, this task may become largely arbitrary. For instance, consider a learning task where a subject has to pair items according to a complex unknown matching rule, and will at some point discover the rule. The investigator can simply define the experimental conditions as correct trials vs failed trials, but one may also consider that different brain states were involved in the few successful trials where the subjects were just guessing and in the trials where the subject had actually discovered the rule. This type of behavioral information may unfortunately not be accessible to the investigator.

This objective can be addressed in a framework involving a hidden Markov model. Specifically, we consider an extension of the linear model where the brain states are modeled as unknown data that the statistical algorithm has to estimate. No explicit specifications of the experimental conditions are required. However, this type of model is at the cutting edge of current development of statistics, and is technically challenging.

Different models of hidden brain states are being investigated, and so also is the identifiability of each model — using both synthetic and real data.

Sumitra Purkayastha and Dr. Pierre Bellec

Analysis of data on normals on brain surfaces

A set of data giving normals on brain surfaces of a number of males and females is analyzed. The objective is to study effect of age, sex etc. on the distribution of the normals. In particular, the focus is testing if the distributions of the normals are same for males and females. The problems are related to statistical analysis of univariate and multivariate surface and volumetric data. (http://www.math.mcgill.ca/keith/surfstat/)

Sumitra Purkayastha and Dr. Felix Carbonell

Probability inequality

Kimball's inequality (*Ann. Math. Statist.* 1951) has widespread use in multiple testing. A proof of this inequality, different from the one obtained by Kimball, has been obtained.

Sumitra Purkayastha

Multiple Testing, Objective Prior selection, Nonparametric Function Estimation

Multiple testing in the context of high dimensional data with sparse signals has been studied. Decision theoretic optimality properties of various multiple testing rules including those of False Discovery Rate Control methods have been studied. General notion of optimality have been defined and characterized. Objective prior selection methods have been studied in detail using different measures of divergence between prior and posterior distribution and some general characterizations have been found. Rate adaptive estimation in the context of nonparametric regression has also been studied.

Arijit Chakrabarti

Pattern Recognition by Cellular Automata

A new method of pattern classification with real-valued features, based on Generalized Multiple Attractor Cellular Automata (GMACA) and binary Particle Swarm Optimization (bPSO), has been developed. The abstraction and generalization capabilities of this approach have been examined empirically.

Amita Pal

Consistent Estimation of the Accuracy of Importance Sampling using Regenerative Simulation

Importance sampling is a common technique traditionally used in cases where interest lies in estimation of characteristics of a density π (1), but samples are available from a different distribution π (0). It is important, however, to evaluate the accuracy of the estimate obtained using importance sampling. In cases where samples are obtain educing Markov chain Monte Carlo methods, there does not seem to exist in the literature any consistent or easily computable estimate of the variance of the importance-sampling estimator. An estimator is proposed based on regenerative simulation that is consistent as well as easily computable.

Sourabh Bhattacharya

Bayesian Inference for Circular Distributions with Unknown Normalising Constants

Very often, the likelihoods for circular data sets are of quite complicated forms, and the functional forms of the normalising constants, which depend upon the unknown parameters, are unknown. This latter problem generally precludes rigorous, exact inference (both classical and Bayesian) for circular data. Noting the paucity of literature on Bayesian circular data analysis, and also because realistic data analysis is naturally permitted by the Bayesian paradigm, the above problem is addressed taking a Bayesian perspective. In particular, a methodology that combines Importance Sampling and Markov chain Monte Carlo (MCMC) in a very effective manner to sample from the posterior distribution of the parameters, given the circular data, is proposed. The theoretical properties of this methodology are studied; furthermore, with simulation study and real data analysis, the considerable reliability and flexibility of the proposed methodology in analysing circular data is demonstrated.

Sourabh Bhattacharya and Ashis SenGupta

Bayesian Analysis of Semiparametric Linear-Circular Models

In many environmental and agricultural studies, data on both linear and circular random variables are collected, with possible dependence between the variables. Classically, analysis of such data has been carried out by assuming a classical regression framework. A Bayesian hierarchical framework to handle all forms of uncertainties arising in a linear-circular data set is proposed. One novelty involved in the multivariate linear-circular model is that, marginally, the circular component is assumed to be a mixture model with unknown number of von Mises (or, circular normal) distributions. The Dirichlet process is used to introduce variability in the model dimensionality, and develop a simple Gibbs sampling algorithm for simulating the mixture components. Complicated reversible jump Markov chain Monte Carlo (RJMCMC) methods, which are considered ideal for analyzing mixtures of unknown number of distributions, are avoided. The methodologies are illustrated with simulated and real data sets. The results suggest that models associated with variable number of mixture components perform at least as well than those with known number of mixture components. It is argued that model averaging associated with variable number of mixture components improves predictive power of the model, which compensates for the lack of knowledge of the actual number of mixture components.

Sourabh Bhattacharya and Ashis SenGupta

Gibbs Sampling Based Bayesian Analysis of Mixtures with Unknown Number of Components

For mixture models with unknown number of components, Bayesian approaches, as considered by Escobar and West (1995) and Richardson and Green (1997), are reconciled here through a simple Gibbs sampling approach. Specifically, exactly the same direct set up as used by Richardson and Green (1997) is used, but Dirichlet process prior has been put on the mixture components; the latter has also been used by Escobar and West (1995) albeit in a different set up. The reconciliation proposed here yields a simple Gibbs sampling scheme for learning about all the unknowns, including

the unknown number of components. It is demonstrated that the proposed methodology is computationally many times faster than that of Escobar and West (1995) and much easier to implement as compared to the RJMCMC method of Richardson and Green (1997). We also discuss Issues related to clustering are also discussed and it is argued that in principle, this approach is capable of learning about the number of clusters in the sample as well as in the population, while the approach of Escobar and West (1995) is suitable for learning about the number of clusters in the sample only.

Sourabh Bhattacharya

On Bayesian "Central Clustering": Application to Landscape Classification of Western Ghats

Cluster analysis is widely used in the statistical literature, both classical and Bayesian, but particularly classical. However, although much work has been devoted to devising appropriate clustering algorithms, the important aspect of obtaining probability distributions of clusterings seems to be somewhat neglected so far. A Bayesian analysis that quantifies uncertainty is provided that helps obtain summaries, such as modes, desired credible regions, etc. of (posterior) probability distributions of even the abstract concept, clustering, for rigorous statistical analysis. The Bayesian methodology proposed by Escobar and West (1995) has been utilised to obtain samples from the posterior distribution of clustering on which the proposed methods of summarization are illustrated. The methodology is illustrated with simulated data and also with a large vegetation data set obtained from the Western Ghats.

Sourabh Bhattacharya, Tapas Samanta, Kajal Dihidar and Jayanta Ghosh

Fast and Efficient Bayesian Semi-Parametric Curve-Fitting and Clustering in Massive Data With Application to Cosmology

Recent technological advances have led to a flood of new data on cosmology rich in information about the formation and evolution of the universe for example, the data collected in Sloan Digital Sky Survey (SDSS). The analyses of such data demand cutting edge statistical technologies. For the SDSS (2007) catalogue consisting of 96,307 bivariate observations, the validity of Hubble's law for the apparent magnitude and redshift for quasars, and the possibility of clusterings of the quasars are studied. Central to the application is a Bayesian semiparametric curve-fitting procedure, based on a new, flexible, fast, and efficient mixture analysis idea assuming unknown number of components. Moreover, employing a new, efficient, method the posterior distribution of clusterings, also generated as a by-product of the Bayesian model, is analyzed. The cosmological data analysis provides strong evidence against Hubble's law at high redshifts, and clearly indicates the possibility of clustering of quasars especially at high redshift. This sheds new light not only on the issue of evolution, existence of acceleration or deceleration and environment around quasars (say, Radio-loud and Radio-quiet) at high redshift but also help estimate the cosmological parameters related to acceleration.

Sourabh Bhattacharya, Sabyasachi Mukhopadhyay and Sisir Roy

Nonstationary Nonparametric Bayesian Modeling of Dynamic Effective Connectivity in fMRI Experiments

Effective connectivity analysis provides an understanding of the functional organization of the brain by studying how activated regions influence one other. A nonparametric Bayesian approach to model effective connectivity assuming a dynamic nonstationary neuronal system is proposed. This approach uses the Dirichlet process to specify an appropriate (most plausible according to our prior beliefs) dynamic model as the "expectation" of a set of plausible models upon which we assign a probability distribution. This addresses model uncertainty associated with dynamic effective connectivity. A Gibbs sampling approach to sample from the joint (and marginal) posterior distributions of the unknowns is

derived. Results on simulation experiments as well as on a real functional Magnetic Resonance Imaging (fMRI) dataset demonstrate the model to be a better candidate compared to those proposed in the previous approaches. Although proposed in the context of studying dynamic effective connectivity, the approach is general enough to apply to similar situations.

Sourabh Bhattacharya and Ranjan Maitra

A Fully Bayesian Approach to Assessment of Model Adequacy in Inverse Problems

The problem of assessing goodness of fit of a single Bayesian model to the observed data in the inverse problem context is considered. A novel procedure of goodness of fit test is proposed, based on construction of reference distributions using the 'inverse' part of the given model. The model combines 'modern data' which consists of observed species composition and the corresponding observed climates with 'fossil data'; the latter data consisting of fossil species composition deposited in lake sediments for the past thousands of years, but the corresponding past climates are unknown. Interest focuses on prediction of unknown past climates, which is the inverse part of the model. Decision-theoretic justification of the proposed approach is provided and other theoretical and computational advantages are discussed. The methodology is demonstrated with many simulated examples and three complex, high-dimensional, realistic palaeoclimate problems, including the motivating palaeoclimate problem. Although the proposal is ideally suited for checking model fit in inverse regression problems, it is indicated that the proposal may be potentially extended for model checking in quite general Bayesian problems.

Sourabh Bhattacharya

Bayesian Learning of Phase Space Distribution Function Using Gaussian Processes

The study of the dynamical behaviour of a galaxy is an exercise in characterising the distribution of its stellar orbits - something that translates to an understanding of the phase space distribution function (DF). This tells us the probability of finding a star in an infinitesimal element of phase space, at any given time. Here, by "phase space", is implied the six dimensional spaces defined by the three spatial coordinates and their conjugate momenta. A natural question to ask is, "What is the nature of the phase space that we live in?" On astronomical length scales, this translates to the pursuit of the topology of phase space in the solar neighbourhood. Determination of this in an objective and quantified manner is proposed - something that has not been undertaken so far! This is of course irrevocably intertwined with the history of our Galaxy itself. Thus, this investigation will help shed light on the evolution of the Milky Way. To this purpose, data from the RAdial Velocity Experiment (RAVE) survey is proposed to be used; RAVE is a programme that aims to measure the line-of-sight or radial velocities and other, stellar atmospheric properties, of about million stars (Steinmetz et. al, 2007). The analysis can be carried out in a completely Bayesian manner, by computing the "inverse" posterior predictive distribution of the velocities at any given location, given the observed data. The results obtained so far are quite promising.

Sourabh Bhattacharya, Smarajit Bose and Ayanendranath Basu

Bayesian Non-parametric Dynamic Matrix-Variate Graphical Models with Application to Financial Time Series for Predictive Portfolio Analysis

Bayesian Dynamic Linear Models are used extensively for analysis and prediction of financial data, which are usually temporal in nature. The time-varying regression structure and the flexibility inherent in the sequential nature of dynamic models make them very suitable for such analyses. Additionally, but very importantly, the Bayesian paradigm provides the much-needed flexibility to combine the data and expert opinion in a very coherent and elegant manner. However, until very recently, extension of the existing methodologies in the case of multivariate time series, have received little attention. Carvalho and West (2007) introduce a novel class of Bayesian models, drawing upon literature on

dynamic linear models and graphical models. More specifically, the synthesis uses sparse graphical modelling ideas to introduce structured, conditional independence in the covariance structures of the multiple time series. In this project, these assumptions are relaxed by constructing a probability measure on the set of all plausible graphical models using the Dirichlet process. It is shown that computational ease is pre-served, in spite of the extension of the existing methods to a much richer class of models suitable for multivariate time series analysis. Simulation studies and real data analyses will be considered.

Sourabh Bhattacharya, Sumit Gupta and Subhadeep Mukhopadhyay

Semiparametric Bayesian Palaeoclimate Reconstruction

Haslett et al (2006), attempted to reconstruct past climate in Glendalough in Ireland, about 15,000 years ago, using pollen data (this includes both modern and fossil data) and modern climate. The model they used, however, implicitly assumes that past climates are similar to the modern climate; in fact, it can be shown to be an interpolation problem. Realizing the difficulties, Bhattacharya (2006), proposed a novel semiparametric Bayesian model to relate species abundance to climate, and applied the methodology to a chironomid data set, rather than the pollen data set of Haslett et al. (2006). He showed that climate prediction using this model can be correctly viewed as an extrapolation model, and that the semiparametric model better reflects the uncertainty on the relationship between species and climate. Importantly, compared to the model of Haslett et al. (2006), computational difficulties are greatly alleviated in this modelling strategy. A useful contribution in this project will be to apply the methodology of Bhattacharya (2006) to the pollen data set of Haslett et al. (2006) and compare results with those obtained by the latter. Moreover, the Multinomial model of Haslett et al. (2006) have been replaced by zero-inflated Poisson model, since the latter is more appropriate, given the large number of zeroes present in the data set. Preliminary results indicate that this new model and methodology significantly outperforms the previous models/methodologies.

Sourabh Bhattacharya and Sabyasachi Mukhopadhyay

On efficiencies of strategies for exploring doubly intractable posterior distributions

The theoretical and empirical properties of stochastic algorithms used for exploring posterior distributions corresponding to which the likelihoods are known only up to a constant, the constant involving the unknown parameters are investigated. Such posterior distributions are known as doubly intractable posterior distributions. Clearly, usual MCMC strategies are rendered invalid in this set up. Of interest is a new methodology for exploring such distributions, proposed by Bhattacharya (2009). The existing proposals are compared with this new methodology with respect to their corresponding theoretical and computational properties and the aim is to show that the proposal of Bhattacharya (2009) is more efficient and flexible, particularly in high-dimensional situations.

Sourabh Bhattacharya and Somak Datta

Perfect Simulation from Posterior Distributions of Mixtures with Unknown Number of Components

Under mild regularity conditions MCMC theory assures "convergence" of the underlying Markov chain to the target stationary distribution. In other words, as the number of iterations tends to be infinitely large, the samples come "approximately" from the target stationary distribution. Thus, the validity of the MCMC theory is only asymptotic. In many situations, such approximate samples can incur severe bias. Perfect simulation theory, in principle, promises to reproduce the Markov chain of infinite length in only finite time, and hence, in principle, one can obtain samples "exactly" from the target stationary distribution. In practice, however, perfect simulation theory seems to have extremely limited use, the applicabilities being confined to very special models of theoretical interest only. A very challenging problem in the Bayesian paradigm is the construction of efficient MCMC algorithms in the case of posteriors where the model is a mixture of normal distributions with unknown number of components. Since the number of components is unknown, the model is variable-dimensional---in other words, this

is a situation where "one of the things you do not known is the number of things you do not know" (Peter Green). Although MCMC algorithms have been proposed for such problems, convergence is a very serious issue here, and in spite of enormous work, much of it being empirical, no solution to this problem has emerged. A novel perfect simulation algorithm, which completely solves the convergence problem, yielding "exact" samples from the posterior distribution where the likelihood is a mixture of unknown of components (each component may or may not be normal), is proposed.

Sourabh Bhattacharya and Sabyasachi Mukhopadhyay

Stochastic models for study of Fertility

In connection with couple fertility, stochastic models have been developed incorporating socio-cultural factors to explain and analyze observed data on various types of birth intervals and number of births to couples in a specified period of time and to outline new procedure for obtaining the estimates of the parameters involved in these models.

Shankar Dihidar

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

The research activities in the Advanced Computing and Microelectronics Unit (ACMU) comprise theoretical and applied research in the areas of high performance computing, pervasive and mobile computing, VLSI design tools and electronic design automation, logic synthesis and testing, error correction and fault-tolerance, physical design of microchips, embedded systems, system-on-a-chip, low-power architectures, computational geometry, algorithms and data structures, computational biology, hardware for image processing, nano-technology and giga-scale integration techniques. During the period 2008-2009, the faculty members of the unit were engaged in the following research projects:

a) Mine Telephony
b) Floorplan optimization for Nanobiochips
c) Localization in Wireless Sensor Networks
d) Techniques for Robust Physical Design of Nanometer ICs

Mine Telephony

Setting up a personal communication system among the workers inside any coal mine is of paramount importance, for efficient management of day-to-day mining work and in particular, for disaster management. Most surprisingly, as of today, nowhere in the country there exists a personal communication system available for miners, except the handheld walkie-talkie system, operating around 450 MHz. We are building a mobile personal communication system, which will be used by the miners and powered from the battery cell carried by each miner.

Some experiments have already been performed inside a mine in Jharia (near Dhanbad) at a depth of 8 seam to study the attenuation characteristics of radio signals. It turned out that there is strong signal attenuation in the microwave range. Commercially available transceivers, for example Chipcon 2510FX chips operating at 2.4GHz are good for transmission only up to a distance of 80 meters along line of sight and the attenuation increase rapidly with further increase of frequency up to 9 GHz. Considering the size of the antenna, 450 MHz was found be optimum to be used as the carrier frequency.

The following items have been developed:

1. a hand-held terminal operating at 450MHz, using CC1101 RTKR transceiver chips.
2. a strategy for placing suitable active repeaters at some fixed points. e.g., at every T junction or every cross point inside the mine.
3. required software for the MAC layer protocol, location registration, call set up, call delivery and hand-off mechanisms, which should be loaded in the memory of the hand-held devices to build a mobile communication network.

B. P. Sinha and N. Das

Floorplan Optimization for Nanobiochips

Nanobiochips deploy nanofluidics, sensors, and imaging technology extensively for their implementation and have fueled a revolution in the emerging field of nanomedicine. Such chips have manifold applications to DNA detection, biochemical diagnostics, drug delivery, to name a few. To build a biochip efficiently, several associated design problems need to be solved, which require expertise in multidisciplinary areas including semiconductor process technology, interface design, combinatorial optimization, CAD tools, and biology. A major design component of these chips consists of implementing a mechanism that controls navigation of discrete micro-/nano-liter volume of fluids (droplets) on the chip surface or through the channels therein. Several combinatorial optimization problems for computer aided design and testing of digital microfluidic biochips are being studied.

The following problems have been solved and being studied in this context:

1. *Microfluidic channel design and flow scheduling problem*: Various types of discrete fluid droplets (sample, reagent, or drug) are to be navigated through different channels and reservoirs on the chip, at different point of time, either by DEP or EW technique. Since the same channel may be used for different droplets, this mimics a traffic flow problem, and requires an optimum solution – which involves appropriate (application-specific) layout of track geometry as well as a scheduler, a controller, and a suitable delivery mechanism. A geometric model has been developed for capturing the impact of various parameters and a search mechanism has been developed.

2. *Cell sorting on a microarray*: In a microarray fed with a sample, the good and bad cells can be discriminated by fluorescence techniques. Next, separation and subsequent accumulation of bad cells are often needed for conducting further diagnostic tests. In a DEPbased microarray, this separation process can be abstracted as several combinatorial optimization problems. Modeling, formulation, navigation of cells, simulation, and solving for optimal sorting, are complex and challenging tasks. We have studied certain aspects of these problems. In particular, the problem of DEP- based cell sorting for emerging medical applications has been formulated from an algorithmic point of view and simulation experiments have been conducted.

3. *Testing of digital microfluidic biochips*: Various methods of functional testing of nano-bio-chips have been developed. Two international (IEEE) conference papers have been published in this context.

B.B. Bhattacharya

Localization in Wireless Sensor Networks

Micro Sensor is a small size and low powered electronic device with limited computational and communicating capability. A Sensor Network is a network containing some ten to millions of such micro-sensor (or simply sensors). Wireless Sensor Network (WSN) can be used for fire detection in a forest, alert the appearance of phytoplankton under the sea, investigating living living traps after a disaster etc. Finding the locations of sensors (localization) as well as sensed objects are important issues.

The problem of localization has been considered in this work when distances between all pairs of sensors within communication range are known. All unknown distances are assumed to be more than the range of communication. Under this model we have proved some initial results. However, the

number of solutions here may be very large. We then considered the restricted case, where, every point in the field of interest is covered by some sensor. It is also assumed that the communication range is at least twice as much as the sensing range. Under this restricted set up an algorithm has been proposed to localize all the sensor positions. Though the worst case time complexity is O(n^2), our simulation studies show that the actual complexity is much lower. A necessary and sufficient condition has been given, which can be used to easily verify, without localization, whether every point in the field is indeed fully covered.

In another work, the same problem was considered and under this restricted set up a distributed algorithm has been proposed to localize all the sensor positions. Our algorithm uses only local neighbourhood distance information. Each node communicates information for localization to its neighbours only, thus reducing traffic over the network. The time required to localize all sensors uniquely under this model has been shown to be linear in the number of sensors.

It has been so far assumed that the distances measured are error free. In reality, it is very difficult to measure distances exactly. The future plan of this research work is to extend our localization model considering distances with limited error.

K. Mukhopadhyaya

Techniques for Robust Physical Design of nanometer ICs

Among the plethora of new challenges in robust and reliable design of integrated circuits using nanometer fabrication technology, two issues related to the physical design phase are being considered in this project and a unified scheme for both is the actual goal. First is area-fill synthesis required for mechanical robustness of chips with minimal degradation in performance and minimal insertion of extra metal. Secondly, the soaring complexity and cost of design has led to the notion of system-on-chips with re-usable cores which raises the issue of intellectual property protection - both of the design as well as the computer-aided design tools.

Existing methods for watermarking ASIC designs are constraint based thus causing loss of design quality. For FPGA watermarking and fingerprinting, logic blocks of FPGA are used to store bit-stream corresponding to signature of IP owner and IP buyer. IP protection methods for design tools, design description in HDL and for multi-core design has also been proposed. However, there is a dearth of algorithms for faster insertion and extraction of buyer's fingerprint and IP owner's watermark in the physical design phase, with provable bounds on vulnerability and solution quality.

A novel scheme for encoding and watermark embedding in VLSI physical design for IP protection has already been designed and implemented. The issue of reducing area overhead and increasing robustness against IP attacks need to be considered.

An efficient and provably secure method to repudiate possible IP infringement attacks on value-added physical design has been designed which deterministically modifies a nominal number of buffers in the repeater system of an ASIC, to insert the signatures. The area and delay overhead are negligible.

For direct IP protection of custom design layout style floorplans, analysis has been performed for the existing floorplan representation schemes to assess the corresponding encoding-friendliness, and then a new tree-encoding algorithm has been designed which provides high degree of robust IPP.

As typical techniques for public verification of signatures are susceptible to revealing the signatures themselves and hence are fragile, we have designed a leakage proof zero-knowledge protocol for verification.

S. Sur-Kolay

Computer Vision and Pattern Recognition Unit

Offline handwritten document processing

A new work has been accomplished on automatic offline synthesis of handwriting. Here the idea is that a person will write some text in computer through keyboard and the system will synthesize the text in his own handwriting, which can then be printed in paper, or transmitted to another person. The approach has two phases namely training and testing, where the training phase consists of text written by user which is processed by the software to extract relevant information like individual character and its variants, transition from one character to the next, line orientation and undulation, interline separation, margin and paragraphing information, word separation statistics etc. In the test phase, these information are combined to synthesize the text entered by the user through keyboard. Both English and Bangla handwriting synthesizers have been developed. In addition, a new method has been developed for identification of text line from handwritten text image. Another algorithm for word separation based on inter-word and intra-word gap classification was also developed. At present we are working on character/part separation and their recognition method.

B. B. Chaudhuri and S. Bera

Multi-lingual document analysis

A system for character segmentation from multi-oriented and curved document was developed. A modified scheme was proposed for the recognition of printed multi-oriented and curved document. To get higher accuracy a modified word-wise script identification system for Bangla, Devnagari and English document has been developed. A database for Indian tri-lingual (A Bangla, Devnagari and English) pin-code recognition has been developed and a system for script independent tri-lingual pin-code recognition was developed. A robust system for word-wise identification for Devnagari, English and Kannada has been developed. A modified feature extraction scheme was proposed for the multi-script OCR development. A database for Hindi handwritten city name recognition was developed.

U. Pal

Online handwritten character recognition

A Bangla character recognizer based on Nearest Neighbor Approach has been developed. Also, a lexicon analyzer for approximately two hundred Bangla words has been developed, which along with the character recognizer can recognize those two hundred Bangla words.

T. Pal

Artificial immune systems (AIS)

The role of AIS has been studied for pattern analysis tasks. A novel prototype reduction method has been designed based on AIS principles. A newer paradigm in immunology, e.g. danger theory, has also been investigated for designing pattern recognition tools.

U. Garain

Computational forensic

Low-level image features are investigated for identification of a writer in a large dataset. Role of two-dimensional auto-regression model has been experimented for writer identification in multi-script environment. The same framework was also applied for writer identification when number of writers is more than one for a single page of writing. A statistical framework has been successfully developed for automatic dating of manuscripts of individual writers. In another work, image analysis and pattern recognition have been used in conjunction with developing a general tool for authentication of security documents like bank cheques, legal deeds, different types of tickets as used in lottery, games, airlines, etc.

U. Garain

Research Activities

Text to diagram conversion

A piece of text basically describing some diagram is common in many branches of science like Physics, Geometry, Engineering, etc. A novel method has been designed to involve machine to understand such text and then draw the diagram. Initial experiment considered school level geometry problems and gave promising results. As a part of this study, a review on the approaches for machine understanding of natural language mathematical problems was done and this study has produced a significant review report (possibly the first of this kind) in the related field.

U. Garain

Camera based image processing

Existing commercial optical character recognition (OCR) systems are found to perform very poorly in recognizing text in camera taken images. This has been demonstrated with images of inscriptions at the sites of historical monuments. An independent component analysis (ICA) based approach has been developed to enhance the image quality of the text part and thereby improve the OCR results.

U. Garain

Compressed domain document image analysis

A method for summarization of compressed document images has been developed and tested for Indian language documents. As a part of this study, stop word detection and word stemming have also been done in imaged documents. These studies will facilitate the information retrieval task from scanned documents.

Improvement of OCR performance

Identification and extraction of mathematical expressions in document images was done to improve the performance of an optical character recognition (OCR) system while recognizing scientific documents consisting of mathematical expressions.

U. Garain, A. Maity and A. Dhar

Improvement of algorithms for the analysis and correction of hearing disabilities

The scope of this project involves the addressing of common hearing disabilities such as amplitude attenuation, frequency selective degradation, severe hearing loss in one ear, along with source separation and selective boosting/suppression of the source components, typically speech or music. The presence of undesired, interfering signals is very confounding for a hearing handicapped person. Blind source separation methods have been examined and are being further explored for possible improvement. Classification of the separated audio signals into music and speech has been implemented using simple classifiers. Real-time implementation on a DSP processor is being carried out. Extensive evaluation of the performance of the integrated hearing system, in real-time, will follow.

S. Palit and D. Sengupta

Bangla WordNet for NLP

We collected 1000 most common contemporary Bangla noun and adjective words and their synonyms, antonyms and polysemous senses in the 1st year. This year we have also collected 732 nouns, 372 adjectives, 226 verbs, 90 adverb and 24 interjections along with hyponym, hypernym of the words for the implementation of WSD (Word Sense Disambiguation) algorithm. Development of WSD approach is being worked out.

B. B. Chaudhuri, M. Bose, D. Sarkar and R. Pradhan

Automatic reading of texts in camera captured images

The objective of this project is extraction and recognition of Bangla texts in camera captured images of signboards/hoardings. OCR has long been a fundamental problem in document image analysis. Existing works on OCR for Indian scripts consider input document images captured by a flatbed scanner under ideal conditions. Available methodologies cannot be applied directly to camera-captured images of texts. Our thrust area of study is extraction and recognition of Bangla texts in camera captured images of natural scenes. Eigen transform has been used in the existing literature to extract texts embedded in scene images. We studied the effectiveness of the same on a set of scene images collected by us and identified its weakness factors. Also, we designed a system based on mathematical morphology and a set of simple criteria for detection of texts of Bangla or Devanagari in such images. Here, we exploit the existence of headline in such texts and the preliminary results are encouraging.

U. Bhattacharya, S. K. Parui, B. B. Chaudhuri, P. Samanta and S. Mondal

Online handwriting recognition – Bangla

Under the MIT, Govt. of India funded project "OHWR - Bangla", we collected and prepared a large number of online handwritten Bangla word samples towards the development of a database. During this year we collected and prepared approximately 50000 samples of handwritten Bangla words in addition to the 78000 samples already collected during the previous year. Also, we developed a DEMO software for recognition of a limited vocabulary handwritten cursive Bangla words. Its present recognition accuracy is approximately 68% at word level.

U. Bhattacharya, S. K. Parui, A. Roy, Sk. Mohiuddin and S. Bhowmick

Online Handwritten Character Recognition Using Character Sub-Strokes and Discriminative HMM Classifier

HP Research Lab, India, funds this project. A database of 25,948 handwritten samples of 50 Bangla basic characters in UNIPEN format is developed. This database and the recognition research for its samples are primarily aimed for form-based data processing applications. An important example of such applications is processing of census data. However, the present database should also be useful for the development of recognition modules of continuous Bangla handwriting. We also designed a new scheme for extraction of sub-strokes from the samples, which are significantly cursive in shape. A feature vector is computed for each sub-stroke. A hidden Markov Model (HMM) is designed for each class of the present recognition problem. States of the HMM for a particular class are obtained by modeling a mixture distribution based on all sub-strokes extracted from the training samples.

S. K. Parui, U. Bhattacharya, T. Mondal and K. Das

Recognition of text in images of natural scenes

The goal of the research work under the ongoing collaborative project is to exchange scientists of CVPR and Computer Science Department, University of Bristol, UK working on Computer Vision problems. The particular area of proposed research activities is the development of a system for extraction and recognition of texts in natural scene images captured by mobile phone cameras. The target users are, for example, the blind, tourists with language difficulties, and casual users who wish to save words and text them to others.

S. K. Parui and U. Bhattacharya

Development of Robust Document Analysis and Recognition Systems for Indian Printed Scripts

The goal of our project is to develop OCR system for printed Bangla and Devanagari script. During last year, we have improved our line, word and character identification algorithm for documents printed in old technology like letterpress printing. An alpha version of Devanagari OCR developed last year has been improved in accuracy for various fonts and styles. We have developed an alpha version of multifont Bangla OCR, which has been sent to the consortium test centre to analyze the performance. Large scale testing on various Hindi books of 1500 pages has yielded good result. An approach for document orientation (landscape vs. portrait) detection has been developed for all printed Indian scripts namely Bangla, Devanagari, English, Gujrati, Gurmukhi, Kannada, Malayalam, Oriya, Tamil, Telugu and Urdu. The approach is based on a reservoir (concavity) based feature vector.

B. B. Chaudhuri, S. Ghosh, S. Das and T. K. Bhattacharya

Information Retrieval

An evaluation framework for Indian language IR, consisting of benchmark datasets, was created and used to compare retrieval results. Work on retrieval from semi-structured data has continued. The language modeling approach to IR was incorporated into the existing search system and was found to be more effective than the traditional vector space model.

M. Mitra, S. Maiti, A. Bandyopadhyay, D. Modak and S. Sanyal

Documentation, Research and Training Centre (DRTC), Bangalore

The main areas of research in which the different members of the DRTC Faculty were engaged during the period, are furnished below:

1) The Study of various methods of knowledge representation, semantic web, Ontology, knowledge organization, Internet applications, etc.

2) The application of modern scientific management techniques to the planning and management of information system, centers and services.

The development of bibliometric and scientometric measures for evaluating the use of library and information services and scientific output respectively.

K. S. Raghavan, D. P. Madalli, A. R. D. Prasad,
B. S. Daya Sagar and R. I. K. Ravichandra

Generating web based Information Services using Semantic Web Technology

A.R.D. Prasad

Electronics and Communication Sciences Unit

Video Processing and Retrieval

A content-based frame transition model was proposed and based on this model a novel algorithm for detecting shot boundaries has been developed and tested on public domain database. For the purpose of video summarization, representative frames from the shots were extracted to produce a storyboard presentation of the video. To achieve this, the already segmented shots were (further) suitably divided to sub-shots using multivariate Wald-Wolfowitz test. Finally, from each shot or sub-shot a key-frame has been selected maintaining maximum similarity with the other frames.

B Chanda

Document Image Processing

An ICA based image enhancement algorithm was developed for machine reading of camera-held low quality text images. The algorithm was tested on real data and its usefulness has been established.

B Chanda

Image and Video Processing

Application driven image segmentation algorithm has been implemented for oil sand ore image processing. This image segmentation technique was the precursor to oil sand size estimation, which could be linked to the volume of crude oil production. A set of algorithms has also been developed based on Gestalt image analysis for image segmentation and for tracking objects of interest in video. This technique was also extended for medical image processing. Topology adaptive active membrance was also used for tracking objects of interest in medical video.

Sitangsu Kr. Das, Snehasis Mukherjee and D. P. Mukherjee

Bioinformatics

A novel generalization of Golub's SNR for multi-class problems that can identify useful biomarkers was made. In this context, the concepts of dominant and dormant genes are introduced for a given set of cancers/diseases. The dominant genes were easy to find and were very effective for designing diagnostic prediction systems; while good dormant genes may not always be available as they require stronger conditions to satisfy, but when they were available, then could be used to authenticate decisions made based on dominant genes.

N. R. Pal

Fuzzy Systems

One of the main attractions of a fuzzy rule based system is its interpretability, which is hindered severely with an increase in the dimensionality of the data. An integrated method that can find the poor features simultaneously when finding the rules from data for Takagi-Sugeno (TS) type fuzzy systems was proposed. It was an integrated learning mechanism that could take into account the nonlinear interactions that might be present between features, and between features and fuzzy rule based system. Hence it could pick up a small set of discriminatory features and generate useful rules for the problem at hand.

N. R. Pal

Neural Networks

NEUROSVM, new multilayer hybrid classifier architecture with two cascaded modules, feature extraction module (FEM) and classification module (CM), was developed. The FEM usedneural networks while the classification module used support vector machines (SVMs)(other tools such as MLP or RBF could also be used). Sub-modules of FEM extracted features capturing the discriminating characteristics of different areas of the input space. The NEUROSVM exhibited superior performance over that of MLP, SVM, and popular ensemble methods. The NEUROSVM practically eliminated the severe dependency of SVM on the choice of kernel.

N. R. Pal

Machine Intelligence Unit

Pattern Recognition

There is no technique in literature, which simultaneously extracts and selects features in pattern recognition. A novel algorithm in this regard has been developed. Its superior performance on several data sets has been successfully demonstrated.

C. A. Murthy

The synthesis and analysis of a special class of non-uniform cellular automata (CAs) based associative memory, termed as generalized multiple attractor CAs (GMACAs), has been reported. A reverse engineering technique was presented for synthesis of the GMACAs. The desired CAs were evolved through an efficient formulation of genetic algorithm coupled with the reverse engineering technique. This has resulted in significant reduction of the search space of the desired GMACAs. Characterization of the basins of attraction of the proposed model established the sparse network of GMACAs as a powerful pattern recognizer for memorizing unbiased patterns. Theoretical analysis also provided an estimate of the noise accommodating capability of the proposed GMACA based associative memory. An in-depth analysis of the GMACA rule space established the fact that more heterogeneous CA rules were capable of executing complex computation like pattern recognition.

P. Maji

Two new operators, namely, dependency vector (DV) and derived complement vector (DCV) were introduced to characterize the attractor basins of the additive fuzzy cellular automata (FCA) based associative memory, termed as fuzzy multiple attractor cellular automata (FMACA). The introduction of DV and DCV makes the complexity of the attractor basin identification algorithm linear in time. The characterization of the FMACA using DV and DCV established the fact that the FMACA provides both equal and unequal size of attractor basins. Finally, a set of algorithms was proposed to synthesize the FCA rules, attractors, and predecessors of attractors from the given DV and DCV in linear time complexity.

P. Maji

A new symmetry based cluster validity index was proposed, which, in conjunction with a clustering technique, can select both the appropriate model and the model order from the data set. Real-life applications of the developed techniques were demonstrated for automatic segmentation of landcover types from satellite images, and MR brain image segmentation.

A scheme for outlier detection in subspaces has been developed that utilizes the search capability of genetic algorithms. In this regard, a new data structure for storing the points in different subspaces were proposed which lead to the development of an efficient algorithm for fitness computation.

S. Bandyopadhyay

PCA or KPCA is not a new concept in face recognition. Illumination is always found to be major problem in face recognition. An algorithm for eliminating the effect of illumination has been developed. Attempts are being made to have the effect of size invariance and rotation invariance in the algorithm.

S. Biswas

Image Processing

Spread spectrum (SS) watermarking for multimedia signal became appealing due to its high robustness attribute and has been used widely for various applications. Some of these applications essentially demand development of low cost algorithms so that they can be used for real time services such as broadcast monitoring, security in communication, mobile radio network, etc. A Fast Walsh Transform (FWT) based SS image watermarking scheme has been developed. It serves the dual purposes of authentication in data transmission as well as QoS assessment for digital media through dynamic estimation of the wireless channel condition. Fast Walsh transform offers low computation

cost for implementation, smaller change in image (multimedia signal) information due to data embedding and ease of hardware realization. VLSI implementation using Field Programmable Gate Array (FPGA) has been developed to make it suitable for real time implementation.

M. K. Kundu

Color image processing, now-a-days plays a very significant role almost everywhere in imaging science. An investigation was made based on multi-dimensional approach. Various features, extracted from such a processed image were found to be effective in different areas of image processing. Algorithms were found to be efficient in the frequency domain. Enhancement and segmentation algorithms are under development.

S. Biswas

In remote sensing applications change detection is a process aimed at identifying differences in the state of land-covers. This plays an important role in many different domains like study of land-cover dynamics, monitoring shifting cultivations, burned areas assessment, analysis of deforestation processes, monitoring of urban growth etc. The problem if change detection involves handling uncertain and overlapping data. Study is in progress to manage this uncertain and overlapping data with fuzzy sets and fuzzy logic.

Classification of land cover regions of remote sensing images is essential for efficient interpretation of them. This task is very complex because of low illumination quality and low spatial resolution of remotely placed sensors and rapid changes in environmental conditions. Various regions like vegetation, soil, water bodies, concrete structure etc. are often not well separated. Various classifiers namely, fuzzy product aggregation reasoning rule (FPARR), fuzzy explicit (FE), and neuro-fuzzy (NF) have been developed for this purpose. Wavelet based features were explored in this regard for efficient classification.

A. Ghosh

A novel method for classification of face images based on set estimation method has been developed. Its performance is found to be better than other existing subspace based classification techniques. The method has been extended to color images and videos successfully.

C. A. Murthy

Wavelets

The original image was decomposed into tiles by applying n-level lifting based Discrete Wavelet Transformation (DWT). A binary watermark image (external information) was spatially dispersed using the sequence of number generated by a secret key. The encoded watermark bits were then embedded into all DWT-coefficients of nth-level and only in the High-High (HH) coefficients of the subsequent levels using dither modulation (DM) but without complete self-noise suppression. It is well known that due to insertion of external information, there will be degradation in visual quality of the host image (cover). The degree of deterioration depends on the amount of external data insertion as well as step size used for DM. If this insertion process is reverted, better quality of images can be accessed. To achieve that goal, watermark bits were detected using minimum distance decoder and the remaining self-noise due to information embedding was suppressed to provide better quality of image.

Feature extraction algorithm is always a very important component of any retrieval scheme. An M-band wavelet transform based feature extraction algorithm has been developed. It is well known that, M-band wavelet transform is superior to the dyadic orthogonal wavelet transform in the sense that it divides the scale-frequency in linear as well as logarithmic sub bands. In this work, an orthogonal and linear phase M-band wavelet transform was used as decomposition tool. The MxM sub-bands were used as primitive features, over which energies computed in a neighborhood size were adaptively decided by the spectral flatness measures. These were taken as the features for each pixel of the

image. These features were further clustered using FCM to obtain image signature for similarity matching using the Earth Mover's Distance (EMD).

M. K. Kundu

A new simulated annealing based multiobjective optimization technique has been proposed. The characteristics of this technique are the use of an archive for storing the Pareto-optimal solutions and computation of situation specific acceptance probabilities. A new concept of amount of domination is also introduced for computing the energy difference between a new solution and the current solution. It is shown empirically that the performance of the new technique called AMOSA is similar to, often better than, those of several other widely used multiobjective optimization techniques especially for a large number of objectives.

S. Bandyopadhyay

An investigation has been made to explore the scope of usage of Genetic Algorithms (GAs) for the improvement of efficiency of conventional scheme for data hiding in digital images. The basic aim of this approach using GAs was to achieve an optimal solution in multidimensional nonlinear problem of conflicting nature that exists among imperceptibility, robustness, security and payload capacity. Two spatial domain data hiding methods are proposed where GA is used separately for (i) improvement in detection and (ii) optimal imperceptibility of hidden data in digital images respectively. In the first method, GA is used to achieve a set of parameter values (used as Key) to represent optimally the derived watermark in the form of *approximate* difference signal used for embedding. In the second method, GA is used for finding out values of parameters, namely reference amplitude (A) and modulation index (μ) both with linear and non-linear transformation functions, for achieving the optimal data imperceptibility. Results on robustness for both the methods against linear, non-linear filtering, noise addition, and lossy compression as well as statistical invisibility of the hidden data for some benchmark images were found to be highly satisfactory

M. K. Kundu

A new model of parallel GA was developed and applied for segmentation of images and detections of cracks.

A. Ghosh

Evaluating different models of genetic algorithms objectively for finding optimal solutions is under investigation. A procedure for classification of fitness functions was proposed. The initial results using the classification for evaluating the performance of genetic algorithms have been encouraging.

C. A. Murthy

A novel biomedical application of rough-fuzzy clustering was developed for CT scan images of the brain. It was observed that the algorithm generates good prototypes even in the presence of outliers. The rough-fuzzy clustering simultaneously handled overlap of clusters and uncertainty involved in class boundary, thereby yielding the best approximation of a given structure in unlabeled data. The number of clusters was automatically optimized in terms of various validity indices. A comparative study was made with related partitive algorithms. Experimental results demonstrated the effectiveness of diagnosng the extent of brain infraction from the CT scan images, and have been validated by medical experts.

S. Mitra

Bioinformatics

The advent of microarray technology has enabled the simultaneous measurement of the expression of several hundreds to thousands of genes. This results in the generation of a large amount of data. Clustering is a popular technique for analyzing such data. A new multiobjective optimization (MOO) based clustering technique was proposed and used for clustering gene expression data set. Since the MOO strategy resulted in several Pareto-optimal solutions, a novel way of combining these in a

supervised framework was proposed. This resulted in a single final solution that imbibed the properties of the different solutions.

A novel adaptive weighting strategy was proposed for combining information from multiple data sources. This was used for predicting the function of several uncharacterized yeast genes. An overview of the importance of information fusion in bioinformatics was presented. The area of gene identification using classical methods and new computational intelligence approaches has been extensively surveyed.

S. Bandyopadhyay

Multiobjective evolutionary biclustering was employed for the extraction of strongly coherent biclusters, resulting in the generation of gene interaction networks. Biologically relevant small biclusters were obtained, using time-series gene expression data from Yeast. These were validated using the statistically significant GO annotation database. The pairwise correlation coefficients among gene pairs were computed, followed by the quantile partitioning to select the strongly positive (as well as negative) correlation links. These strongly correlated genes were then chosen to be connected in a network. The TF-target gene pairs in the network were found to exhibit strong correlations. We modeled the interaction among them using the information available in the literature/databases *viz.*, SGD. We have also analyzed the expression profiles of the regulator and the regulated genes, which reveal several complex (simultaneous, time shifted, inverted, *etc.*) relationships between them.

S. Mitra

A method for determining optimal metabolic pathways in terms of the level of concentration of the enzymes catalyzing various reactions in the entire metabolic network has been developed. The effectiveness of the present method is demonstrated on various systems existing in the literature, including a core carbon metabolism and a large network of carotenoid biosynthesis pathway of various organisms belonging to different phylogeny. A comparative study with the existing extreme pathway analysis also formed a part of this investigation. Biological relevance and validation of the results were provided. Finally, the impact of the method on metabolic engineering has been explained with a few examples.

Pathway analysis is one of the most interesting aspects of Systems Biology. Modeling biological pathways is interesting as well as difficult to optimize. Various modeling problems of diseases can be successfully analyzed using this simulation approach. Graphical probabilistic approaches are one of the unique methodologies that are used for designing and analyzing pathways. Several graphical approaches that are actively involved in pathway modeling have been discussed.

The literature on the analysis of biochemical pathways based on supervised, unsupervised and reinforcement learning methodologies has been reviewed.

R. K. De

Machine Vision and Perception

Traditionally the intensity discontinuities in an image are detected as zero-crossings of the second derivative that models the receptive field of retinal ganglion cells. Such zero-crossings supposedly form a raw primal sketch edge map of the external world in the primary visual cortex of the brain. Based on a new operator which is a linear combination of the second derivative of Gaussian and Dirac-delta function that models the extra-classical receptive field of the ganglion cells, we found that zero-crossing points thus generated, store in presence of noise, apart from the edge information, the shading information of the image in the form of density variation of these points. We have also shown that an optimal image contrast produces best mapping of the shading information to such zero-crossing density variation for a given amount of noise contamination. Furthermore, we have observed

that an optimal amount of noise contamination reproduces the minimum optimal contrast and hence gives rise to the best representation of the original image. We showed that this phenomenon is similar in nature to that of stochastic resonance phenomenon observed in psychophysical experiments.

Signal Processing

A generalized methodology of constructing a Mexican hat wavelet family involving even order Gaussian derivatives has been devised in a Gaussian scale space. The optimization has been carried out in Fourier domain and the kernels in Gaussian scale space domain were found to be exact replica of their derivative wavelet counterpart for low as well as high order. Wavelet properties of the lowest order (2), has been discussed and the results were shown to be better and different from the well-known LOG-DOG equivalence of Marr-Hildreth. Such filters, simple to implement in Gaussian scale space, are likely to be important in vision, as well as in analysis of seismic signals, cosmic microwave background (CMB) maps and possibly in the general cases of signals from Gaussian point source.

K. Ghosh

Physics and Earth Sciences Division

Geological Studies Unit

Growth and evolution of Neoproterozoic carbonate platforms in the Chattisgarh and Cuddapah basins, South India: Tectonic and palaeogeographic implications

The principal research effort for second year of the project was to map in detail the area around Singhora in the southeastern part of the Chattisgarh basin, and solve the existing stratigraphic problem. Identification of transgressive-regressive cycles, and reconstruction of sequence stratigraphy are in progress.

Detail facies analysis of the carbonates from Chattisgarh and Kurnool is in progress. Physical and chemical aspects of carbonate depositional systems, and their potential in predicting climatic changes on regional scale is being initiated. Two major types of carbonate platform have been identified in both the basins. Detail facies analysis was done in the lower carbonate platform of the Chattisgarh basin to study the evolution of a non-rimmed carbonate platform in the late Mesoproterozoic sea. Sequence stratigraphic analysis revealed a major drowning with development of euxinic condition and deposition of black limestone.

Carbon and oxygen isotope data of the carbonate rocks from Kurnool and Chattisgarh has been generated to study physicochemical aspects of carbonate depositional systems and changing climatic conditions.

Petrographic studies of immature sandstones, volcaniclastic sandstones and pyroclastic rocks are in progress. SEM-CL studies of sandstones from different stratigraphic level for the purpose of provenance determination are in progress. Dating of detrital zircon from all the sandstones Chattisgarh and available tuffs by SHRIMP method from Chattisgarh and Kurnool is in progress in the USGS geochronology laboratory at Stanford.

S. Patranabis Deb and D. Saha

Geochronological constraints on tectonic assembly and dispersal, in relation to the Eastern Ghats Orogen.

The relation between alkaline magmatism and tectonism has been a contentious issue, particularly for the Precambrian continental regions. While alkaline complexes at the western margin of Eastern Ghats Belt, India, could relate to rift systems, those occurring in granulite ensemble in the interior segments of the Eastern Ghats Belt, could not possibly be related to the rift-system, assumed for the western margin of the Eastern Ghats Belt. Structural setting of two such alkaline complexes has been described earlier: one showing evidence of tectonic deformation, and the other emplaced in a pull-apart structure. Also geochemical signatures in the two complexes are described as distinct: one showing clear evidence of crustal contamination, while the other lacks such evidence. Isotopic data from the two complexes and their country rocks reveal contrasting magmatic history: one shows evidence of intra-crustal melting coeval with granulite facies metamorphism in the country rocks, and the other shows evidence of a juvenile magma, and post-crystallization thermal overprint, along with that in the country rocks.

Two alkaline complexes of Rairakhol and Koraput, occurrying within granulitic country rocks, have been dated by U-Pb zircon, as 1000 and 746 Ma respectively. The Koraput complex represents a juvenile magma (positive epsilon), syntectonically emplaced along with granulite metamorphism of the metapelitic country rocks at ~746 Ma. The Rairakhol complex, on the other hand, is post granulite (~1100 Ma) and a product of intra-crustal melting, as evidenced by significant age difference between magmatism (~1000 Ma) and mantle derivation (~1.6 Ga).

S. Bhattacharya

Depositional systems and sequence stratigraphy of the Vindhyan inlier of the Hosangabad-Bhopal area

The Vindhyan basin is a classic example of Proterozoic intracontinental basins that developed in the central part of the Indian shield along with several other basins such as Cuddapah, Chattisgarh, etc. The strata are exposed in three major sectors: Son valley, Bundelkhand and Rajasthan. Substantially thick Vindhyan rocks have also been recognized under the Gangetic alluvium. The constituent stratigraphic units of the Vindhyan Supergroup are laterally correlatable and vertically stacked in similar fashion in individual sectors, but their stratigraphic and sedimentologic attributes vary from one sector to the other. Bulk of the studies on the Vindhyan strata are confined to the sectors mentioned above. On the other hand, the isolated Vindhyan inlier occurring in the Hosangabad-Bhopal region has attracted little attention so far. The principal objective of the proposed project is to study in detail the Vindhyan succession of this region, and establish its relationship with those of the other sectors. The importance of the present study is manifold:

1) In the Hosangabad-Bhopal region the Bhander Group (the uppermost unit of the Vindhyan Supergroup) attains its maximum thickness. The upper part of this succession contains a package that is not present in the Son valley region. Therefore, sedimentological analysis of this succession would lead to a newer understanding of the Vindhyan sedimentation during the terminal stage of basin evolution.

2) The age of the lower part of the Bhander Group has been estimated to be around 650 Ma. This implies that the Precambrian-Cambrian boundary may be well defined in the upper part of the Vindhyan succession of the Hosangabad-Bhopal area.

C. Chakraborty

Tectonosedimentary evolution of the Talchir Gondwana basin, India

The Talchir basin is the southernmost of the array of the Gondwana basins. This is an elongate basin bounded by regionally persistent fault zones, and the basin fills (around a kilometer thick) are also affected by intrabasinal faults. The constituent sedimentary formations include: Talchir, Barakar, Barren Measure. The succession overlying the Barren Measures is rather poorly studied and is clubbed into a single formation called- "Undifferentiated Kamthi". One of the major objectives of the present project is to reconstruct the tectonic regime of the basin. Secondly, marine fossils have been discovered from the Talchir strata in many of the Gondwana basins of peninsular India, but remain to be recognized in the Talchir basin itself. Careful observation and recognition of marine fossils from the Talchir basin would lead to delineation of the marine emabayment that covered the Indian shield during Permian. Thirdly, the succession of the Talchir basin has not yet been studied in the light of Sequence Stratigraphy, which is essential for deciphering the tectono-sedimentary evolution of a sedimentary basin in relation to accumulation of similar deposits in the other Gondwana basins occurring along the Son-Mahanadi belt.

P. K. Maulik

Diversity of Mesozoic terrestrial tetrapods of the Gondwana basins of India with special reference to the Rewa, Satpura and Damodar basins

During 2006 to 2008, we have reported the rich diversity of Mesozoic terrestrial tetrapods of Indian Gondwana basins as well as the occurrences of several new and rare faunal elements from the Middle Triassic Denwa Formation of the Satpura basin. Based on that a survey on macroevolution and the community structure of the fauna reveals the following: -

1) The diversity of nonamniotes gradually became lesser (towards the end of the Triassic) than the amniotes in the community.
2) Proportion of herbivores and carnivores also changed with time.
3) There were few dominating taxa in every assemblage and the low diversity of those families was compensated by their dominance in numbers.
4) The overall fauna has both similarities and dissimilarities with the coeval faunas of the world.

In connection with the diversity of faunas, a detailed osteological study of *Barapasaurus tagorei* the Jurassic sauropod dinosaur from the Pranhita Godavari valley was reported earlier. During 2008-09 we carried out a detailed phylogenetic study of *Barapasaurus* for the first time. This work has been carried out in collaboration with experts from Museum of Northern Arizona and Indian Institute of Technology, Kharagpur.

Taphonomy and paleoecology of Gondwana vertebrates of India

The vertebrate fossils occur mostly in red mudstones of the four major Gondwana basins of India. The chemistry of the mudstones can reveal hitherto unknown aspects of taphonomy and paleoecology. Detailed mapping of the fossiliferous areas of the four major basins, the Satpura, Pranhita-Godavari, Rewa and Domodar basins have been done. Mudstone samples from all these formations have been collected. Chemical analysis of those samples will be carried out.

Synthesis on diversity

Our ISI funded project on vertebrate diversity during Mesozoic Period in India will be completed within 2010-2011. Hence, in future, that is during November 2008 to March 2009 and onwards, we are planning to synthesize the vast data set that has so far accumulated on diversity, community structure, evolution, paleoecology and chronology of the Mesozoic terrestrial fauna of India. Hopefully, the project will provide a comprehensive analysis of the diversity of more than 50 new Mesozoic terrestrial taxa, noted from India, over a span of 180 million years back from the present time.

S. Bandyopadhyay and D. P. Sengupta

Sediment transportation and sorting processes in sand-pebble mixture in experimental channel and their geological implications.

Sedimentological data and samples from ancient (Paleoproterozoic succession of the Singhbhum, Jharkhand) as well as modern sediments (Shankarpur and Bakkhali, West Bengal) have been collected. Cyclic variation in cross-stratification style has been documented in ancient marine successions. Velocity data in clear water was collected and some preliminary experiments were performed with fine-grained sand in the Fluvial Mechanics Laboratory to see the sequence of bedform development. At the moment heterogeneous bed material is being prepared by mixing various size fractions (medium to coarse sand and pebble). Artificial ripples and dunes, having different dimensions and lee face angles, have been designed and will be sent soon for construction.

R. Mazumder

Sedimentology and Palaeoclimatology of the Upper Gondwana Succession in the Satpura basin

Petrological, mineralogical and geochemical characteristics of the Permo-Triassic sediments in the Satpura Gondwana basin as well as the Precambrian basement rocks lying south of the basin margin have been analysed to identify source-sediment lineages in relation to basin tectonics, palaeoclimate, sediment transport-history, depositional conditions, and diagenetic environments. The study suggests sediment derivation from predominantly felsic rocks of upper continental crust. However, subordinate contribution from mafic, and meta sedimentary rocks of the Precambrian basemaent is also evident. The results suggest craton interior type prvenance and passive margin tectonic setting for the Satpura basin, which are mostly consistent with intracratonic, pull-apart origin of the Satpura basin. The temporal changes in petrological, mineralogical, geochemical characteristics of sediments also reflect change in sedimentation regime from glacio-marine, glacio-fluvial to fluvial, fluvio-deltaic and fluvio-lacustrine under climatic spectrum of cold, arid to temperate, humid to warm, semi-arid.

S.N. Sarkar

Physicochemical studies of self-assembled systems (microemulsions and reverse micelles) involving mixed surfactants

To explicate the nature of the oil/water interface, which plays an important role for stability to these dispersions, a systematic studies have been taken up to insight detailed knowledge on (a) phase diagrams of pseudo-quaternary systems, (b) the interfacial composition (relative population of surfactant and cosurfactant in the interfacial region), (c) the distribution of the cosurfactant between the oil and water, (d) the effective packing parameter (P_{eff}) at the threshold level of stability, (e) solubilization limit of water in water-in-oil (w/o) microemulsion systems, (f) thermodynamics of transfer of cosurfactant from the oleic phase to the interface and (g) structural parameters [radius of the droplet (R_e) and waterpool (R_w), the variation of effective thickness of the interfacial layer (d_l), aggregation number of surfactant (N_s) and cosurfactant (N_a) at the droplet interface and number of droplets (N_d) for mixed surfactant(s)/cosurfactnat(s)/ oil (biocompatible and hydrocarbons)/water (NaCl) self-assembled systems under varied physicochemical conditions [with special reference to molar ratio of water to surfactant(ω), mole-fractions of the nonionic surfactant to ionic surfactant, $X_{nonionic}$,temperature etc.] using the dilution method, instead of using sophisticated techniques like SANS, SAXS and DLS etc. All ingredients [viz. surfactant(s), cosurfactant(s), oil(s)] were chosen in such a way that the role of their charge-types, hydrophobic moiety, size and type of their polar head groups (for cationic, nonionic and anionic surfactants), lipophilicities of the cosurfactants, chain length of the hydrocarbon oils and structure of the biocompatible oil. Some of the studied systems are summarized as follows. (CTAB+Brij-58)/ butanol (pentanol)/ n-heptane)(n-decane)/ water, (CPC or SDS or Brij-35)/ n-pentanol/ decane (dodecane)/ water (sodium chloride), (CTAB+Brij-35) or (SDS+Brij-35)/ n-pentanol/ isopropyl myristate (IPM)/ water, (CPC+Brij-58) or (SDS+Brij-58)/ pentanol/ n-heptane (n-decane)/ water. The results have been analyzed in a comprehensive manner to arrive at a conclusion as envisaged

through the objectives of the study. The prospect of using these w/o micoremulsions for the synthesis of nanoparticles with small size, have been discussed in the light of the radii of the droplet and water pool, the extent of variation of effective thickness of the droplet under molar ratio of water to surfactant and temperature.

An attempt has been made to synthesize and characterize nanoparticles/nanocomposites by using the microemulsion technique, wherein different microemulsions containing reactants are mixed together and nanoparticles/nanocomposites are produced through reaction, nucleation and growth in mixed surfactants of self-assembled systems specially the mixtures AOT (anionic) and nonionics (of different hydrophobic moiety and polar head group in different proportions) in hydrocarbon oils of different chain lengths. These kinds of studies are rarely reported in literature.

B. K. Paul

Northeast Project-I: Geomorphology and sedimentology in a foreland basin setting: A study in parts of northeastern Himalayan foothill regions

In order to correlate the erosional patterns of the orogen with the depositional units in the alluvial plain a new digital terrain analysis technique was developed to study the spatial pattern of hinterland erosion and to estimate sediment contributions from individual drainage basins. The results indicate that the intensity of orogen scale erosion shows considerable lateral variation and the zone of maximum erosion occurs at the central part of the orogen in the catchment basin of Gandak River of Nepal. The analysis of TRMM precipitation data has been taken up to understand the relationship between the pattern of erosion and precipitation.

A number of textbooks and publications had perpetuated a notion that Kosi has gradually shifted from east to west in last 200 years over the surface of Kosi megafan. In 2008, Kosi changed its course abruptly and flowed through the central part of the megafan causing a devastating flood in a region that was not considered as flood-prone. A scrutiny of a series of maps published since 1760 suggests that the prevalent notion is erroneous and over most of this period Kosi maintained a straight north-south course running through the central part of the megafan. It was artificially confined to its western-most position by man-made embankments during middle part of the twentieth century. During the 2008 flood, Kosi attempted to re-occupy its original course and possibly will do it again if not properly managed.

The studies on the Tista and Kosi megafans are in progress. Preliminary age data indicate that the Quaternary deposits of Tista region are younger than those of the western part of the Ganga plains.

P. Ghosh, T. Chakrabarty and R. Kar

North-East Project-II: Thrust sequences, cross faults and fault zone rocks in the Eastern Himalaya: partitioning of ductile displacements and brittle fault slips

In continuation of earlier work in the Darjeeling and Sikkim Himalaya, field traverses in western Arunachal were carried out. Preliminary analysis of data from Bhalukpong-Tippi-Sessa sector shows that the Middle Siwalik succession here is cut by N-S trending reverse faults in an imbricate zone which may reflect the lateral constraints emanating out of complex plate motions near the eastern syntaxis of the Himalaya and beneath the Indo-Mynamar Ranges. Such structures indicating E-W contraction is absent in the in the Sikkim-Darjeeling sector. On the other hand transverse normal faults, often in conjugate pairs, from the Lesser Himalaya as well as the Higher Himalaya west of Tawang lend support to the view that through the Eastern Himalaya late strain release is partitioned into orogen parallel extension manifest mostly as brittle structures, and the usual south vergent fold-and-thrust structures. In the Dirang-Sela-Tawang-Zimmithang sector, gross elevation difference in

MCT outcrops may be related to E-W folding and block faults controlled by both orogen parallel and transverse fault systems which transect the Higher Himalaya.

Microstructural and petrographic studies and EPMA analyses on select samples from the Darjeeling and Sikkim Himalaya suggest distinctive kinematic and thermotectonic evolution of the psammopelitic enclaves within the biotite granite gneiss (HHC) in the hanging wall of the MCT and the garnet bearing Daling schists in the footwall. High-temperature (sillimanite grade) crystal plastic deformation of quartz and feldspar in the hanging wall is associated with contemporaneous microcracking, under general non-coaxial deformation. Almandine garnets within the enclaves contain folded inclusion trails with included prograde biotite. Biotite granite gneiss (stromatic migmatite) have magmatic garnets with biotite and palgioclase inclusions of random orientation, and contain more spessartine molecules (5-6% MnO2) than those in the enclaves. In the phyllitic rocks (Daling) of the footwall, snowball garnets have folded inclusion trails of small-elongated quartz and ilmenite in the core. Folded trails of Si within the core of garnet porphyroblast indicate prograde metamorphism up to garnet grade coupled with non-coaxial deformation, followed by retrogression of garnet to biotite. A second non-rotational deformation apparent from straight quartz fibres in pressure fringes occurred under chlorite grade of metamorphism.

D. Saha

Physics and Applied Mathematics Unit

Theoretical Condensed Matter Physics

The study of semiconductors with spin orbit interaction (Rashba and Dresselhaus type) is of much recent attraction. It has been shown that if the non-Abelian spin-orbit gauge field strength is split into two Abelian field strengths, the Hamiltonian of the system can be re-expressed as a Landau level problem. The quantum levels were created with up and down spins with opposite chirality and lead to the interesting quantum spin Hall effect.

B. Basu

The physics of atoms with permanent electric dipole moment and non-vanishing magnetic moment interacting with an electric field and inhomogeneous magnetic field has been studied. This system has been demonstrated as the atomic analogue of Landau quantization

B. Basu

An analytic study (and hence modeling) of electronic behaviour in a quantum (nano) ring was carried out. The magnetic property of this system has been studied. The results are being verified numerically.

A. K. Roy

A new approach was applied in studying Graphene where a generalized form of Foldy-Wouthuysen formalism is used. General results for a distorted Graphene lattice were given that agree with existing results for a uniform distortion.

S. Ghosh

Quantum Mechanics

Isospectral partners of (non Hermitian) generalized Swanson models have been obtained and they are shown to be related to the original models through pseudo super-symmetry. Bound states in continuum (BIC) have also been studied within this framework. Partial results have also been obtained in the area of models with a minimal length.

P. Roy and A. Sinha

Research Activities

Complexified version of a specific form non-linear oscillator has been studied. The classical aspect of dynamics shows interesting behavior through the structure of orbits that has relevance in PT-symmetric quantum mechanics framework.

S. Ghosh

Various generalizations of the quantum nonlinear oscillator e.g. exactly solvable, quasi exactly solvable and non-Hermitian variants have been studied. The details of the revival structure of the coherent state of the nonlinear oscillator arising from different time scales underlying the quadratic energy spectrum have been investigated.

B. Roy

A method to obtain exactly solvable Schrödinger potential has been developed using Supersymmetric Quantum Mechanics and the properties of special Jacobi Polynomials. Also an innovative method for obtaining C-operator for *PT* symmetric quantum system is being attempted.

R. Roychoudhury

The science of quantum dots (QD) has become quite exciting in recent times due to the impressive developments in semiconductor technology. The analytical solutions to one-particle Schrödinger equation for an electron in a quantum dot with a short-range confinement potential in the presence of Rashba spin orbit interaction and external magnetic field were presented.

B. Basu and B. Roy

A framework has been developed where partial reduction of wave packet is considered depending on certain conditions. The connection with weak measurements as proposed and developed by Aharanov et al is under investigation.

S. Roy

Quantum Information Theory

Quantum correlation is a surprising feature of entangled quantum states. The impossibility of reproducing quantum correlation by any local realistic theory is revealed by violation of Bell's inequality. Any two-qubit pure entangled states violate some Bell's inequality. Whether same result holds for three or more qubits still remained unresolved. The problem has been solved for three qubits showing that any three-qubit pure entangled state also violates a Bell's inequality. The problem will be further probed for more than three qubits. The study of Hardy's non-locality in the context of generalized non-local theory is another interesting area where some results have been found.

G. Kar

Study of multi-partite quantum correlations is an important issue in quantum information theory. It was proven that the generalized W class of N-qubit states are uniquely determined by just their bipartite reduced marginal. This reveals the bipartite nature of entanglement in W states. The result is valid in higher dimensions also.

P. Parashar

Quantum Field Theory

In the context of non-commutative quantum field theory, a bosonized version of chiral fermions interacting with U (1) gauge fields valid to all orders in the non-commutative parameter has been constructed.

S. Ghosh

High and Ultrahigh Energy Physics

In the domain of High Energy Physics an alternative explanation for the diagnostics of the so-called quark-gluon plasma (QGP) has been assiduously built up. Besides, the properties of "nuclear modification factor" for RHIC-interactions have been assorted and analyzed in great detail. Very recently, in the area of Astroparticle Physics, a breakthrough into the understanding of some reported 'anomalies' has been achieved by refurbishing an old model proposed by the same scientific work.

S. Bhattacharyya

Gravitation and Cosmology

A new formulation for obtaining gravitational anomaly has been proposed based on the spectral flow approach of chiral gauge anomaly. This will be relevant in the context of Hawking radiation from black holes because here Hawking radiation itself plays the role of the spectral flow of states from positive (negative) energy to negative (positive) energy.

S. Ghosh

A new paradigm to explain the expansion history of the universe as well as formation and evolution of cosmic structures leading to possible explanations for dark energy and dark matter has been developed. Based on the embedding geometry in a generalized gravity framework, it has been shown that the generalized Einstein equations are capable of addressing issues related to the dark entities of the universe from a more fundamental point of view. The observational sectors of this paradigm have also been addressed to a great extent, which may lead to a spectrum of possible aspects related to cosmic constituents.

S. Ghosh and S. Pal

Cosmology and Theoretical Astrophysics

In the Cosmology sector, a technique to study relativistic perturbations in brane cosmological scenario has been developed, which gives rise to a dark matter candidate in explaining formation of cosmic structures (stars, galaxies etc.). Secondly, a framework of generalized particle dynamics has been proposed, a significant consequence of which is to generate an effective negative pressure on the cosmological universe resulting in dark energy effects in modeling present acceleration of the universe.

Cosmological braneworld solutions have been obtained and issues related to localization of gravity and other matter fields have been addressed. In the Astrophysics sector, a formalism of gravitational lensing by objects in generalized gravity theories involving two potentials has been developed and the observable quantities have been calculated and confronted with data for typical astrophysical objects like galaxies and clusters.

S. Pal

Interaction of a Three-level Atom with a Single-mode Field

An extension of Jaynes - Cummings model has been studied by adding a further atomic level to support a second resonance and cooperative effects in multi-atom systems. A successive passage of a three-level atom in the V configuration interacting with one quantized mode of electromagnetic field in a cavity has been considered to study atomic inversion and entropy evolution of the state.

The generalization of standard Jaynes - Cummings model of two-level atom to three-level atom interacting with a bimodal field in a cavity has been studied. It has gained substantial interest in studying expected collapses and revival of the Rabi oscillations and have been found that the Rabi oscillations in the atomic population and their accompanying collapses and revivals diminish in

strength if the atom is prepared in particular combinations of atomic states. Particular linear combinations of atomic states enable one to achieve coherently trapped population in the cavity.

P. K. Das

Parallel networking in interacting Fock space

The state space modeling of closed optical QED feedback control system in interacting Fock space, has been shown to be a generalization of Langevin stochastic model in boson Fock space. The design of quantum networks of the feedback systems of QED cavity using beam splitter device in interacting mode and their stability analysis using Nyquist criterion has been studied.

A new method for generating multi-state entangled states by designing quantum networks of the closed optical QED cavities connected in parallel has been studied. The Nyquist stability of the quantum feedback control system in the interacting Fock space using beam splitter device has been analyzed. The generation of W, W-class and GHZ states has been discussed by constructing respective composite networks of the optical feedback QED cavities.

P. K. Das

Astro Optics

Analysis of extinction spectrum of Astronomical silicate and graphite with a view to applications in the area of interstellar dust modeling were studied. A part of the work has been done and is being published. The remaining part is being pursued.

A. K. Roy

Theoretical Plasma Physics

Solitary wave and double layer solutions in dusty plasma in a magnetic field has been studied. This study is being extended to non-planar geometry and relativistic plasma.

R. Roychoudhury

Planck Scale Physics and Cellular Network Theory

Cellular Network Theory has been proposed to understand the space-time at Plank Scale. Kind of self-similar processes are supposed to be involved in the emergence of space-time around Planck Scale. Recently, Agent based simulations (using Net Logo Software) has been done successfully.

S. Roy

Bayesian Approach to Data Analysis in Astronomy

Bayesian semi-parametric methodology has been used to study the redshift data of quasars from SDSS catalogue. This clearly shows the non-linearity between the apparent magnitude and redshift at high redshifts. It will shed new light on the issue related to origin, evolution and acceleration/ deceleration of the universe.

S. Roy

Flow over Dunes and Impact on Sediment Transport

Turbulent flow and its characteristics over dune shaped structures with or without surface waves, and understanding its impact on sediment movement has been studied. The presence of surface waves and bottom undulations changes the flow dynamics and consequently the suspended sediment concentration changes significantly. It has been recognized by geologists that the deposits of river dunes adopt great significance in many ancient sedimentary successions because they are one of the most common depositional bedforms, forming in the range of sediment sizes from silt and sand through gravel. Then the question arises here: how the processes of flow over dunes lead to erosion,

transportation and deposition? The present study addresses the turbulence characteristics of flow along a series of static dune shaped structures to understand the physics of flow.

B. S. Mazumder

Flow Visualization and Image Processing

The digital imaging technique has been used to characterize the particle movement in the light of particle motion, displacement and orientation of particles and their trajectories, particle rotation and their interactions with the boundary layer. The most striking phenomenon observed in this study was that the fluctuations of angle of orientation of any particle follow statistically the Gaussian distribution, which may be closely related to fluctuating shear stress. The shear stress is the differential convection to the fluid layers, which causes the rotation to the particles. The image processing technique is a new emerging tool to understand the tracer particle movement at the turbulent boundary layer flow. The visualization of flow field using image-processing technique has been studied for the first time using sophisticated equipments.

B. S. Mazumder and A. Bhattacharya

Convection-diffusion Process

Transport of reactive substances due to the shear effect of flow has been studied analytically as well as numerically in the annular pipe due to axial convection and radial diffusion in an oscillatory flow subject to reversible phase exchange and irregular absorption at the outer wall. This study provides the basic mechanism of dispersion of contaminants in open-channel flows relevant to river geometry, estuaries or tidal basins. Dispersion of contaminant is important not only to the physical process of matter transport, but also to the biological processes of birth and growth of plank-tonic larvae in the sea.

B. S. Mazumder

Water Waves

Interaction of water waves with surface discontinuities, wave scattering by two nearly vertical thin plates, singularities in water with an elastic solid cover, wave scattering by bottom undulations in a two-layer fluid, wave interaction with cylinder, sphere submerged in two-layer fluid with an ice-cover, construction of wave-free potentials, waves in beaches have been studied.

B. N. Mandal

Integral Equations

Numerical solutions of integral equations of various types have been studied by using Bernstein polynomials, by using the theory of wavelets, solution of dual integral equations with Bessel function Kernel.

B. N. Mandal

Dynamical System and Chaos

In recent times much interest is taken on various mathematical aspects of the dynamical system of equations. In the present scheme, we have considered two systems of such equations e.g., i) the Rossler system and ii) Schimizu and Morioka system. For both the case, we have carried out the stability analysis of the motions of the systems and examined as well as the influences of controlled parameters on the systems by perturbation scheme through Lyapanov's method.

H. P. Mazumdar

Turbulent Boundary Layer

An improved version of two-layered turbulent boundary layer model has been constructed from sophisticated measurements of ZPG turbulent boundary layer data. The theory, developed thus has

been extended to the case of turbulent boundary layers with adverse and favourbale pressure gradients. To establish a general model for the turbulent boundary layer, the present approach is to be applied to other cases including turbulent boundary layer flow with suspended sediments.

H. P. Mazumdar

Fluvial Mechanics Laboratory

Interdisciplinary research work is going on involving applied mathematicians, geologists and statisticians. Various problems of Applied Fluid Mechanics, turbulence, sediment transport modeling, wave-current interactions, flow visualization and image processing, convection-diffusion process (theoretically as well as experimentally) have been studied. The results of these investigations are of use to sedimentologists, geographers, hydraulic engineers and oceanographers interested in sediment transportation, fluid-particle interactions, bedform dynamics and deciphering of palaeo-hydraulic conditions in ancient streams etc.

B. S. Mazumder

Brain Function Modeling

The oscillatory diffusional sequence of potassium ion channel as observed by McKinnon *et al.* is one of the outstanding problems in ion channel dynamics & information processing in brain. Recently, along with Professor Rodolofo Llinas & collaborators we have successfully simulated the above dynamics based on Generalized Langevin Equation. This will shed new light on the issue of applicability of quantum mechanical paradigm in brain function.

A generalized Langevin framework has been proposed to study the dynamics of potassium ion channel. The oscillatory sequence has been shown to be possible within this framework. This confirms the observational findings of McKinnon.

S. Roy

Multivariable System and Control Theory

Works on Identification, Realization of systems has been done. Numerically reliable algorithms havebeen developed. Numerical methods have been developed to design non-interacting controller for Descriptor Variable system. Stability of the system has also been studied. Dynamical system of equations in the form of Schimizu-Morioka has been studied. Integrals of motion are obtained by considering the leading behaviour of the system in the neighborhood of a singularity.

S. Gangopadhyay

Econophysics

In the field of econophysics, the size distribution of urban agglomerations for India and China has been studied. The scaling exponent for the Zipf's law with the census data for India and China has been estimated. The goodness-of-fit tests of the estimated distributions were performed using the Kolmogorov-Smirnov statistic.

B. Basu and K. Gangopadhyay

Biological Sciences Division

Agricultural and Ecological Research Unit

Natural resource inventorying using satellite imagery and GIS tools and technology intervention at eastern plateau and coastal areas of West Bengal

Satellite imageries of Birbhum and South 24 Parganas districts of West Bengal have already been acquired. Digital analysis of Birbhum district has been completed to identify the natural resource status

and land use pattern as well using Geometica software for remote sensing. A series of experiments have been conducted at Agricultural Adoptive Research Farm, Bidhan Chandra Krishi Vishavidyalay, Sekhampur, Birbhum. One is on baby corn – legume-intercropping system where the objective was to assess the advantage/disadvantage of cereal legume intercropping system. The effect of cereal on biological nitrogen fixation by the legumes is another aspect of the study. The other experiment is on effect of biofertilizer on baby corn based cropping system. In this experiment the direct and residual effect of vermicompost, VAM etc are being studied.

P. Banik T. Sasmal, P. K. Ghosal & G. M. Saha

Introducing Tropical Sugar Beet `TSB` (*Beta vulgaris* L.) in different places of West Bengal: A Study on Yield Performance and commercial potentialities

Sugar beet (*Beta vulgaris* L.) was cultivated in sub tropical areas only as winter crop, but recently the Tropical Sugar Beet "TSB" cultivars have been developed that led to extension of its area of cultivation commercially. We have been trying to establish the new varieties of this crop in this agro climatic region through Agricultural Research Farm of State Govt. Nitrogen plays dual role on this crop; it has a positive relation with root yield and has a negative relation with sugar concentration, which can be checked only through potassium supplement with appropriate doses. We have found out from our earlier experiments that out of thirty-six different N: P: K fertilizer combinations, the best combination varied between N150-200, P60-100 and K100-150 kg/ha. During last year (2008-09) experiment we have found that out of 6 varieties of "TSB" namely SANDRINA, ARRIBA ESPERANZA & CAPITANA from JK Agri Genetics Ltd Hyderabad and INDUS & SHUBHRA from Syngenta India ltd. Pune performed well.

S. Barik

Development and value addition of innovative agro-entomotoxic materials from natural sources

A large number of spherical solid Ag and Au nanoparticles (size range 1-100 nm) have been developed and extensively characterized using DLS, TEM, SEM, EDAX and UV-VIS spectroscopy Currently formulations for field application on insects are being prepared. Small scale testing in the laboratory on the *Sitophilus oryzae* is in progress. Solid nanoparticles from other natural sources like volcanic soil and fly ash is in final stages of standardization

A. Goswami

Integrated Nutrient Management for Sisal cultivation in laterite soil of Girdih, a Sub-Tropical Plateau Region of India

Sisal (*Agave sisalana* Perrine) is a perennial strong hardy fibre yielding plant. The fibre is produced from its leaves. Intercropping with elephant yam, horse gram, linseed, peas, Sesame, Niger etc has been initiated. Various doses of manures and fertilizers have been used, and yield data of the intercrops have been collected

The study is in progress on the following areas:

1. The impact of integrated nutrient management
2. Possibilities of growing pulses, oilseeds and elephant foot yam as intercrops between two double rows of sisal.

M. Ghose, B. Sarkar and R. Dasgupta

Mycorrhizal status of Mangroves of the Sundarbans

Mycorrhizal infection may be ecologically relevant for colonization of plant community and the arbuscular mycorrhizae (AM) indeed, an ecological reality for colonization and development of mangrove also. Quantitative estimation of mycorrhizal colonization of mangroves and mangrove associates of different islands of the Sundarbans has been studied. VAM spores have been isolated, and identified from the rhizospheric soils. Effects of physico-chemical properties of soils and tidal

inundation on the mycorrhizal status have been studied and effect(s) of root exudates on VAM spore germination and hyphal growth.

M. Ghose and T. Kumar

Monitoring of pond biodiversity to assess the ecological status of ponds

Six ponds with diverse aquatic plant forms have been studied to ascertain their floral diversity. The effect of natural versus cemented embankment in ponds on the floral diversity was also investigated. Altogether 30 plant species belonging to the three growth forms (emergent, floating and submerged) were found to occur in these ponds. Variation was observed in species number between ponds but seasonal variation for species within ponds was not evident. Greater species diversity was observed in ponds, which were used for anthropogenic purposes as compared to unused ponds. Among the growth forms, the emergent flora occurring in ponds with natural embankments was found to contribute most to species diversity. Plant diversity was found to reduce drastically as a consequence of cementing the embankment of ponds.

Anjana Dewanji, P. Ghosal, C. Medda,
Anup Dewanji and D. Sengupta

Allelopathy in Natural and Manipulated Ecosystems – with reference to root exudates, leaf leachates and fruit pulp

Allelochemicals in the synthesis of the biopesticides and growth promoters is emerging an important area. Allelopathic activity of *Tamarindus indica* L. and *Artocarpus lakoocha* has been studied. Five active allelochemicals have been isolated, purified and crystallized from *Tamarindus* leaves. Of which one is Heptadecanoic acid with 270 mol. wt and another is benzyl derivatives with mol. wt. 390. Both the compounds have antifungal and antibacterial activity and also showed concentration dependent variable activity. In *Artocarpus lakoocha* Roxb., three potent bioactive compounds have been recovered. Of which one showed strong antibacterial activity against *Escherichia coli, Cercina lutia, Streptococcus sp, Staphylococcus aurius, Cercina lutia, Micrococcus aurius, Micrococcus roseus,* another showed strong antibacterial activity against *Aspergillus niger, Aspergillus tamarii, Aspergillus fumigatus and Penicillium sp.* The third compound showed stimulatory activity against rice, wheat and mustard

S Mandal Biswas and S. Chanda

Exploration of Plankton Dynamics and Associated Ecosystems: Field study, Laboratory Experiment and Mathematical Modeling

We have worked on two fundamental problems on ecology and general biology respectively known as 'plakton paradox' and 'paradox of enrichment'. We concluded that toxin producing phytoplankton be a possible solution to resolve the paradoxes. We also proposed a model for explaining both red tides and recurring phytoplankton blooms. Three assumptions are made, namely the presence of toxin producing phytoplankton, the satiation phenomenon in zooplankton's feeding, modelled by a Holling type II response, and phytoplankton aggregation leading to formation of patches. The dynamics of the plankton population is shown to depend on the fraction of the phytoplankton population that aggregates to form colonies and on the number of the latter.

J. Chattopadhyay

Chemical and microbiological studies on Haritaki (*Terminalia chebula* Retz.) against uropathogenic *Escherichia coli*

Terminalia chebula is a medicinal plant widely available throughout India and is always listed first in Ayurvedic Materia Medica because of its extraordinary powers of healing. The plant is used

extensively in the preparation of many Ayurvedic formulations for infectious diseases such as chronic ulcers, leucorrhoea, pyorrhea and fungal infections of the skin. Studies conducted in our laboratory revealed that ethanolic extract of Haritaki fruits (Terminalis *chebula* Retz.) exhibited strong antibacterial activity against uropathogenic *Escherichia coli* both in agar well diffusion and macrobroth dilution assay methods with low MIC and high total activity values. Chemical analysis revealed that high concentration of phenolic compounds present in Haritaki fruit may be responsible for this activity. These promising findings support the use of Haritaki fruits for human and animal UTIs (Urinary Tract Infections) therapy and reinforce the importance of ethnomedical approach as a potential source of bioactive substances.

R.R. Chattopadhyay, *A. Bag* and S.K. Bhattacharyya

Study of Molecular Genetic Diversity of some degraded Mangroves of Sundarbans

The mechanism of gene flow and the distribution of genetic variation within and among populations of some degraded mangrove species in Indian Sundarbans has been assessed by PCR based genetic marker technique. Genetic variation in natural population may vary across different geographic and different climatic areas either by biochemical or genetic (isozymes and DNA) markers. The result of this work may provide information towards the priority areas for conservation strategies.

S Das, P Ghosal and K. Bhattacharya

Biological Anthropology Unit

A molecular genetic study of couples with recurrent spontaneous abortions

The HLA based work on the couples with recurrent spontaneous abortions and the recently taken up project on the genetic etiology polycystic ovary syndrome have considerable social relevance. The findings on the HLA based work, which is in the concluding stage, may help in genetic counseling of these couples and in designing appropriate therapeutic measures

B.M Reddy

Diet, Activity and Aging: A Prospective Study among the Elderly of Kolkata

The project aims to evaluate age related variations in respect of selected biological/health characteristics among a sample of middle aged and elderly population, having sociocultural homogeneity, inhabiting Kolkata in relation to dietary and physical and mental activity patterns. It examines the effect of chronic (habitual) calorie restriction on cardiovascular and brain aging; and evaluates the role of psychosocial factors measured in terms of perceived stress and behavioral factors, measured in terms of nature and extent of physical and mental activity in age related cardiovascular changes, and cognitive decline and its modulation by calorie restriction among a group of elderly non-obese individuals of Kolkata

B. Mukhopadhyay

Human Genomic Diversity

Genetic affinity of Tibeto-Burman populations and their genetic relationship with Austro-Asiatic, Dravidian tribes of India and with other East-Asian populations has been investigated. The findings indicate that the morphologically and culturally similar but linguistically diverse tribes of Austro-Asiatic and Dravidian tribes show close affinity suggesting common antiquity, and genetic diversity among the linguistically same, but morphologically and culturally diverse tribes of Mon-Khmer and Mundari speakers of Austro-Asiatic.

Research Activities

Phylo-geographic distribution of mtDNA and Y-chromosome diversity in India

Overall pattern of mtDNA macro-halplogroup distribution of M, N and its subhaplogroup distribution among diverse populations shows patterns with respect to region, linguistic and ethnic affiliations.

Modelling of abnormal proteins associated with Park 1 and Park 8 loci with respect to Parkinson's disease and docking with appropriate ligands

Park 1 and Park 8 are some of the most predominant loci involved in the Parkinson's disease. The abnormal alpha-synuclein structure, which was not been available. Three models that have been generated -- for VAR024954 (Y199C), VAR024958 (G20195) and VAR024959 (12020T) – for the variants of *LRRK2* protein showed significant differences in Ramachandran Plot.

T.S.Vasulu

Human Genetics Unit

The Unit has been pursuing research projects, both internally and externally funded. During the year under review, scientists of this unit published 12 papers in various scientific journals. They have also been participating in teaching activities in the Institute and other Institutions. Brief accounts of research activities are provided below.

Genomic and Epidemiological Studies on Common Diseases in Indian Populations

The focus of these studies is to understand the genomic and environmental contributions to common diseases in India.

Genomic Studies on oral cancer

HPV infection and XRCC1 polymorphisms and risk of oral cancer

One of the mechanisms in HPV related carcinogenesis is inhibition of DNA repair by HPV oncoprotein. We investigated whether polymorphisms at *XRCC1*, one of the DNA repair loci, could modulate the risk of tobacco related leukoplakia and cancer in HPV infected individuals. Tissue DNA from 83 oral cancer, 91 leukoplakia and 100 healthy controls were screened for HPV16/18 infection and polymorphisms at *XRCC1* by PCR-RFLP to estimate the risk of diseases independently and jointly. HPV infection was significantly associated with increased risk of leukoplakia and cancer (OR=2.8, 95%CI=1.2-6.5 and OR=5.5, 95%CI=1.6-19, respectively). Independently, genotypes at three polymorphic sites on *XRCC1* did not modulate the risk of diseases but pooled variant haplotypes increased the risk of leukoplakia in overall and HPV non-infected (OR=1.8, 95%CI=1.2-2.8; OR=2.2, 95%CI=1.2-4.0, respectively) samples but not that of cancer. The association between variant haplotypes at *XRCC1* and risk of leukoplakia is pronounced in non-infected individuals since HPV oncoprotein could inhibit directly the DNA repair activity of XRCC1. But more samples of leukoplakia and cancer are essential to validate these results.

Mitochondrial mutation in oral cancer

Apart from environmental factors like tobacco abuse and HPV infection, host genetic factors have been shown to play vital roles in oral leukoplakia and cancer development. In various cancers, mutations in the "D-loop" region and 4,977bp (~5kb) deletion in the mitochondrial DNA (mtDNA) have been reported in different studies. We investigated ~5kb deletion in buccal smears from 150 healthy controls and biopsy samples from 59 leukoplakia and 69 cancer patients using PCR based method. Mutations in D-loop region were investigated in a subset of patients and controls (24 controls, 24 leukoplakia and 44 cancer patients) by re-sequencing. The ~5kb deletion was significantly more in

both leukoplakia (OR=41.9, 95%CI=4.7-375.6) and cancer tissues (OR=30.3, 95%CI=3.6-259.4) compared to controls. Somatic mutations in D-loop, on the other hand, were significantly more in cancer tissues compared to either control (Z-score=5.6) or leukoplakia (Z-score=4.8) tissues. A 50bp deletion in D-loop region was also observed in few of the cancer and leukoplakia tissues. Thus ~5kb deletion was found to be prevalent among both leukoplakia and cancer tissues but D-loop mutations were detectable only in cancer tissues suggesting that "common" ~5kb deletion is an early event in carcinogenesis but D-loop gets somatically mutated not until pre-cancer progresses to full-blown cancer. The 50bp deletion in the HVS 2 region seems to be more common than earlier thought to be.

B. Roy

Genomic studies on cervical cancer

HPV16 is the most prevalent viral isolate accounting for majority of cervical cancer (CaCx) cases in India. Other than the significant role of viral *E2* gene-disruption, viral DNA load is also likely to influence the risk of CaCx development. To test the hypotheses that high viral load is associated with CaCx development either independently or in association with viral *E2*-status (intact or disrupted) and age of subjects, a case-control study (152 CaCx cases and 87 controls, all HPV16 positive) was undertaken. Viral load per 100 ng genomic DNA was estimated by quantitative Real Time PCR. Median HPV16 viral load was significantly higher among cases ($2.99x10^7$) compared to controls ($1.92x10^4$), irrespective of viral *E2*-status (**p=0.000**). Logistic regression analysis of Ln(viral load) versus disease status also confirmed the finding (**p=0.000**; **$OR_{age\text{-}adjusted}$=1.261; 95% CI=1.161-1.369**). Inclusion of *E2*-status as a co-variate, enhanced the associations of Ln(viral load) [**p=0.000; $OR_{age\text{-}adjusted}$=1.333; CI=1.207-1.472**] and *E2*-disruption [**p=0.013; $OR_{age\text{-}adjusted}$=5.225; CI=1.426-19.149**] with CaCx. Risk-prediction graphs showed that probability of CaCx increased with viral load irrespective of age and *E2*-status. Among individuals of similar age and viral load, risk increased for *E2*-disruption than *E2*-intactness. At equal probability levels, (i) viral load was higher among those of lower age, irrespective of *E2*-status, and (ii) viral load was higher among those of similar age but having intact *E2*, compared to disrupted *E2*. Significant association of high viral load with the risk of CaCx development either independently or in association with age (high viral load at low age) and *E2*-status (high viral load among *E2*-intact individuals) justifies the potential of viral load estimates as an early marker of disease risk.

The underlying mechanism of cervical carcinogenesis under the impact of oncogenic HPVs is mediated through protein-protein interactions of the host and virus. We determined the complete sequence variations within the LCR, E2, L1, L2, E4, E5, E6 and E7 within a group of HPV16 positive CaCx cases (invasive squamous cell carcinomas) and population controls (cytologically normal). The objectives were to identify sequence variations of HPV16 that could be biologically relevant for oncogenicity of the virus. Of the 215 nucleotide variations recorded within coding regions, 105 (48.38%) were synonymous. Case (n=74) and control (n=24) comparisons revealed that such variations were significantly higher among cases within E2 (p= 0.025), L2 (p= 0.008) and L1 (p=0.02) compared to controls taking into consideration the respective gene sizes. Variations leading to humanized codons were maximal within L2 (n= 25) compared to either L1 (n= 13) or E2 (n= 9) genes of HPV16. While 100% of the latter variations within L2, L1 and E2 were identified among cases, only 32%, 23% and 33% respectively, of such variations were identified within the control samples. The study therefore reflects that synonymous variations within the viral genes implicated in productive infection might be biologically relevant for cervical carcinogenesis, since such codon optimization is likely to provide an advantage to the expression of L2, L1 and E2.

S. Sengupta

Genomic Studies on Other Common Diseases

Adiponectin is an adipose tissue specific protein that is decreased in subjects with obesity and type 2 diabetes. In collaboration with the Madras Diabetes Research Foundation we conducted a study to examine whether variants in the regulatory regions of the adiponectin gene contribute to type 2 diabetes in Asian Indians. The study comprised of 2,000 normal glucose tolerant (NGT) and 2,000

type 2 diabetic, unrelated subjects randomly selected from the Chennai Urban Rural Epidemiology Study (CURES), in southern India. Logistic regression analysis revealed that subjects with TG genotype of +10211T>G had significantly higher risk for diabetes compared to TT genotype. Among Asian Indians there is an association of +10211T>G polymorphism in the first intron of the adiponectin gene with type 2 diabetes, obesity and hypoadiponectinemia.

P. P. Majumder

Statistical Genomics

The focus of these studies is to critically analyze existing statistical methodologies and to develop new methodologies for human genetics, especially for gene-mapping, genotype-environment interactions and human evolution.

Statistical Methods for Analysis of Complex Traits

Some novel statistical methods have been developed for linkage and association analyses of complex genetic traits. These include:

(a) Analytic and empirical comparison of population-based case-control studies and the family-based TDT.
(b) developing a family-based test for association analyses of quantitative traits using logistic regression.
(c) developing a quantile-based regression method for association mapping of quantitative traits using population level data and comparing the method with ANOVA.

Analyses were performed on:

1) Type 2 diabetes and related quantitative precursors.

2) Major psychoses phenotypes including bipolar disorder and schizophrenia

3) EEG as a quantitative endophenotype for schizophrenia

4) Quantitative traits related to RA

5) In connection with our ongoing studies on population genetics and bioinformatics, we are mining public domain databases. One of the most useful and popular population genetic databases is the HapMap. In the course of our work on mining HapMap data, we discovered some major discrepancies. We then designed some wet laboratory experiments to identify the causes of these discrepancies. The relevant details and findings were: The HapMap data are being widely used in human genetic studies. We show by direct resequencing of a 86-kb region of chromosome 1 that the HapMap data are unreliable for this region. This region contains a recent mitochondrial (mt) DNA insertion. The HapMap data report the corresponding mtDNA variation and not the nuclear DNA variation. In view of mtDNA insertions of varying lengths throughout the human genome and considerable segmental duplications, it is necessary to use the HapMap data cautiously.

P. P. Majumder and S. Ghose

Human Population Genetics and Evolution

The focus of these studies is to contribute towards a deeper understanding of human evolution and structure arising from the impact of various evolutionary forces.

South Asia has been a major corridor for the geographic dispersal of modern humans from out-of-Africa to other regions of the world. Genomic markers have provided key information for tracing trails of human migration. Based on our genomic studies in population groups of India, Pakistan and

southeast Asia, we have carried out a comprehensive statistical analyses. An overall view of the migration trails and peopling of South Asia has emerged, though there are still many contentious issues. We have also quantified the extent and nature of genomic differentiation in South Asia, which was found to be high, resulting from a combination of admixture and isolation.

P. P. Majumder

Social Sciences Division

Economic Research Unit

During the period under consideration, the scientists in the Unit have undertaken research, both theoretical and empirical, in diverse areas. Besides research, the members of the unit have been involved in teaching various courses for its Ph.D. programme and for the B.Stat. (Hons.), M.Stat., M.S.(Q.E) and ISEC (regular and specialization). Currently the unit has four Senior Research Fellows and five Junior Research Fellows. The important topics of research are the following.

Agricultural Economics

Investigations have been made on problems related to agricultural economics such as crop diversification, labour use efficiency and employment segregation in rural India.

Manabendu Chattopadhyay

Applied Econometrics Testing for Absolute Convergence: A Panel Data Approach

Recently, new testing procedures for the convergence hypothesis using panel data have been developed. A convergence process is assumed to occur when deviations of a process (say, the per capita GDP) from the cross sectional average approach individual constant values as time approaches infinity. If all these values are zeroes, the convergence process is said to be absolute (convergence in levels). If at least one of these values is different from zero, the convergence process is said to be conditional. A new test has been developed for testing the null hypothesis of absolute convergence against the alternative hypothesis of conditional convergence. The proposed test is robust to cross-sectional dependence. A detailed simulation study has been conducted to examine its performance.

Samarjit Das and Manisha Chakrabarty

Regional Convergence of Growth, Inequality and Poverty in India-An Empirical Study

This study attempts to examine whether there is regional convergence of consumption growth, inequality and poverty across various states in India. Using panel unit root tests that are robust to cross-sectional dependence, it is observed that inequality and poverty indicators converge across both rural and urban level. Consumption growth also converges at urban level but not at rural level. Based on factor analysis, two groups of states for rural sectors, *viz.*, low growth and high growth states are identified, and it is observed that consumption growth converges within each group separately. An attempt at identifying the responsible entities for such divergence-- central or state governments or both is also made.

Samarjit Das, Gouranga Sinha and Tushar K Mitra

Data Envelopment Analysis

The issue of investigation here is earning capacity and poverty of Indian states in Data Envelopment Analysis (DEA) framework. Attempts have been made to measure 'earning capacity of the households

given the households' endowment, ability, potentiality and social opportunities from NSS household level data.

Manisha Chakraborty, Amita Majumder and Chiranjib Neogi

Efficiency and Productivity

The concerns of Indian Banks, among other things are: (i) large volume on non-performing asset and (ii) the problem of excess employees and high staff cost in the domestic banks. An attempt has been made to find the extent of labour congestion and the sources of variation of efficiencies in Indian banks.

Chiranjib Neogi

Financial Econometrics

India is now considered to be one of the most important emerging market economies, and hence empirical determination and forecast ability of important economic and financial variables like foreign exchange rate of India, stock market index and inflation, with due modeling consideration to both the conditional mean and conditional variance should be important as well as useful. Keeping this in mind, research works have been carried out on the following topics by applying modern techniques of time series econometrics. Studying forecast ability of volatility of Indian stock market based on different volatility models; Improved forecasting combining forecasts based on several models; Forecasting uncertainty of inflation in India; Forecast ability of the SETAR, SETAR-GARCH and double threshold GARCH models for foreign exchange rate; Smooth transition autoregressive model and the Markov switching regression model for exchange rate return.

The empirical exercises done on the topics mentioned above throw some light on the nature of volatility in the financial variables concerned, the extent of scope of improvements in the forecast values and also the extent to which these nonlinear models are able to capture volatility, persistence and regime shifts inherent in the financial variables of an emerging/developing country like India. Work has also been on the following two aspects concerning India's foreign exchange rate: (i) Modelling foreign exchange return with macroeconomic variables: A predictive regression approach and (ii) *Long–run relationship between exchange rate and macroeconomic variables.* The predictability of exchange rate return on India using important macroeconomic variables has been carried out from consideration of both short-run and long run

Nityananda Sarkar

Forest Management Policy

Coordination and trust among the forest participatory committee (FPC) members are crucial requisites for the success of any collective forest management activity. However, heterogeneous compositions of user groups do have a determinant impact on the likelihood of success of collective action. Implementing a more egalitarian distributive mechanism for sharing of benefits and costs fairly across the resource users depend on the collective-choice rule used and the type of heterogeneity existing in the community. The study has tried to establish a relationship between various socio-economic parameters and its effect on the condition and existence of forestry using cross-sectional data where forest protection regime is being practiced rigorously for the last one decade.

S. Paul and Snigdha Chakrabarti

Game Theory (Mechanism Design)

Efficient Allocation of Heterogeneous Commodities with Balanced Transfers

This study characterizes heterogeneous-commodities allocation problems where an efficient rule can be implemented in dominant strategies with balanced transfers. It is shown that the class of such

problems is non-trivial and that the associated difference domain is one-dimensional. If the domain satisfies convexity there exists a permutation of the objects for which the associated difference domain is a straight line passing through the origin with positive slope. An interesting feature of the domains is that at most two orderings of the commodities are permissible and, in particular, one ordering must be the reverse of the other.

Manipushpak Mitra and Arunava Sen

Group Strategyproofness in Queueing models

This study shows the incompatibility of strong group strategyproofness and efficiency in the queuing models. In general, pair-wise strategyproofness is also incompatible with efficiency and budget balance in the class of linear mechanisms. A class of mechanisms, which are called the k-pivotal mechanisms that generalize the pivotal mechanism, is then defined. It is shown that k-pivotal mechanisms satisfy weak group strategyproofness. The main result is a complete characterization of the class of k-pivotal mechanisms using efficiency, pair-wise strategyproofness, equal treatment of equals and linearity. The complete sub-class of feasible k-pivotal mechanisms and the 'best' feasible k-pivotal mechanism are identified.

Manipushpak Mitra and Suresh Mutuswami

Game Theory (Voting Games)

Collective Decision Rule

Equivalence between six collections of axioms that all characterize the Carreras-Coleman decisiveness index has been established. A decisiveness index of a voting body, under a given decision rule, is a quantification of the extent of collective decision making power of a voting body. This index measures the propensity of the voting body to a proposed resolution in an unambiguous way. Thus, it is a characteristic of the voting body itself, rather than of any particular member Axioms in each of the different sets are shown to be independent.

Rana Barua, Satya R. Chakravarty and Sonali Roy

Measuring P-power in a Voting Body

P-power of a member of a voting body, the degree of his control over the final outcome, is measured in terms of his expected share in the prize of power. It is shown that a multiple of the Coleman measure of a voter's 'power to prevent action' can be regarded as a satisfactory measure of P-power in the sense that it meets all the desirable postulates for a measure of P-power. A characterization of the measure has also been developed.

Rana Barua, Satya R. Chakravarty and Palash Sarkar

Index Numbers

Spatial Index Numbers

A method of estimating multilateral price index numbers from cross-section consumer expenditure data on different items using Engel curve analysis has been proposed. The novelty of the procedure is that it does not require item-specific price/unit value data or any explicit specification of functional form of the coefficients of the Engel curve. An underlying assumption, however, is that the Engel curve (in budget share form) is quadratic logarithmic and the form is the same for all the situations being compared. This simple method is likely to be particularly useful in studies of regional comparisons of poverty and inequality, optimal commodity taxes and tax reforms, especially when only grouped consumer expenditure data are available. The method is illustrated using published data of the 50th round (1993–94) and 55th round (1999-2000) consumer expenditure surveys of India's National Sample Survey Organization (NSSO).

Dipankor Coondoo, Amita Majumder and Somnath Chattopadhyay

Index Number Theory: An Axiomatic Approach

An axiomatic characterization of a composite price variable to approximate a Price Aggregator Function has been developed. Matsuda (2006) had proposed this price aggregator in investigating linear approximations to the Quadratic Almost Ideal Demand System (QUAIDS).

Amita Majumder

Industrial Organization

On the comparison between Bertrand and Cournot outcomes in mixed markets

The classic comparison between Bertrand and Cournot outcomes in a mixed market with private and public firms is revisited. The results are strikingly different and often opposite to the ones obtained from a similar comparison in the standard setting with all profit maximizing firms. A welfare-maximizing public firm's price is strictly lower while its output is strictly higher in Cournot competition Private firm's price can be higher or lower in Cournot competition. Despite this ambiguity, it is found that, both firms, public and private, earn strictly lower profits in Cournot. In addition, consumer surplus is strictly higher in Cournot competition if the demand is linear. All these results hold for more than two firms under a wide range of parameterizations. These results also hold under a richer set-up with a partially privatized public firm, where a welfare-maximizing government endogenously determines the extent of privatization. As a by-product of the analysis, it is found that partial privatization always improves welfare in Cournot but not necessarily in Bertrand competition.

Arghya Ghosh and Manipushpak Mitra

On the Rivalry Between Bertrand And Cournot Solutions

The classic comparison between Bertrand and Cournot outcomes in a symmetric differentiated oligopoly where each firm maximizes a weighted average of its own profit and welfare is considered. For general utility functions, the standard Bertrand-Cournot rankings are reversed for all variables-prices, quantities, profits, consumer surplus, and welfare-provided the weight on profit is strictly less than a threshold. Surprisingly, it is observed that the threshold can be arbitrarily close to unity for two widely used utility specifications, quadratic and CES. In particular, for CES utility specification it is established that irrespective of the degree of differentiation, the threshold weight on profit tends to unity as the number of firms approaches infinity.

Arghya Ghosh and Manipushpak Mitra

Efficient Access Pricing and Endogenous Market Structure

This study investigates how regulatory mechanisms influence the nature of competition in a network industry. In the downstream segment of the market, the seller of a differentiated retail product competes with an incumbent firm. The incumbent firm is also the owner of the essential input. The regulator cannot observe the costs of the entrant, and to maximize social welfare designs the retail prices and the access charge that the entrant pays to the incumbent. The optimal access charge is a uniform price that respects the criteria of transparency and non-discrimination that are imposed by the competition and regulation directives in most of the countries. New formulas for retail and access prices adhering to the Ramsey rule are derived. Since the competing firm takes the decision to enter following the choice of the regulatory regime, the nature of the retail market competition is endogenous. It can either be served by both the firms, or can have the incumbent as the monopoly supplier of the retail good.

Kaniska Dam, Axel Gautier and Manipushpak Mitra

Technology Transfer in a Duopoly with Horizontal and Vertical Product Differentiation

The possibility of technology transfer in a horizontally and vertically differentiated duopoly is considered and it is shown that under fee contract there will be no technology transfer if the same firm holds the superior technology as well as the higher product quality. A profitable technology transfer deal will occur if and only if the quality differential is sufficiently larger than the technology differential. In an open economy, however, the existence of a sufficiently high trading cost will make the transfer mutually profitable, irrespective of the degree of quality difference and technology difference. In our model technology transfer results in a higher welfare. Finally, it is shown that in a model with spatial competition there are typical problems for a royalty contract.

Tarun Kabiraj and Ching Chyi Lee

Pre-emptive Merger in a Composite Good Framework

A model of partial merger when there are three goods and three firms and consumers need two goods to complete their consumption is constructed. Therefore these are composite goods, which have both competitive and complementary feature. Pre-emptive incentives of firms for merger, given a target firm, are studied. It is shown that vertical merger strictly dominates horizontal merger. Pre-emption decision is prompted more by the amount of loss if the rival goes for merger. A welfare analysis is also provided While all firms merger maximizes social welfare, under vertical merger consumers are always better off. Industry profit also goes up if the goods are not so close substitutes.

Manas Chaudhuri and Tarun Kabiraj

Under-utilization of Patents and Entry Deterrence: The Case of Pharmaceutical Industry

An attempt to explain why some pharmaceutical companies are observed to withdraw their products before patents are expired and simultaneously introduce new patented (competing) products has been made. Given the specific nature of drug markets the companies in fact increase the entry cost of the potential generic drug manufacturers and thereby lessen competition for new drugs The optimal date of withdrawing the product is determined and comparative static effects of the change of parameters underlying the model are studied.

Sugata Marjit, Tarun Kabiraj and Arijita Datta

Inequality and Welfare

An inequality index is called subgroup decomposable if it can be expressed as a weighted sum of inequality values calculated for population subgroups plus inequality arising from differences among subgroup means. The class of subgroup decomposable inequality indices that satisfies the Bossert-Pfingsten type intermediate inequality invariance is characterized. When the intermediate inequality equivalence concept coincides with the relative notion of inequality, the derived class becomes the Shorrocks generalized entropy family.

Satya R. Chakravarty and Swami Tyagarupqananda

International Economics

Tariffs and Imports: Reporting a Paradox

In a conventional trade model with competitive markets and constant returns to scale (CRS), imposition of tariff on imports by a small open economy necessarily reduces its imports. This study reports a paradox, wherein it is shown that a small open economy in a monopolistically competitive framework and increasing returns to scale (IRS) holds the possibility of a tariff increasing imports.

Interestingly enough, it is shown that a necessary condition for the same is that the intra-sectoral elasticity of substitution be lesser than the inter-sectoral one, a condition reminiscent of Markusen, reported in a different context.

Brati Sankar Chakraborty

A Simple Model of Trade Driven Wage Inequality

A two-factor (skilled and unskilled labour) model of trade is developed incorporating the features of increasing returns and monopolistic competition. The unskilled labour market is modeled in the Shapiro-Stiglitz fashion, exhibiting unemployment in equilibrium. It is shown that trade can very naturally lead to an increase in the skilled to unskilled wage ratio in both the trading countries. Interestingly, this is shown with factor price equalization (FPE) remaining valid. Furthermore with rate of unemployment of unskilled labour being equalized across countries trade pattern can be worked out in terms of the Heckscher-Ohlin primitives, i.e., the factor endowment ratios.

Brati Sankar Chakraborty

Trade and Wage Inequality with Endogenous Skill Formation

The present study develops a two-sector model with one constant returns sector producing basic goods and another increasing returns to scale sector producing fancy goods. A quasi-linear utility function is used to capture the divide between basic and fancy goods. There are two types of productive factors, skilled and unskilled labour, the former working in the skill using fancy goods sector and the latter in the basic good producing sector. Agents differ in their costs of acquiring skill. The model holds possibilities of multiple equilibria and shows that international trade, in spite of equalizing factor prices, also increases the skill premium in all countries.

Brati Sankar Chakraborty and Abhirup Sarkar

Trade and Welfare

An attempt has been made to show the conditions under which patent protection in a developing country raises developed-country welfare in the presence of vertical technology transfer, which refers to a situation where a developed-country firm transfers technology to a developing- country firm.

Arijit Mukherjee and Chiranjib Neogi

Jobless Growth

The phenomenon of jobless growth is the major threat of the modern economic development of both the developing and developed economies. An investigation will be carried out to explain the relationship between productivity growth and the jobless growth in India during the recent period. Also, scope of employment generation due to linkage effect of the newly set up industries with other labour intensive industries will be examined.

Chiranjib Neogi

Polarization

The study of polarization has become very important because of its role in the analysis of income distribution evolution, social conflict and economic growth. An attempt to characterize the difference between positive scale transformations of the between-group and within-group factors of a population subgroup decomposable inequality index as an index of polarization, using intuitively reasonable axioms, has been made. The between-group factor represents the 'alienation' component of polarization and the within-group factor can be regarded as an inverse indicator of the 'identification' component of polarization.

Satya R. Chakravarty, Nachiketa Chattopadhyay and Bhargav Maharaj

Political Economy

Political Economy of West Bengal: An Empirical Exercise

An empirical study with block level data on political economy of West Bengal is in progress.

Chiranjib Neogi and Abhirup Sarkar

Political Economy of a Backward Region

The work develops a political economy model for a less developed region where a significantly large number of people belonging to the informal sector depend on political favours for their survival. The main result is that the party with a better political organization will have the incentive to maximize the size of the informal sector, which will also maximize its probability of winning. In equilibrium this party choosing anti-development policies will have a higher probability to be in power. Thus universal franchise will lead to inefficiencies in such economies.

Abhirup Sarkar

Poverty, Deprivation and Gender Inequality

Measuring Multidimensional Poverty by Unit Consistent Indices

A family of subgroup decomposable unit consistent multidimensional poverty indices has been characterized. Unit consistency requires that poverty rankings should remain unaltered when dimensions are expressed in different measurement units. In particular, we can compare poverty levels of two different communities with different currency units.

Satya R. Chakravarty and Conchita D'Ambrosio

Counting Approach to The Measurement of Multidimensional Poverty

The counting approach to the measurement of multidimensional poverty has been considered. In contrast to earlier contributions, dimensions of human well-being are not assumed to be equally important and different weights can be assigned to different dimensions. A class of individual multidimensional poverty measures reflecting this feature is characterized. In addition, an axiomatization of an aggregation procedure to obtain a class of multidimensional poverty measures for the entire society allowing for different degrees of inequality aversion has been developed.

Walter Bossert, Satya R. Chakravarty and Conchita D'Ambrosio

Analytical Issues on the Measurement of Income Poverty and Gender Inequality

Some analytical properties of income-based poverty indices, gender inequality indices and related problems are the issues under investigation here.

Manoranjan Pal

Women Studies

A study has concentrated on the estimation of both way relationship amongst empowerment and the factors influencing them with the help of structural equation modelling (SEM) approach based on NFHS 2 data. Factors like respondent's occupation and contribution to family income have been found to be the influencing factors in increasing the women empowerment level. But negative influences of husband's education and occupation on women's occupation and financial contribution indicate the forceful involvement of the women in job market reflecting the achievement of empowerment level in restricted sense, not in real sense. This would be the reason for failure in using the facilities provided for the women in India by the government since First Five Year Plan.

Snigdha Chakrabarti and C. Sharma Biswas

Research Activities

Projects:

Poverty and household decisions – an exploration of possible interdependence

An attempt has been made to understand the structural relationships amongst the various attributes related to poverty. Using data from a survey conducted in one village of Kamrup and two villages in Cachar in Assam, India, a structural equation model (LISREL) has been fitted. The results, using limited number of variables, show that there is indeed a two-way relationship between determinants of poverty and poverty itself, thus establishing the self-reinforcing nature of poverty. Some of the main findings are (1) for both districts a hierarchical nature of poverty is evident, (2) food poverty is a determinant of clothing poverty, which in turn determines poverty in terms of housing condition, which again induces poverty in terms of access to information / education / communication, (3) female labour force participation plays no role in modelling poverty in Cachar in contrast to Kamrup, and (4) both in Kamrup and Cachar dissatisfaction with the role of the government in poverty alleviation increases as a person's education, access to information and mobility increases.

Dipankor Coondoo, Amita Majumder, Snigdha Chakrabarti, Sandip Mitra, Subhendu Chakrabarti and D. C. Nath

Impact of Economic Reform on Tribal Poverty

The project has been sponsored by NABARD, Mumbai and started from January this year. During this period, the structured schedules to be canvassed among 1000 households have been prepared. Since the fields will cover three states (viz, Jharkhand, Orissa and West Bengal) the questionnaires were translated into Hindi and Oriya languages apart from Bengali. The local investigators have been selected for all the study areas of three states. Field surveys have been started in the districts of Purulia, Jalpaiguri of W.B., and Dumka and Jamtara of Jharkhand.

Kunal Chattopadhyay, Chiranjib Neogi, Snigdha Chakrabarti

Development of Methodology Towards Measurement of Poverty

Ministry of Statistics and Programme Implementation (MoS&PI) requested Indian Statistical Institute to take up a research project on development of a statistical methodology towards measurement of poverty. This is in view of the fact that the norm of 2400 Kcal for rural India and 2100 Kcal for urban India for calculation of poverty line was prescribed sometime in the beginning of seventies. It is desirable to know whether these norms still hold good as of now as the consumption pattern as well as the quantum of daily energy requirement might have undergone changes during the last 35 years.

Some of the findings and recommendations of the project are given below:

The calorie poverty rates by direct method are always higher than the fixed calorie line method. The poverty rate by the direct method is more sensitive to changes in the consumption and the direct method seems to be superior to the fixed calorie line method in this respect.

Urban poverties are found to be more than corresponding rural poverties when activity levels of adults are not considered.

Calorie poverty rates show an increasing trend whichever method is used except for urban sector during 50^{th} and 55^{th} rounds of NSS.

Two entirely new methods have been proposed in this report – Calorie Decomposition Method and the Error Distribution Method. Poverty Rates found by both the methods are higher than expected. Some modifications of the error decomposition method have also been proposed. The modifications lead to better result in the sense that the poverty rates are considerably lower than the other methods using calorie intakes.

Most of the south Indian states show very high values of the poverty rates. Also these values are relatively higher than those states known to be the poorest states in India. For example Bihar has the rural poverty rate as 0.55, whereas the states like Karnataka and Tamilnadu have poverty rates higher than 0.80.

Manoranjan Pal

Survey of Present Status of Model Steel Villages (MSVs) - evaluation and monitoring

The research project, funded by Steel Authority of India (SAIL) has been undertaken (i) to understand the impact of intervention programmes under Corporate Social Responsibility Programme(CSR) schemes of Durgapur Steel Plant (DSP) on the level of living of the people in 9 Model Steel Villages (MSVs) and (ii) to suggest modification/alteration/remedial measures (short term and long term) with the aim of enhancing the level of income of the households. Two surveys, one at village level and other at household level have been conducted. The data collected have been analysed and the report for first phase of the project has been submitted. The study indicated the existence of poverty, unemployment, illiteracy, low level of infrastructure and incidence of indebtedness. CSR schemes have ensured a positive development through improving the infrastructure, bringing awareness among the villagers, thereby improving the quality of life in the area under study. The present study has focused the need for more income generating schemes keeping in mind the traditional skills and the market in question. The role of NGOs has been appreciated while operating in rural society. However, the functioning of the NGOs must be more transparent and accountable. As a next step, a process of review of the CSR schemes at regular intervals would be undertaken to provide more momentum to the process of development.

Snigdha Chakrabarti, A. K. Adhikari, B. Roy, S. Bandopadhyay, P. Sarkar, K. Chattopadhyay, S. Das and S. Mitra

ISI-ERU & SINP-CAMCS Collaboration: The Kolkata Paise Restaurant Problem and Resource Utilization

The Kolkata Paise Restaurant (KPR) problem, which is an infinitely repeated game with N agents (restaurants), is being introduced. Though the restaurants charge the same price for providing dinner, agents have a strict preference ranking over these *N* restaurants, which is identical for all agents. A sub-class of the KPR problem is identified for which the stage game has the property that the set of pure strategy Nash equilibrium coincides with the socially efficient allocations (allocations leading to a one-to-one mapping between agents and restaurants). Therefore, as long as the set of agents is small and agents are rational, one can sustain any socially efficient allocation as an equilibrium outcome of this sub-class of KPR problem. However, if *N* is large and if agents cannot expect the other agents to be rational then we argue that the KPR problem is intrinsically dynamic. The statistics for the utilization fraction under different 'simple' stochastic strategies is analyzed and the daily fluctuation in the underutilization is found to be Gaussian for the strategies considered here. In terms of strategic and the associated utilization fraction the main findings are (a) with no learning, the utilization fraction on an average is higher in comparison to some 'limited' learning and (b) the statistics for utilization fraction can improve with a strategy where each agent, after getting dinner from a restaurant in period *t*, goes back to the same restaurant in period (*t* +1) (ignoring the ranking of the restaurants).

Manipushpak Mitra, Anindya Sundar Chakrabarti, Bikas K. Chakrabarti and Arnab Chatterjee

Construction and Analysis of Regional Variations of Social Develo[ment Indices in India

The main purpose of this project is to estimate various types of development indices at the state (29) and district (582) level with rural and urban division during last 10 years. Three methods are used: principal component analysis, specific distribution based approach and UNDP's HDI method. It is

tested that there is not any significant difference between the last two methods, though principal component analysis gives birth to different results. Additionally, attempt has been made to link these development indices with economic variables such as poverty, inequality and purchasing power (monthly per capita consumer expenditure). Rural versus urban disparity at the district level has been emphasized.

The initial results of this study are shocking. Firstly, intra-state disparities (read inter-district) in most of these indices are many times more intense than inter-states disparities. Secondly, test of inter-temporal transition shows that there is a strict divergence between 1991 and 2001 among the districts. Thirdly, except Kerala, Punjab, Haryana, Himachal and Gujarat, the rural has become pauperized, while the urban has flourished. Fourthly, the rural in the eastern states of the vertical line from Kanpur to Kanyakumari has remained substantially poor, while the urban in the western states of the line rich. Fifth, districts with higher purchasing power are economically more unequal, less poor and achieved higher social development. On the whole, poverty and social backwardness have been spatially concentrated in very specific districts.

Buddhadeb Ghosh

Economic Analysis Unit

The Economic Analysis Unit (EAU) is engaged in research in quantitative methods in economics and social sciences. Application of these methods to different problems in agriculture, industry and monetary economics is actively pursued. Topics for the current research include estimating the effects of the economic reforms, developing economy-wide models using VAR and VEC methodologies and simulations for estimating production, savings and commodity- wise consumptions in India for the 11th Five year plan period.

Linguistic Research Unit

During the period April 2008 - March 2009, the Linguistic Research Unit of the Institute continued with its research programmes in the areas of *Cognitive Linguistics, Corpus Linguistics and Language Technology, Sociolinguistics and Clinical Linguistics* along with relevant micro-linguistic studies.

Cognitive Linguistics

The unit has initiated the substantivist study of conceptual networks on the basis of *Whole Word Morphology*. Earlier work has demonstrated a connection between this inquiry and the linguistics of lexicophrasal difficulty. The unit now has initiated research in conceptualization kernel studies.

Probal Dasgupta

Corpus Linguistics and Language Technology

The unit has developed a model for corpus-based lexicon in Bengali; designed a model for corpora-based first and second language teaching, developed a model for usage-based electronic dictionary in Bengali, developed a model for corpus-based dialectology, working on a model for usage-based grammar in Bengali; defining rules for automatic POS-tagging of Bengali words; developing an English-Bengali dictionary of idiomatic expressions, set phrases, and lexical collocations for machine translation; developing lexical databases for Basic vocabulary as well as graded vocabulary for modern Bengali.

Niladri Shekhar Dash

Clinical Linguistics

During the last academic year 2008 - 09, the unit conducted important global assessments on children suffering from various neurolinguistic disorders while carrying out its speech therapy programme. These language and cognitive assessments included Boston Diagnostic Aphasia Examination, Boston Naming Test and Rey Auditory-Verbal Learning Test. The process of redefining the speech language pathology nexus revealed that a habilitation program for children suffering from language impairment (L1) calls for thorough up-gradation of present assessment tools. The homogenized therapeutic approach is one such methodology that has been adopted in the upgraded database, generated from detailed analysis of the developmental status of speech sounds of various Indian languages.

Shubhasree Ganguly

Sociolinguistics

The unit has taken up studies in linguistic (lexical and syntactic) difficulty. The sociolinguistic dimension of linguistic difficulty has been studied within single languages, in relation to the mapping between the full conceptualization system and its basic level kernel, and across languages in the Indian context. Here the important target of study has been the place of English in the sociolinguistic fabric of India.

Probal Dasgupta

Projects (Ongoing)

Generation of Differentiated Electronic Lexicon for Bangla

Targets achieved during the academic year 2008-2009 comprise- compilation of a substantial part of paradigmatic sets of Bangla words, semantically and lexically related to each other and supplementing glossaries in the interlexical glossing medium based on Esperanto. This will help in the last and decisive phase of the project in writing lexical entries that are formally explicit and schematic enough to be amenable, in principle, to data entry in machine-readable form; and to establish a corpus of instantiated lexicology in this domain.

Probal Dasgupta

Interlexical Study of Assamese and Boro Nominal Items (New):
Sentences are assembled. Words are retrieved (and occasionally coined). The structuralist exaggeration that retrieval goes all the way up appears in a formalist generative inversion as the thought that assembly goes all the way down, halting at the 'arbitrary' items. But an 'intersecting economies' approach enables the alternative programme, substantivism, which characterizes grammatical representations in terms of distinct lexical and syntactic economies, to attain descriptive adequacy vis-à-vis irregularity and anti-irregularity, and to show that Word Formation Strategies, constitutively non-iterative, cast a 'shadow' that points up the non-assembled character of words.

Probal Dasgupta

Planning Unit, Delhi

Planning unit faculty has, as in the past, continued to work on the cutting edge of economics research, both in theory, as well as empirical analysis. Moreover, much of the research conducted by the unit has relevance for India in particular, and LDCs in general. Bargaining theory has been used to analyze multi-person bargaining with potential applications to the land acquisition problem, an issue of obvious topical interest to India. Theory has also been harnessed to analyze the appropriate role of NGO intervention in micro-finance, with possible direct implications for the SHG-linkage approach to micro-finance being followed in India. Other issues of theoretical interest analyzed by the faculty include, cost allocation in minimum cost arborescence problem, cooperative games with limited communication

and multidimensional mechanism design for public goods. In keeping with the award of the Noble prize in Economics to trade theory, issues like trade policy and polarization in labor markets, diversity and break-ups have also been investigated. Issues affecting the Indian growth performance, as well as the biotechnology and cotton input market in India has also attracted attention. Social capital and collective action in the Himalayas, payments for ecosystem services in Kerala/Tamil Nadu, agricultural fires and air pollution in India have also attracted attention. Measurement of economic burden of households suffering from cancer, firm investment with imperfect capital markets, public investment, the effect of national rural guarantee scheme, are some of the other issues examined.

Here is a more detailed breakdown of research interests:

Bargaining theory

Work on a multi-person bargaining model, jointly with Kunal Sengupta of University of Sydney, is in progress. This has large scope for application, for example, to the land acquisition problem.

Prabal Roy Chowdhury

Micro-finance

This recent research, jointly with Jaideep Ray of Brunel University, examines the role of NGOs in the SHG-linkage micro-finance program in India, in particular if the NGOs should be involved in project implementation, or not.

Prabal Roy Chowdhury

Terrorism

Work on building a model of terrorism is in progress.

Prabal Roy Chowdhury and Satya P. Das

Studies on Indian Economy

This work involves assembling and analyzing a large panel dataset of regional and social indicators for Indian states. The main research question is to identify the proximate and deep causes of turning points in economic performance of Indian states. Also, work on structural change and sectoral policies in India's growth process using an OLG framework is in progress. Other recent work looks at adult literacy and non-convexities in human capital accumulation.

Chetan Ghate

Research is being carried out on the following topics: Economics of biotechnology and food labeling, input markets in cotton, Indian Economic Growth: What was different about the 1990s.

Bharat Ramaswami

The topics of research are: Social Capital and Collective action in the Himalayas, Payments for Ecosystem services in Kerala/Tamil Nadu, Agricultural ires and air pollution in India, Long-term Impact of Displacement on Income and other components of well-being.

E. Somanathan

Game Theory/ Decision Theory

- Cost allocation in minimum cost arborescence problem; Multidimensional mechanism design.
- Aggregation of equivalence relations

Debasis Mishra

- Economics of Cricket and Games.

Satya P.Das

Mechanism Design

- The design of incentive-compatible voting rules with positively correlated beliefs, investigation of type domains where incentive-compatibility implies the tops-only property, characterization of semi-single-peaked domains.

Arunava Sen

Decision Theory

- Characterization of Uniform Expected Utility decision rules and extension of Bolker-Jeffries theory to finite sets.

Arunava Sen

Cooperative Games

- The connection between the Shapley Value and the Nash Welfare Solution in TU games.

Arunava Sen

Free-Riding in the Decentralised Voluntary Provision of Local Public Goods Requiring Multiple Inputs

A Theoretical and Experimental Investigation: The aim was to develop an experimental framework to analyse some problems in the study of voluntary contributions in public good settings. The class of public good problems considered has not been examined before. The results are expected to contribute to better understanding of issues in governance, coordination etc.

Priyodorshi Banerjee

International Trade

- Trade Policy and Polarization in Labor Markets.

Satya P. Das

Labour Economics

- Effects of an Employment Guarantee Scheme on Labour Allocation in Households.

Abhiroop Mukhopadhyay, Himanshu and N. Gravel

Health Economics

- Effect of HIV- AIDS on Female Labour Supply: Case of India.
- A Longitudinal Study of Cancer Patients: Economic Effects.

Abhiroop Mukhopadhyay and B.K. Mohanty

Integrating Mental Health in Welfare Evaluation: An Empirical Application

- Negative Reality of the HIV Positives: Evaluating Welfare Loss in a Low Prevalence Country.

Tridip Ray

Econometric applications

- Measurement of Economic Burden of Households suffering from Cancer;
- Investment Decisions of Group and non-Group firms when capital markets are imperfect;
- Productivity Changes in the Rail Track Industry.

Sanghamitra Das

Industrial Organisation

- Income Distribution and Product Quality, Uncertainty, Arbitrage and Industry Location.

Tridip Ray

- Diversity and Break-Ups.

Satya P.Das

Population Studies Unit

Diffusion models for Avian Influenza (Bird Flu) in West Bengal

Two models to understand the spread of Avian Influenza were developed, which were found to be in good fit with the real data supplied by the government. These models could be used for appropriate planning for the future epidemics. Two of the related papers appeared in high impact factor mathematical biology, general science journals.

Arni S.R. Srinivasa Rao

Discrete mathematics

Some questions related to Roter-Router models in one dimension, higher dimension are studied. Problems related to prime numbers and distance between individual and group of prime numbers are explored in deterministic and probabilistic ways.

Arni S.R. Srinivasa Rao

Non-linear mathematical models for AIDS, H5N1, Rota Viruses

Models were developed for spread of HIV and Rota viruses. Distribution of ART to the individuals suffering with AIDS is one of the tasks for the third phase of national AIDS control policy in the country. Above models developed are in use by the government and a detailed publication of the same will be appearing in a well-known applied mathematics journal.

Arni S.R. Srinivasa Rao

Partition functions, Mahlburg's work on cranks and integer sequences

Further links between partition functions and crank functions, after groundbreaking results on crank functions published in 2005, have been found. Mahlburg's deep and key findings (2005) established the central role of Cranks in understanding Ramanujan-type congruence functions. The distribution of partitions and behavior of the ranks involved are being studied. Understanding the behavior of the integer sequences and certain functional behavior is been studied using classical arguments. Very preliminary results are accepted for publication.

Arni S.R. Srinivasa Rao

Bayesian methods in Population enumeration and epidemic incidence

Counting the population in a country is part of the Census operations. In every census not all people are covered due to several unavoidable reasons. Developing methods to estimate the undercount in the population by exploring Bayesian hierarchical models is one of the focuses in the project. Another application of Bayesian methods is that estimating epidemic incidence in sparse populations i.e. incidence of epidemics where number of individuals infected are rare in terms of percentage in the population but total number of infected Individuals are large.

Arni S.R. Srinivasa Rao, Kiranmoy Chatterjee, and B.N. Bhattacharya

Financial Management of Reproductive and Child Health Care by Kolkata Slum Dwellers

The study analyses the expense on managing female reproductive health problem, the expense on pre-natal, natal and post-natal care and the expense on childhood sickness in association with overall household expense on health care by different categories of per capita monthly consumption expense (PCMCE). It has been found that with increasing PCMCE, a household tends to spend higher percentage of its PCMCE on health care. It has been established that about 60% or more households in different PCMCE categories have not been using any proportion of their total health care expense on reproductive and child health (RCH problems). While the proportion of the total monthly health care expense of a household, spent on RCH is on an average about one-third it indicates a declining trend with increasing PCMCE. Two possible reasons behind the observed trend might be (1) the rate of increase of monthly household expense on health care with increasing PCMCE is higher than the rate of increase of monthly household expense on RCH with increasing PCMCE and (2) the members of the households in the lower PCMCE categories are generally more young with higher chances of adding new members to the population through reproduction than the members of the households in the higher PCMCE categories.

Prasanta Pathak

Vulnerability of Kolkata Slum Population in Financial Management of Health Problems

An attempt has been made to find out the relation between the total expenditure incurred for having medical treatment and the per capita monthly consumption expenditure (PCMCE) in a household. It also finds out various expense head wise mean percentage of total incurred expenditure for availing different types of health care for children, mothers and adult males and females. Importance of different sources of financing the household expenditures on managing the health problems has been found out. Finally, the vulnerability of a household to fall in a debt trap is investigated. Positive association between total expenditure on medical treatment and PCMCE has been established. The mean percentage of the total expenditure incurred on purchases of medicines has been the highest, followed by the mean percentage of expenditure on various diagnostic tests. The three most important sources of financing the household expenses on managing health problems in decreasing order of importance are (1) money earmarked for monthly spending, (2) loan and (3) savings. Dependence on the second is the maximum for the hospitalization cases. With increasing expense on managing a health problem, dependence on the first and the third sources decline, but dependence on the second rises, resulting in increasing vulnerability of a household to fall in a debt trap.

Prasanta Pathak

Fertility Behavior of Indian Female Cohorts Crossing Childbearing Age during 1993-2012 by Socio-economic Conditions: a Model Based Approach

Thee fertility experience of Indian female cohorts belonging to various socio-economic groups who are crossing child bearing age in various calendar years has been studied. A special form of Gompertz curve, whose parameters are easy to interpret, has been used for understanding the fertility behavior of above cohorts using all the three National Family Health Survey data sets. Wide differentials in

fertility behavior and the changes in it among various socio-economic groups have been found. Identifying those factors which truly contribute to fertility differentials and that can be used for policy prescriptions to bring down fertility has been attempted. Transitions that have occurred in the determinants of fertility during the study period have also been quantified. Several interesting hypotheses proposed in Indian context for explaining the causes behind the fertility differentials have been tested. The most important findings of the present study are 1) there is a reduction of 1.4 children (i.e., from 5.55 to 4.15) in completed fertility per female (2) effective fertility period (length of age interval during which fertility level raises from 5% to 95% of saturation level) is shrinking at the rate of 2 months 24 days per year and (3) the age of giving birth to half of the children has also decreased by 1.44 years (i.e., from 25.93 years to 24.49 years) during the period 1993-2012.

Samba Siva Rao Pasupuleta and Prasanta Pathak

Spatial and Temporal Changes in Fertility Behavior of Indian Cohorts in Recent Times and Future Prospects

Fertility experience of cohorts in different regions in India, who are crossing childbearing age in different calendar years in the recent years, have been studied to understand the spatial and temporal changes in their fertility behavior. An attempt has been made to forecast fertility behavior of females who are going to cross childbearing age until 2025 by initially projecting the unknown cohort age specific fertility rates of different cohorts by age and then using them to estimate the characteristics of fertility behavior. Some of the interesting findings of the present study are (1) fall in cohort total fertility rate during 1993-2012 is the maximum in Southern India (a fall from 4.687 births to 2.973 births per female), (2) estimated CTFR for females who are going to cross childbearing age in 2024 in South India, West India, North India, North-East India, East India and Central India are 2.3, 2.8, 3.2, 3.3, 3.6 and 4.7 respectively in comparison to the all India estimate of 3.4.

Samba Siva Rao Pasupuleta and Prasanta Pathak

Health at Old Ages in India: Statistical Exposition of Its Socio-Cultural and Gender Dimensions

This work attempts to develop a conceptual framework to model health of older adults (OA) in association with various socio-cultural and economic factors. The data indicate that the Poisson and the Negative Binomial distributions are appropriate respectively to model count of diseases and count of disabilities of OA. Thus, the Poisson and the Negative Binomial Regression models have been made use of in this study. In the case occurrence of diseases, the effects of age, marital status and number of children have been found significant. Education has effect in the rural areas alone and the effect of caste differentials has been visible in the case of diseases among the female OAs only. Religion has significant effect in the rural areas only. The effects of household economic status and economic dependency have also been found significant. The type of economic activity of a household also affects disease prevalence among the male OAs. The amount of land possessed by a household affects the disease prevalence among rural OAs only. In the case of disabilities, age and economic dependency of the OAs have been found to have significant effect.

Sanjeev Bakshi and Prasanta Pathak

Demographic Feature of Indigenous Population in India

The main objective of this study is to highlight demographic features of Indigenous /tribal population in India using census records. An attempt has been made to estimate tribal fertility by parity progression ratio. Sex ratio [(F/M)*1000] of scheduled tribe is relatively higher than that of general population. The scheduled tribe drop out rates is much higher compared to that of total population. Ageing index reflects that tribal population bear less old age burden compared to non-tribal population. The age pyramid demonstrates that tribal population in India experience expansive type population pyramid with a broad base, indicating a high proportion of children, rapid rate of population growth, and low

proportion of older people. It is observed total fertility rate based on parity progression ratio is 3.03 for Indian tribes as per 2001 census. While empowering tribal population emphasis will be on social, economic and political empowerment with social justice.

Pranati Datta

Clustering of Nepali Migrants in West Bengal

This study is devoted to find out whether useful grouping or cluster exists among Nepali migrants in West Bengal, an Indian state. Agglomerative hierarchical single linkage clustering techniques have been applied to volume of Nepali migrants by districts of West Bengal for census 2001. Proximity matrix, agglomeration schedule and dendogram have been prepared to identify different clusters. Dendograms show relative size of proximity coefficients at which districts were combined. Districts with low distance/high similarity are close together e.g Dakshin Dinajpur, Bankura, Uttar Dinajpur, South 24 Parganas, Murshidabad, Purulia, Kooch Bihar, Birbhum, Maldah, Nadia, Medinipur etc. At 1076 level Kolkata is merged, then at 6458, 6495 distances level Jalpaiguri and Darjiling are merged. Darjiling and Jalpaiguri are merged at highest distance level since they are dissimilar members in terms of larger volume Nepali migrants. Nepali migrants tend to cluster in the districts Darjiling and Jalpaiguri, which are adjacent to Nepal.

Pranati Datta

Immunizational Status in India

This stdy involves: Indepth study of immunisational status in India using NFHS 3 data; Statewise child mortality within woman and cross sectional analysis by estimating parameters of extended Beta binomial distribution using Newton Raphson method for iteration and Trend analysis of NFHS1, NFHS2 and NFHS3 data.

Swati Sadhu

Analysis of trends in age specific mortality rates

In this study, attempt is made to examine the trends in age specific mortality rates by sex and projection of mortality using the time series data from Sample Registration System (from 1970 to 2006. Objective of this study is to evaluate the trends of child and age-group wise mortality rate by sex and residence in India and major states. Attempt is also made to explore the differences of mortality rate among different age- groups and also differences of mortality rate among the major states in India.

Subhash Barman

Socio-Economic status of the *dalits* in India

In this study attempt is made to analyse the status of the dalits in India and major states. Attempt is also made to compare the socio-economic status of the dalits among themselves and with the OBCs and other higher caste population by level of education, by age and some other socio-economic characteristics by using Census 2001, National Family Health Survey data (NFHS 2) and National Family Health Survey data (NFHS 3). Inter-state comparison is also made for the same purpose. It is observed from the data that the so-called dalits (SC & ST) and the OBCs are under developed educationally and socio-economically as compared to the other higher castes people of the country.

Subhash Barman

Correlates of child labour in India and states

Objective of this study is to examine the child labour rates under different socio-economic circumstances, differences of child labour force participation rates by sex, residence and castes. The study also examines the causes of child labour by sex and residence using Census 2001 and National

Family Health Survey (NFHS) Data 2 & 3. Child labour force participation rate is expected to be high among the Scheduled Castes and Scheduled Tribes caste groups. Their high participation in the labour force is closely associated with the poor educational level along with poor socio-economic status of these people.

Subhash Barman

Conflict between Gender Deprivation and Economic Deprivation: A study of Indian Districts with rural urban division

The popular belief that gender inequality declines with increasing education and richness is challenged in this study. Gender inequality is represented here by infant sex ratio, female education & female literacy. Economic deprivation is represented by percentage of people living below poverty line, average purchasing power and Gini co-efficient. Our results are highly alarming in that i) rural-urban differences are difficult to capture in aggregate district data, ii) the poorer a region lesser the woman deprivation, and iii) the richer the region the higher the gender inequality. The main policy conclusion of the study warrants a street caution against those who try to convey the message that with education and economic development Gender inequality is bound to decline.

Swagata Gupta

Health Care Efficiency in India using DEA Approach: An Inter-State Analysis

India has experienced rapid economic growth in the later decades but still it is experiencing two different worlds at a time. In one hand, it observes rapid economic growth and social changes, and in other hand, a large number of populations are still left behind due to lack of better social services, minimum employment opportunities and stagnated progress. Over the years a massive personnel and public health infrastructure was created. As there is no competition and hardly any choice to the patients resulting poor quality services leading to allocative and technical inefficiencies. This also creates inequalities in terms of access and utilization of health services across socio-economic groups. Again progress in different indicators like, life expectancy at birth, infant and child mortality, and maternal mortality has been uneven and slow across States. So it is necessary to evaluate the performance of various health care systems across states and to find out their correlates for their ineffiency and backwardness. The present study uses data envelopment analysis (DEA) model that can be implemented by public sector management to assess the efficiency of a health system within various states of our country. This study compares health system across major states of India. The results of the analysis evolved empirical indicators of efficiency, which may be used in future planning to understand the factors, associated with better performance of health system. The present technique allows one to measure efficiency in the use of resources to produce multiple health outcomes. In fact it estimates the extent to which a state within a country can achieve better health if all health resources were efficiently employed. This analysis permits a rich assessment of the efficiency of health system across different states in India.

Partha De

Trends in Components of Under-five Mortality

The International Conference on Primary Health Care held in Alma Ata in 1978 was the first global forum to consider how child mortality could be reduced by systematic development of a primary health care system. Since then, the United Nations has been actively involved in reducing infant, child and under five mortality rates in developing countries. The Government of India invested substantial resources in child survival programmes over the past decades. These programmes had the desired effect of reducing child mortality and improving child health as is evidenced from child mortality statistics of 1976–2006. However, the infant mortality rate (IMR) and under-five mortality rate (U5MR) have become increasingly important indicators that needs to be monitored. The U5MR including infant, neonatal and child mortality started declining since the late 1970s and until 1993 the rate of decline

was substantial. Thereafter, between 1993 and 1998, the decline in U5MR was slow. Despite improved interventions and increase in the overall resources, the country's targeted goal could not be achieved yet. The major uncertainty seems to be whether the IMR is approaching a looming limit. So, the aim of the study is to investigate the changes in each of the components of infant mortality during the period 1976–2006. The Sample Registration System (SRS) under the Registrar General of India (Ministry of Home Affairs) provides estimates of births and deaths at state/national level. These SRS estimates of mortality indicators were used to study the levels and trends in child mortality prevailing during 1976–2006. Trends in different components of under-five mortality have been estimated by fitting a regression line (spline) to the relation between observations of mortality and time for each state and for India, allowing the rate of change of mortality varies over the period.

Partha De

Psychological Research Unit

The faculty members and scientific workers of the unit are actively involved in research and different project works. The faculty members are also providing guidance to two Senior and two Junior Research Fellows for their Ph.D. works in Psychology in different State Universities.

A Study on Performance appraisal, satisfaction and absenteeism of Employees

Secondary data were collected from one crane company, Kolkata. Results noted high discrepancy between evaluator judgment consistencies; less satisfaction in compensation and benefits, significant differences in absenteeism across years. Findings are important for development of performance appraisal.

D. Dutta Roy and Sunita Kejriwal

Awareness of External environment and Perceived innovative climate of the Organizations In Public & Private Sectors

Success of innovation depends on awareness of organization's external environment. In this study, data were collected from 50 managers of different manufacturing organizations in public and private sectors. Results revealed that managers aware of changes in external environment perceived high innovative climate. Results will help in formulating effective innovation strategies in the organization.

D, Dutta Roy and Moumita Samaddar

Emotional Display Rules and Personality Pattern Across Different Groups of Individuals

The regulation of emotional display is a necessary process for effective social functioning. An individual must acquire emotional display rules that specify when, where and how it is appropriate to express emotions toward different members of the society. The objective of the study is to investigate the pattern of emotional display rules and its relationship with personality in visually handicapped and normal individuals. Literature review has been done. Scale and inventories have been selected and data are being collected from different parts of India.

Anjali Ghosh

Influence of Social Support and Life Meaningfulness on Perceived Self Control Over Addiction: An Exploratory study on Substance Abusers

Questionnaire to assess perceived meaning in life and addiction specific social support among substance abusers have been developed. Initially the scales were administered on a group of 100 substance abusers seeking treatment in a de-addiction center in Kolkata. Both the scales were found to have good reliability (alpha=0.85; alpha=0.75 respectively) and good convergent validity as both the scales were found to be well-correlated with standardized measures of life meaningfulness and

perceived social support respectively. In order to probe the pattern of relationship between social support, life meaningfulness and self-control over addiction, the above-mentioned scales along with measures of general perceived social support, self-control over addiction are being administered on different groups of substance users.

Fouzia Alsabah Shaikh and Anjali Ghosh

Pattern of Distributive Justice and Its' Correlates in Different Groups of School Students

Distributive justice is the normative principle designed to guide the allocation of resources among the members of a community. Researches have suggested that some biographical variables such as maturity, gender, socio-economic status and some personality variables such as, altruistic behaviour, trait anger and anger control and parenting style influence moral reasoning of an individual. The present study was conducted on students (early and mid adolescents) selected from different types of school such as (i) English medium, (ii) Missionary and (iii) Govt. affiliated Bengali medium schools of Kolkata. The study reveals that some demographic variables such as maturity, gender, parental education, type of schooling and some personality traits such as altruistic behaviour and trait anger play important role in the development of distributive justice of students. Among different dimensions of parenting styles, the positive impact of authoritative parenting style is more prominent among mid adolescents whereas the negative effects of authoritarian and permissive parenting style are prominent among early adolescents. The agreement between the perception of fairness concept by adolescents and the expectations of their mothers' regarding their children's fairness concept generally increases with age.

Rita Karmakar and Anjali Ghosh

Pictorial Semi-projective Test to Assess Need Achievement

For quick collection of data from illiterate people, pictorial semi-projective test is useful. In the current study, a pictorial semi-projective test was administered to 35 rural women and men workers in Meghalaya with the support of Central Board for Workers Education. Four domains of need achievement were assessed – goal perception, willingness to achieve goal, path clarity and self-doubt. They were Results revealed that more than 75% possessed all the four domains suggesting high need achievement level.

D. Dutta Roy and Shivani Santosh

Reading and Writing motivation of students

Assessing reading and writing motivation is important in framing pedagogy of school curriculum. Objective of the current study is to examine pattern of reading and writing motivation of students in plain and hill areas. Questionnaires were administered to 200 students of 9^{th} standard in plain land and hill areas. It was noted that students in hill areas felt motivation to read for application of knowledge and those of in plain areas motivated to read for gathering knowledge. Students of hill areas were extrinsically and those of plain areas were intrinsically motivated in writing. Findings are important for designing educational programs for students of hill and plain land.

D. Dutta Roy

Relationship between Career stages and Locus of Control of Teachers

A literature review on the relationship between career stages and teachers' locus of control has been done. Super's career stage model (1990) essentially posits four identifiable stages in a worker's career, namely, exploration, establishment, maintenance and disengagement. The model was suitably adapted for teachers by Huberman (1989). He proposed career entry, stabilization, diversification and change, stocktaking and interrogations at mid-career, serenity and affective distance, conservatism and disengagement. Huberman (1989) largely characterized tht proposed career stages in term of teachers' individual behaviours beliefs, the latter not only about themselves and their work, but about students, other teachers and work environments. Locus of control is an individual's generalized

expectancies for control, (Rotter, 1990) and has been found to be significantly related with teacher's career stages (McCormick & Barnett, 2008). The present study wants to examine the relationship between the two variables in context of Indian teachers. Development of questionnaire assessing career stages in Indian teachers is in process.

Rituparna Basak and Anjali Ghosh

Role stress management In The Public and Private sectors

Data were collected from 50 managers of organizations in private and public sectors. . Results revealed that managers of private sectors perceived high role stress than their counterparts. Results provide insight about stress management in the industries.

D. Dutta Roy and Shramika Purkait

Self-Assessment and its Relationship with Academic Achievement and Achievement Motivation among Secondary School Students

The objective of the study is to see the importance of assessment form the internal source since it will focus on self. The relationship between self-assessment, academic achievement and achievement motivation may help to predict achievement jointly with other cognitive factors. There is little research about assessment of achievement factors from the internal source i.e., the self. Self assessment encourages meta cognitive abilities and critical evaluation of the learners, promotes student autonomy and decision making, encourages intrinsic motivation, critical thinking and self sustained learning and develops the student's responsibility for their own. Data have been collected from different districts of West Bengal. Results indicate that in West Bengal Achievement Motivation is positively related with Academic Achievement, six dimensions of self-concept and total self-concept and the relations are significant. But the relationship among Academic achievement and all six dimensions of self-concept are somewhere positively significant, negatively significant and somewhere insignificant.

Rumki Gupta

Team Efficiency in Work Settings

The objective of the present study is to identify important factors of team behaviour and teamwork, which affects team efficiency of different work teams. Here team efficiency is defined in terms of individual and team performance. Emphasis is given on to explore the variables, which are, crucial for team performance in different work situations. The data for this study have been collected from the information and technology (IT) industry of Eastern, Western, Northern and Southern zones of India. Variables studied here are personality, self-efficacy, transactive memory system, collective efficacy, team climate, satisfaction, and team efficiency. Results indicate that team performance and individual performance are positively correlated with some of the input and process variables, which lead to efficiency of the teams.

Monika Sharma and Anjali Ghosh

Sociological Research Unit

Research in the Unit during the year has encompassed a variety of topics under the broad rubric of studies of socio-economic development.

Food Security

Using National Sample Survey data from the 61st Round, a study on the impact of the targeted public distribution system was undertaken. High rates of exclusion of needy households (agricultural labour and other labour households, households belonging to the Scheduled castes and tribes, households

with little or no land and households in the lowest expenditure classes) were found from the system and a clear deterioration of coverage in States like Kerala where the universal PDS had been most effective. A study of food security in rural Orissa, using secondary data as well as primary data from two villages of the most backward region of the State (Koraput and Nuapada districts), was completed. The study examined the performance of the public distribution system and programmes of rural employment. At the village level, the study found a high degree of exclusion from the PDS, with around 40 per cent of households in the two villages not holding a ration card. Regression analysis showed a significant difference between the two survey villages in household participation in government social security programmes and one important contributory factor was differences in functioning of the local panchayat bodies.

Madhura Swaminathan, Rajshree Bedamatta

Land And Social Inequality

A study on land use and crop area statistics in West Bengal was undertaken. Net sown area (or area actually under cultivation) predominates greatly in the reported area of the State. The share of fallow land, unculturable land and pastures in West Bengal is very low and constituted only 1.2 per cent of land under different uses in West Bengal (2005-06). Fallows and unculturable land in the State are concentrated in specific regions of the State. Further, unlike the erstwhile ryotwari States, in West Bengal, data on land use as per the nine-fold classification is not from village records but from sample surveys.

A study on access of Dalit households to land, a key productive resource, was completed. NSS data showed that while 41.6 per cent of households in rural India did not own land other than homesteads, the incidence of landlessness was higher among Dalit households (56.5 per cent). In West Bengal, a State in India where efforts have been made to grant land rights to landless households, Dalit households had better access to land than other States. Further, with data from a six-village survey, it was shown that Dalit and Adivasi households have been major beneficiaries of land reform, and have also gained access to land through market purchases.

Aparajita Bakshi, V. K. Ramachandran

Rural Incomes

A very detailed account, item by item, of costs and incomes among cultivators in two rice-growing villages of Thanjavur region, the "rice bowl" of Tamil Nadu, was completed. A striking finding of this study was of widespread distress among cultivators due to income losses from rice cultivation. The losses, however, varied with the size of operational holding, and small-sized cultivators suffered more than large-sized cultivators. There were also differences across caste in terms of costs and returns. For Dalit households, the majority of whom are landless, access to cultivable land was only through tenancy.

Using data from a three-village survey conducted in Andhra Pradesh in 2005-06, another paper examined patterns of income diversification. The study found that income generation was dominated by the primary sector in two villages. Agriculture (crop and animal husbandry) was the main source of income in Ananthavaram, a village of high-yielding canal-irrigated paddy cultivation in South Coastal Andhra and also in Bukkacherla, a dry and drought-prone village of Rayalaseema. Only one village, Kothapalle, in North Telengana, showed greater diversification of income generation and the location of this village on a major highway was clearly an important factor in this process of diversification. We found no simple relationship between the dependence on the primary sector and level of asset ownership.

V Surjit, Niladri Sekhar Dhar, Madhura Swaminathan, V. K. Ramachandran

The Digital Divide

A study on bridging the social and digital divide, based on evidence form rural Kerala and Andhra Pradesh, was undertaken. Combining empirical evidence with Amartya Sen's concept of capabilities, this paper argued that the digital divide is not merely a problem of access to ICTs. It is part of a larger developmental problem in which vast sections of the world's population are deprived of the capabilities to use ICTs, acquire information and convert information into useful knowledge. Fieldwork research including sample surveys conducted in rural locations in Kerala and Andhra Pradesh in India shows that these capabilities can only be created through large-scale complementary interventions in economic and social development.

Jayan Jose Thomas

Problems of Jharkhand

There are two projects that have collected new data from Jharkhand, one had examined the nature and extent of women's empowerment and the second has looked at the impact of the total literacy campaign. The study of women's empowerment aims to understand the pace, perception as well as process of empowerment of women from different strata of rural society.

Bholanath Ghosh, Suparna Som

Statistical Quality Control and Operations Research Division

The Division comprises of nine SQC & OR Units located at Bangalore, Baroda, Chennai, Coimbatore, Delhi, Hyderabad, Kolkata, Mumbai and Pune and the Central SQC (CSQC) Office located in the main campus at Baranagore. The CSQC Office functions as the office of the elected Head of the Division and co-ordinates various activities of the Division.

The activities of the division consisted of consultancy and training, research with a focus on the applied one, academic teaching including conducting M.Tech. (QROR) programme at Kolkata and Part-Time Certificate course at Bangalore and Hyderabad. The faculty members of the division also taught in other academic programmes like B.Stat. and M.Stat. Supervision of thesis along with the dissertation and project work by M.Tech. (QROR) and M.Stat.students were another part of the responsibilities discharged by the divisional members.

The divisional members carried out theoretical and applied research work. About 38 scientific papers were published in various journals and about 3 papers were published in books. About 5 papers were presented in conferences and were included in the conference proceedings.

The activities of the Division under different headings are furnished in the following.

SQC and OR Unit, Chennai

Reliability and Warranty Analysis

Effect of usage intensity on failure of some common redundant systems (cold standby with perfect/ imperfect switches and shared-load) was studied. It has been shown that dependency structure can be described by acceleration failure time model to carry out reliability and warranty analysis.

D.K. Manna

Research Activities

Field data on two-dimensional warranty of automobile system were analyzed with acceleration time failure model to evaluate reliability, B10 life, mean life etc. Some inference procedures have been developed.

D.K. Manna and A. Sarkar

SQC and OR Unit, Delhi

Topics of Research: Mathematical Programming, Combinatorial optimization, Linear Complementarity Problem (LCP), Matrix Theory (Characterization of Matrix Class useful in Optimization and Game Theory), Non-cooperative games, Algorithms for Stochastic Games.

S.K. Neogy

SQC and OR Unit, Hyderabad

Currently research activities are being carried out in the areas of Decision Support Systems, Linear Complementarity Problem, Six Sigma, DOE, SPC.

SQC and OR Unit, Kolkata

- Multi attribute Sampling Schemes, SNA application in industry.

  Anup Majumdar

- Evaluation of Process Parameters & Optimization of Mechanical properties of Epoxy concrete w.r.t. an application in Machine tool structures using Quantitative Methods

- Study on Modelling the Productivity of Blast Furnaces 4 and 5 Using Support Vector Machine-- at Bokaro Steel Plant, Bokaro

- Study on Modelling Failure Types and Failure Times with given failure type for Heavy Duty Boring and Turning Machines Using 2nd order Time Homogeneous Markov Chain and Second order time Homogeneous Markov Chain with Bivariate Distribution Function ----at GPI, Kolkata.

- Study on Maximisimg Total NSR (Net Sales Realization) and Total Weight of Rolls given that utilization of heat treatment furnaces is maximum and maximum number of batches of rolls is produced ---- at GPI, Kolkata.

- Study on Reliability Modeling of Centre Lathe Machine System with Stochastic Point Process Model based on the concept of 'Minimal Repairs Interspersed with Imperfect Preventive Maintenance' ----at GPI, Kolkata.

- Study on Evaluating Relative Efficiencies of 9 Different Roll Grades Using Data Envelopment Analysis and Developing Price Models for different Roll Grades--- at GPI, Kolkata.

- Study on Portfolio Optimisation for Select Stock Set Using different Portfolio Selection Models based on Fuzzy Probability & Possibility Distributions and Model Discrimination for Choosing the Best Portfolio.

  Sujit K. Majumdar

4K-09-12

Theoretical Research

Software Reliability Modeling with Periodic Debugging Schedule

The very first model published for software Reliability is the well-known Jelinski-Moranda (JM) model. This model assumed among other things that the failure data is available in the form of "time between failures" It also used the derivative to find out optimal values (MLE) of the unknown parameters, irrespective of the fact that some parameters may be discrete. Also, failure data in many cases need not be of the "time between failures" form and instead could be discrete in nature having number of test cases between failures as data. One of the important assumptions of the JM model is that the bugs are fixed as soon as they are identified. Again, the more realistic scenario is that there is generally a gap between software failures to occur and finally when they are fixed. This leads us to model the more realistic phenomenon as a "periodic debugging" model. We try to investigate the implications of these realistic features for the JM model along with some asymptotic results.

A Generalized model for several classes of software bugs

Yamada (1985) developed a software reliability model where the bugs are classified into two classes based on the criticality of the identified bugs. However, in practice, quite often we find that the classifications are not restricted to two only but mostly to three or more classes. We try to generalize the model taking into consideration that the actual number of classes of bugs could be any finite number j, say. Yamada's model becomes a special case of this generalized model with j equal to 2. The developed model is then applied to the data given in Yamada (1985). It is interesting to note that the data better fits when j is actually equal to 3.

Modeling the Recurrence of Laryngeal cancer

Cancer recurrence after treatment of the cancer depends upon the number of surviving clonogens in the tumor. In this case, the patients were treated with radiotherapy and were reviewed in successive intervals. After treatment linear-quadratic approximation of the cell survival probability as a function of radiation dose is made. Then we try to model the likelihood of cancer recurrence over the review period, taking into consideration the total number of surviving clonogens at each review period.

Multivariate Process Capability Indices – some unsolved problems

Here we developed and studied the properties of multivariate folded normal distribution and applied the same to study the properties of some multivariate process capability indices. The surface plot for the bivariate folded normal distribution is also obtained.

A Stochastic Reliability Growth Model using Principles of Size-biased Sampling and Recapture Debugging

In the earlier models of software reliability the assumption commonly made is that every error in the software has equal chance of being detected and each error, detected and rectified, has equal impact on the reliability growth of the software. However, in real testing scenario all errors do not have equal chance of being detected. Moreover software-testing strategies are greatly influenced by the requirements and operational profiles of the potential customer. In the suggested model different errors have different failure rate. Errors having higher rate of failure have higher chance of being detected. Consequently, errors being fixed earlier having greater impact on the reliability growth of the

software than the latter ones. To get some extra information about the parameters of the underlying failure distribution of the errors and to get a better estimate of the original number of errors, recapture-debugging principle is used.

Applied Research

Evaluation of Process Capability of Striker of Fuse 162

Striker is manufactured in the Light machining shop (LMS). Problems were encountered when it was observed that several lots were rejected due to the strict inspection procedure. It was then decided at the highest level to look into how good was the process of producing striker. At the beginning of this study, Data were collected at the Light machining Shop on a daily basis. Since the data are of variable type X-bar R chart is used to monitor the process. Process capability indices are calculated to measure the potential capability of the process. Data are collected for angle, which is found to be critical for the performance of the striker and two other related diameters of the striker. Univariate and multivariate process capability indices are found out. Then Nested ANOVA is used to find clue to the reasons of variation and on the basis of that suggestions are given. Optimal sample size and sampling intervals are determined for future control.

Estimation of consumption of some Spare parts and Common items

Managing inventory of spare parts and common consumable items like paper is a challenging problem to all types of industries. A shortage can create a bottleneck for production; on the other hand excess inventory will lead to less money-flow in the system. For, Ordnance factory Dum Dum, such a study had been carried out for some particular spare parts and common consumable items. Several methods are applied to predict future consumptions for each item and they are compared with respect to their performance in predicting correctly the future consumptions. Initially some methods show good results, but on the whole most of the methods' performances cannot be termed as outstanding.

Radical Radiotherapy for Glottic Cancer

Data from a government hospital in Kolkata on Radical Radiotherapy for Glottic Cancer has been analysed to find out survival probability of the patients who are having glottic cancer. It was found that the number of affected lymph nodes can have significant effects on the survival of patients. An United States published data, when analysed similarly, confirmed that the number of lymph nodes affected has a bearing on the survival of the patients.

Ashis K. Chakraborty and Anup Dewanji

- Study on Some Challenging Issues in Implementing Lean Six Sigma
- Study on Some Implementation Issues of TQM in Higher Education and Other Service Sectors and Gap Analysis by Lean Management

  Arup Ranjan Mukhopadhyay

- Industrial research in the areas of modeling and optimization of the system of materials science using statistical methods and soft computing techniques

  Prasun Das

Nonparametric control chart for controlling variability

It has been pointed out by many researchers that the deviation from normality has serious effect on variability or dispersion or scale parameters. Hence development of nonparametric control chart for controlling variability is an important research issue. Since there exists very limited literature on non-parametric control chart for controlling variability, new nonparametric control charts for controlling variability have been developed. The performances of the proposed methods are studied under different situations simulating observations from different distributions for different sample size.

Multivariate nonparametric control chart

In many industrial situations there exists more than one correlated quality characteristics for which one need to implement multivariate control chart. In this situation Hotelling T^2 control chart is the most appropriate one. But this chart is very sensitive to the normality assumption. Deviation from normality has severe effect on the performance of Hotelling T^2 chart. This established the need for developing a parallel multivariate non-parametric control chart. We propose a new non-parametric multivariate control chart. The performance of the proposed chart is evaluated for multivariate normal and multivariate non-normal distribution (multivariate t distribution) and compared with that of Hotelling T^2 control chart.

Nandini Das

Developing Quantitative Techniques for the Subjective Approaches Used in Process Control

Unless the preliminary *m* subgroups of small samples are drawn from a stable process, the estimated control limits of $\overline{X}$ chart in phase I can be erroneous due to which the performance of the chart in phase II can be significantly affected. Traditionally, the stability of the process while the preliminary samples were drawn is assessed retrospectively by plotting the subgroup ranges and averages in the *R* and $\overline{X}$ charts respectively, and then examining visually that the patterns in these charts are random. A test procedure based on extraction of shape features of control chart pattern in $\overline{X}$ chart is developed for evaluating stability of the process mean while the preliminary samples were drawn. It is found that the test procedure is very effective when the number of subgroups ≥ 48. The research is continuing for developing quantitative techniques for some other subjective approaches.

Optimization of multi-response problems in Taguchi method

Mathematically rigorous techniques for the multi-response optimization are usually impractical for application by the engineers who do not have a strong background in mathematics/statistics. Simplified process performance index (PPI)-based techniques are easily comprehendible and all the necessary computations in these approaches can be performed using Excel worksheet. So these methods are popular to the engineers. However, the optimal factor-level combination with respect to the PPI often results in one or more individual responses to move far away from their target values which are undesirable. A new method, called multiple regression based weighted signal-to-noise ratio (MRWSN) method, has been developed that can ensure that all the quality characteristics are very close to their respective target values with minimum variability around the target. The entire computation for this method can be carried out using Excel worksheet and so it is also easily implementable.

Multi-objective Optimization of the Machining Responses

Better finish, low tolerance, higher production rates, automated data transmission, miniaturization etc. are being demanded by the modern day manufacturing industries. Aiming to satisfy these demands newer machines tools and processes, which can accurately and easily machine the most difficult-to-machine materials to intricate and accurate shapes are developed. Some of these non-traditional machining processes are Wire electrical discharge machining (WEDM), Abrasive jet machining,

Ultrasonic machining and Laser machining. Selection of the optimal process condition is very important for obtaining improved machining performance. The WEDM processes have been studied in details. It is found that some of important performance measures are correlated and thus, weighted principal component method for the multi-response optimization result in the best optimization for the WEDM processes.

An Expert System for Control Chart Pattern Recognition

Detection of a control chart pattern (CCP) allows the users to have more insight about the process in addition to the in-control/out-of-control decision. The classified patterns can help the users to identify the potential problems in the process and provide clues or guidelines for effective trouble-shooting. Previously, an extensive research work has been carried out and algorithm for recognition of eight main types of CCPs has been developed. The aim of the current research is to extend the work for all the nine main types of CCPs and develop expert system for on-line detection of various types of control chart patterns, which will enable the operator to initiate prompt corrective actions for an out-of-control process. Some new useful features have been identified and extracted so far.

Susanta Kumar Gauri

Estimation of quality adjusted lifetime (QAL) distribution

In this work, we consider nonparametric estimation of quality adjusted lifetime (QAL) distribution in a three-state illness-death model. In our approach, we first write down the expression for the distribution of QAL in terms of the joint distribution of the sojourn times in the health states. The estimate of the QAL distribution is obtained by substituting the estimates of sojourn time distributions in the expression of QAL. Consistency and asymptotic normality of the proposed nonparametric estimator have been established. We also consider semi-parametric approach to estimate the QAL distribution. Hazard rate in each health state is modeled using Cox's proportional hazard model. Consistency and asymptotic normality of the proposed estimator have been established. Simulation study is in progress to investigate the performance of the estimators.

Biswabrata Pradhan and Anup Dewanji

Bayes estimation of gamma distribution

Here we consider Bayes estimates of two-parameter gamma distribution. It is well known that the Bayes estimators of the two-parameter gamma distribution do not have compact form. It is assumed that the scale parameter has a gamma prior and the shape parameter has a log-concave prior. Bayes estimates and highest posterior density credible intervals are obtained by Gibbs sampling technique. We also compute the approximate Bayes estimates using Lindley's approximation. Simulations are performed to compare the performances of the Bayes estimators with the classical estimators. We further discuss about the Bayesian prediction of future observation based on the observed sample and it is observed that the Gibbs sampling technique can be used quite effectively, for estimating the posterior predictive density.

Biswabrata Pradhan and Debasis Kundu

Library, Documentation and Information Sciences Division

The Library, Documentation and Information Science Division comprises of the Central Library at Kolkata, Centre Libraries at Delhi and Bangalore, and the Prasanta Chandra Mahalanobis Memorial Museum and Archives at the headquarter. The Division is perhaps the most important central facility of the Institute.

Library, Kolkata

The Central Library occupies a unique place in academic and research activities of the Institute. The Central Library moved to its present location in 1978, and it occupies 4 floors (56000sq.ft) of a ten-storied building at Calcutta. The Central Library seeks to:

- Meet the informational, educational, recreational, and cultural interests and needs of the user community by providing timely access to print and non-print resources appropriate to those needs.
- Encourage and facilitate reading, literacy and lifelong learning by supplying resources in a variety of formats designed to interest, inform, and enlighten.
- Protect the public's right to know by providing equal access to information needed for informed and effective daily living, decision making, problem solving and thoughtful participation in civic/community affairs.
- Provide the highest quality service and to organize and display the collection for easy, open access by all.
- Maintain publication exchange programme of the Institute with regional, international, national, and foreign institutions and organizations.
- Continue to function as the Eastern Regional Library of the National Board of Higher Mathematics [NBHM], Department of Atomic Energy, Government of India since 1989.

Over the years, the ISI Central Library has attained the distinction of being one of the richest libraries in India in the areas of mathematics, statistics, economics, theoretical computer science and related areas. To achieve the goals of the Library, following activities were undertaken during the year under report:

Collection Development: The Library maintains an excellent collection of books, journals, reports, rare and special collection, government publications, data-books, theses and other documents/ materials in print and electronic formats. During the year under report, the library accessioned 825 books out of which 585 were purchased from ISI budget and 187 from NBHM grant, while 52 books were received on complimentary basis. Added 01 book to the project collection. The library accessioned and processed 235 E-books during this year totaling its collection to 800. The Library also accessioned 1000 bound volumes of journals and subscribed to 504 scholarly journal titles in print. More than 50 journal titles were received as complimentary and 99 titles in exchange with Sankhya. The library received and processed more than 10000 loose issues of journals. It classified and catalogued 1040 new books and filed 4260 computer printed catalogue cards. It also processed 401 titles on government reports/data-books etc. Beside this, the library has added a collection of 188 books, mainly in English, Bengali and Hindi on literature, humanities, travel, health and recreation in its Statistical Workers' Circulating Library totaling its collection to 38562.

In addition to this, the library has about 32000 reprints. Thus the total collection of the library stands at around 352648.

E-Resources:

i) The library has a good collection of electronic resources on different media and has access to several online journals/databases. During the year under report, the library has added 37 CDs & floppies containing books and CDs on statistical data. Thus, the total collection of CDs has risen to 1007.

ii) **Consortia based online subscription of journal and database:**

Consortia among three centers of ISI- The library subscribed/renewed the subscription of online databases like ScienceDirect, Springer Link, J-STOR Archive and Oxford University Press Journals on consortia basis among three centers of ISI – Kolkata, Delhi and Bangalore.

It has subscribed to the Web of Science- Science Citation Index Extended covering year 2001-2009 among three ISIs.

It has also subscribed to the MathSciNet through consortia among ISI and NBHM members
It renewed the INDEST Consortia of IEL Online of the IEEE/IEE publications and ACM Digital Library.
iii) **Online journal/database:** The library subscribed/renewed to Current Index to Statistics (CIS) on Web, Econlit database, Wiley Interscience, Science Classic, Nature Online, SIAM online, LOCUS archive, Duke Mathematical Journal online, Economist Historical Archive etc.
iv) 235 e-books have been purchased in the library.
v) The library has also subscribed to few statistical data sources available on CDs.

Publications Exchange Programme: The library maintains the publication exchange programme of 'Sankhya - the Indian Journal of Statistics' with 57 national and 23 international institutions/organizations. The 23 international agencies are from various countries of the world such as Bangladesh, Belgium, Brazil, Canada, China, Taiwan, Croatia, Czech Republic, Denmark, France, Hungary, Italy, Japan, Pakistan, Poland, Romania, Russia, Slovakia, Spain, Switzerland, Thailand, UK, and USA. In exchange Library has received 99 titles during the reporting period.

Membership: Membership of the ISI-Library is restricted to persons with post-graduate or equivalent academic qualification, interested in the objectives of the Institute. Faculty members, research scholars, students, research associates, visiting scientists, ISEC trainees, project-linked staff, project assistants, ISI-employees, outside students and the Institute members are eligible for the membership of the Institute Library. However, they have to apply for the membership of the library and receive a bar-coded Library Card. During this period, library membership was given to 242 persons and 193 readers were given special permission to use the library for a short period. Currently the total number of library member rose to 3517. Total number of members including staff, students and research scholars of the Institute rose to 960 in its workers' circulating library.

Services: The ISI-Library, since its inception has been providing a variety of library and information services to its users. The services presently being provided include.

Web-OPAC- Members use this facility to browse and search the database to see the status of a document including their own transactions.

Lending/Document Delivery Service: During this period, 130580 books and other documents were issued to the user on loan and reference. Publications from Government of India and other International Organization and data CDs, were issued to users for reference purpose. The library supported 3700 pages of reprint requests from journal articles. It provided email-based reminder services like 7-day advance alert, long overdue notice and check-in information. 20000 books from the workers' circulating library were issued for lending and reference during this period.

Inter-library loan: 25 Books and journals were borrowed from other libraries, while 93 books and journals were lent to other libraries.

Current Awareness Service: 12 monthly lists of current additions to the library were made available online.

Self-Photocopying Service: The library provided the Self-photocopying service in its periodical section, which was available everyday throughout the library hours. During this period 24000 pages were photocopied from the journals.

Electronic Document Delivery Service: Full-text articles and/or bibliographical data were provided through email from online resources. Besides electronic document delivery, 2000 pages of printouts were also supplied against demand.

Online Full-Text Access to Journals/ Database: During the period under review, the library has provided services from more than 2000 online journals and major databases like MathSciNet, Econlit, ScienceDirect, Springer Link, IEL Online (IEEE/IEE Electronic Library), ACM Digital

Library, CIS on WEB, Web Of Science-SCIE, JSTOR, OUP etc. The online access is available through campus-wide network.

Reprographic & Photographic Service: During the year, it provided around 370000 pages of photocopies, 225 graphic designs, 1429 scanned pages, 2450 pages of color and b/w pages of printouts, 2575 copies of plates, 6000 pages of color photocopies, and 275 spiral bindings, laminated 460 pages.

Documentation Service: A searchable bibliographic database has been prepared on scientific contributions made by the ISI scientists on all subject fields since 1934. The entries are currently being subjected to editing.

General Enquiry Assistance & Consultation Service.

Special Initiatives:

(i) Consortia arrangements: During the reporting year, the Library has further strengthened the consortia initiative to enhance the electronic collection and online access to scholarly resources to cope up with the increasing subscription cost and diminishing budget.

(ii) Preservation and conservation: Total 744 books, 1000 journals were bound. Lamination and de-acidification of 12 rare books of 3059 pages, fumigation of 273 books, photocopying of 4 rare and out-of-print books were executed during this period.

(iii) Institutional Repository (IR): A prototype of IR of ISI has been created. Currently it covers metadata of about 800 ISI research papers, full text of all convocation addresses and some Ph.D thesis that are accessible online.

(iv) Digitization of ISI Question papers: During this period, 18000 pages of question papers have been digitized and are currently available on compact Disks. These will be made available on the Web after the completion of the work.

Prasanta Chandra Mahalanobis Memorial Museum and Archives

The Museum and Archives carried out regular maintenance programme for 752 exhibits through 91 panels and a collection of artifacts related to Professor. Mahalanobis displayed in the ground floor, chatal, and Professor's residence along with the pest control programme for the whole building of Amrapali. Among other programmes it is now following the restoration of old film rolls, audio spools etc. through CD conversion and installation of computerized security system for the museum entry and exit.

As a part of the computerized security system one PTZ camera and one IP camera monitoring system were installed at the entrance and exit of the Museum. Among the archival collections, miscellaneous documents were sorted, listed and recorded. Conservation treatment was undertaken for about 3,000 nos. of archival documents, which included letters, files, paper cuttings and others. The three-year project for 'Formulation of archival description and authority record' had completed its second year target of data identification for reference by March 2009. About 2500 nos. of data had been computerized and 3,856 nos. of original documents had been scanned this year.

This year, the museum had been visited by the distinguished scientists, dignitaries and. participants and resource persons of numbers of research oriented seminars, conferences, workshops and lectures held during the year also visited the museum.

Library, Delhi

Indian Statistical Institute, Delhi Centre, maintains an academic library, which aims to be a leading library in the fields of Mathematics, Statistics, Economics, Operations Research and Statistical Quality Control.

The library caters, mainly to the needs of bonafide students, scholars and staff of the Institute. However, it is also open for reference to academic and research users of other educational and scientific institutions of the city and its neighbouring regions.
It is an automated library with an extensive collection of books, journals, CDs, reports, govt. publications and other documents in print and electronic formats. Some of the main activities of the library during the period under review were as under:

Collections: The library purchased 218 books both from the regular and NBHM funds. Received 55 books as gift. Thus raising the stock to 45731 volumes (Books + Journals). During the period under review, 250 titles of journals, both foreign as well as Indian have been renewed.
The library renewed online access to the Elsevier Science journals, Springer-Kluwer journals, JSTOR archive, OUP journals through the Consortium among the three centers of ISI. It has also renewed the MathSciNet with the American Mathematical Society and Academic Membership with SIAM through consortium arrangements. Access to Online databases such as "Current Index to Statistics"(CIS) and "EconLit" has also been renewed.

Membership: During the period, 119 members availed of the lending facilities as permanent members of the library and 578 members were provided reference facilities as temporary members of the library.

Exchange programme has been established with some of the Scientific Institutions in the regions of Netherlands, China, Korea, Poland, Spain and Vietnam for getting their publications in exchange for our journal "Sankhya"-Indian Journal of Statistics and "Texts and Readings in Mathematics".

Circulation: More than 4675 books and other documents have been circulated among the members. During the period under review, 18 publications were borrowed on Inter-library loan from the neighbouring Institute libraries. 28 books were lent out to other Institutes under the same program.

Reprographic Services: More than 28396 pages have been Xeroxed and made available to both the permanent and temporary members of the library and outsiders. Xerox facilities were also provided to the research scholars of neighboring Institutes under NBHM programme.

Online Full-Text Access to Journals: During the period under review, the library has provided Online services from more than 450 Consortia based Online journals. These Online journals have been listed on the web with direct access to the publisher's web page under the heading "Electronic Journals"

Electronic Document Delivery Service: In addition to Xerox facilities, 200 Full texts articles were provided through email from online journals under NBHM.

Current Awareness Service: The following lists were brought out regularly from the library:
(i) Monthly list of current periodicals (Online)
(ii) New additions (books) Online
(iii) Current Contents of journals (print form)

WEB-OPAC: The Users have been given an access to the complete Catalogue of the library holdings through the OPAC. A Web search engine has been provided in the library Home page.
NBHM Regional Library: ISI, Delhi Centre Library being the regional library to serve the Northern Region, received an additional grant of Rs. 28.00 lakhs from National Board for Higher Mathematics (NBHM), for strengthening its resources in Mathematics and statistics.

Library, Bangalore

Indian Statistical Institute Bangalore Centre Library is aiming to be identified as a model library in the academic scenario. The library has geared itself to provide modern library services such as Web based information services and initiation of Lib 2.0 applications etc. The library has developed a very distinguished collection in the different knowledge domains namely Mathematics, Statistics, Economics, Quality control and Operations Research and Library and information Science. Presently it is aiming to build up a good collection in Computer Science. Various services are designed to meet the information needs of the faculty members, students, research scholars and visiting scientists. The library caters to the walk-in users from other research institutes and universities.
The following activities were undertaken by the library to achieve the goal during the year April 2008-March 2009.

Collection Development: The library purchased 386 books during this period of the report and thus amounting to a total of 28518 accessioned books in the library. The library received 47 books as complimentary. So the total books accessioned on gratis during this period is 1973. The library subscribed to 264 journals in hard copy format. 8 titles were received as gratis. 12 journal titles were subscribed from NBHM grants. During this period 472 bound volumes were added to the shelf and thereby leading to 14185 bound volumes in the library.

Technical Processing: Total number of books classified and catalogued during this period is 433. However 16 books were reclassified.

Membership: 115 registered users enjoyed the library facilities and the services. Also these facilities were extended to 1873 walk-in users during this period.

Circulation Service: Around 4680 books and 840 bound volumes of journals were circulated during this period. 1746 loose issues of journals were issued overnight to users.

Inter Library Loan Service: ISI Bangalore Central Library has been identified as one of the best libraries in the select fields of study. As a result and also due to good liaison amongst local libraries the library has been involving itself in providing inter library loan service. Library has attended 257 inter library loan requests. The library has borrowed 13 books from the other research libraries on ILL.

Document Delivery Service: Under this service around 230 documents were downloaded and supplied to the registered users from e-versions of the journals.

Center for Soft Computing Research: A National Facility

Web Mining

Most web documents have an inherent internal tag structure and external link structure that render the desirable use of multidimensional representations offered by tensor objects. We have made a case here for utilizing tensor space model for representation of hypertext and web services.
A split and merge technique was formulated for the classification of semi-structured web documents (hypertext and web services). The splitting process was performed at the feature level by representing the hypertext features in a tensor space model. The merging process was performed on multiple classifications obtained from split representation using rough set based ensemble classifiers.
Combining the results of a number of individually trained classification systems to obtain a more accurate classifier is a widely used technique in pattern recognition. We have introduced a rough set based ensemble classifier. It is an optimal combiner whose output accuracy is no less than that of individual classifiers. It provided better results for text classification and focused crawling.

Suman Saha

Image Processing

Feature space based approaches are popularly used to perform low-level image analysis. A density modification framework that enhances density map based discriminability of feature values in a feature space has been proposed in order to aid feature space based segmentation and edge detection in images. The framework embeds a position-dependent property associated with each sample in the feature space of an image into the corresponding density map and hence modifies it. The property association and embedding operations in the framework has been implemented using a fuzzy set theory based system devised with cue from beam theory of solid mechanics, and the appropriateness of this approach has been established. Qualitative and quantitative experiments of segmentation and edge detection in images have been performed to demonstrate the effectiveness of the proposed framework. A novel method of edge extraction in color/multispectral images based on multidimensional feature space analysis has also been proposed in this context.

Debashis Sen

A methodology using Multi Objective Evolutionary Algorithm (MOEA) has been developed for automatic Image Enhancement. The work demonstrates the suitability of MOEA in the selection of image enhancement operator by optimizing multiple evaluation functions such as entropy, Compactness and Index of Area Coverage. The effectiveness of MOEA is exploited to find a number of solutions in the Pareto-optimal front and finally one of the solutions is selected based on the image characteristics.

Dinabandhu Bhandari

Evolutionary Algorithms

An optimal stopping criteria based on a statistical measure for elitist model of genetic algorithms (GA) has been found. The proposed criteria with suitable modification will be extended to Multi-Objective Genetic Algorithms (MOGA). Theoretical basis of using the proposed measures as stopping criteria has also been established. It eliminates heuristic decision making, is easy to implement and does not need any auxiliary information.

Dinabandhu Bhandari

Swarm Intelligence

A new algorithm, called Aggregation Pheromone density based Classifier (APC), for pattern classification has been proposed. Here each data pattern is considered as an ant, and the training patterns (ants) form several groups or colonies depending on the number of classes present in the data set. A new test pattern (ant) will move along the direction where average aggregation pheromone density (at the location of the new ant) formed due to each colony of ants is higher and hence eventually it will join that colony. Thus each individual test pattern (ant) will finally join a particular colony. Experimental results showed the potentiality of the proposed algorithm in terms of the evaluation measures.

A novel method for image segmentation considering the aggregation behavior of ants has been proposed. Here image segmentation is viewed as a clustering problem, which aims to partition a given set of pixels into a number of homogenous clusters/segments. At each location of a data point, representing a pixel, an ant is placed; and the ants are allowed to move in the search space to find out positions with higher pheromone density. The proposed algorithm was evaluated on a number of different types of images. Experimental findings showed the usefulness of the proposed algorithm for image segmentation.

Anindya Halder

Soft Computing

Fuzzy sets constitute the oldest and most reported soft computing paradigm. The concept of fuzzy membership, lying in [0,1], allows the simultaneous finite belongingness of a pattern to two or more overlapping clusters. A novel fuzzy clustering algorithm, Fuzzy CLARANS (Clustering Large Applications based on RANdomized Search) has been proposed. It incorporates the concept of fuzzy membership onto the framework of CLARANS to overcome the uncertainty in context of data mining. Moreover, a new scalable approximation has been proposed to increase the computational efficiency. The performance on synthetic as well as real data sets demonstrate that the proposed algorithm always converges to the optimum number of clusters for the various validity indices used to evaluate the goodness of the clustering method.

Sampreeti Ghosh

Bioinformatics

An important problem related to mining large biological data sets, both in dimension and size, is of selecting a subset of the original features. When class labels of the data are available we use supervised feature selection, otherwise unsupervised feature selection is appropriate. In many data mining applications, class labels are unknown, thereby indicating the significance of unsupervised feature selection there. A new unsupervised feature selection method has been developed. A novel concept of biological information is integrated in this method in order to establish a relationship among the genes. The superiority of the algorithm in terms of performance is established over various microarray data sets.

Sampreeti Ghosh

New operators of genetic algorithms are developed and their effectiveness on the traveling salesman problem (TSP) and microarray gene ordering has been demonstrated. Novel functional predictions of 12 unclassified Yeast genes may provide new directions in biological research.

Shubhra S. Roy

Cognitive Vision

The centre-surround model of receptive field in our visual pathway is a classical bottom up approach to visual information processing based upon brightness-contrast information. Its corresponding mathematical operator was first proposed by the empiricist Ernst Mach on the basis of the Mach band illusion. This model or its equivalents, though effective for explaining many brightness-contrast illusions, can't account for many others like the White effect. Top down approach, on the other hand, is historically associated with the name of Hermann von Helmholtz who argued that perception is the product of unconscious inference linked later to Bayesian inference or likelihood principle by many contemporary researchers. In between, the Gestalt school claims that perception is an outcome of recurrent bottom up and top down process on the basis of such coherence criteria as proximity, similarity etc., thus enabling figure-ground separation like feature extraction. We have attempted to advance this approach with a new computational model of early perception that enables very effective figure-ground segregation. It modifies Mach's equation by introducing a bi-harmonic of Gaussian compared to Laplacian and a fourth moment dispersion measure compared to between and within-class variances akin to Gestalt coherence criterion of similarity (and dissimilarity) among pixels and frequently used in thresholding gray scale images for obtaining binary outputs. A single step convolution with such a combination at unique parameter values results in binary maps that are expressive of the main information content imbibed in all the three classes of illusory images mentioned above and not obtainable by any standard grayscale thresholding method.

Kuntal Ghosh

Commonsense Reasoning

We have introduced a new algebraic structure called the 'Nonmonotonic Algebra', which aids in the formal study of nonmonotonic reasoning. Explicit strategies have been designed in the existing logical framework for sequential game structures. This aids in studying rational interaction in multi agent systems.

Sujata Ghosh

Computer and Statistical Services Centre

CSSC manages the central computing facilities of ISI, Kolkata. It serves approximately 700 users. Software packages available at the centre are Oracle, Arc GIS, BMDP, Mathematica, SAS, SHAZAM, S-Plus and TSP. The centre manages campus-wide network and Internet facilities at ISI, Kolkata. The center also manages the inventory of computers in consultation with the Computer Purchase Committee. The centre provides statistical and numerical consultancy services to scientists and research scholars, including non-ISI scientists. The centre occasionally conducts workshop for training ISI officials on using of computers. The centre organizes workshops for Northeastern states of India. Members of CSSC take part in teaching different courses of the institute. Members of CSSC supervise project work of non-ISI students studying MCA, B-Tech, etc.

3. PROJECTS

Internally Funded Projects

Ongoing Projects

Sl. no.	Name of the project	Principal Investigator(s)	Unit(s) involved
Theoretical Statistics and Mathematics Division			
1.	How much market is influenced by big traders	Gopal K. Basak	Stat-Math Unit, Kolkata
Applied Statistics Division			
1.	Robust Statistical Procedures and Inference for Directional Data	Ashis SenGupta	ASU
2.	Investigation of the Global Dynamics of Nonlinear Cellular Automata	Prabitra Pal Chaudhuri	ASU
3.	Pattern Classification by Cellular Automata	Amita Pal	BIRU
4.	Classification Issues in Speaker Identification	Smarajit Bose	BIRU
5.	Simulation-based Study of Correlaltion Inequality in the Context of Linnik's Unlinking Conjecture	Subir Bhandari	BIRU
6.	Issues Related to Critical Sets in Latin Squares and F-Squares	Rita Saha Ray	BIRU
Computer and Communication Sciences Division			
1.	Mine Telephony	B. P. Sinha	ACMU
2.	Floorplan Optimization for Nanobiochips	B. B. Bhattacharya	ACMU
3.	Localization in Wireless Sensor Networks	K. Mukhopadhyaya	ACMU
4.	Techniques for Robust Physical Design of nanometer ICs	S. Sur-Kolay	ACMU
5.	Offline handwritten document processing	B. B.Chaudhuri	CVPR
6.	Multi-lingual document analysis	U. Pal	CVPR
7.	Online handwritten character recognition	T. Pal	CVPR
8.	Pattern analysis using Artificial Immune Systems	U. Garain.	CVPR
9.	Improvement of algorithms for the analysis and correction of hearing disabilities	S. Palit	CVPR & ASU
10.	Bangla WordNet for NLP	B. B.Chaudhuri	CVPR
11.	Automatic reading of texts in camera captured images	U. Bhattacharya	CVPR
12.	Facet Analysis and Enhancement of Information Retrieval in the Digital Environment	K.S Raghavan	DRTC
13.	Digitization of Seminar Volumes	D. P Madalli	DRT C

14.	Video Indexing and Retrieval using Rectilinear Motion	B. Chanda	ECSU
15.	Studying Meaningfullness of Image and Video Content	D. P. Mukherjee	ECSU
16.	DNA Computing with Fuzzy Logic	K. S. Ray	ECSU
17.	Fuzzy Logic Approach to Weather Forecasting	K. S. Ray	ECSU
18.	Soft Data Mining for Analysis of Gene Expressions	S. Mitra	MIU
19.	Rough-Fuzzy Hybridization for Clustering Large Biological Databases	P. Maji	MIU
20.	Development of algorithms for protein analysis: Applications in rational drug design	S. Bandyopadhyay	MIU
21.	Development of pattern recognition and machine learning tools for solving certain problems in systems biology	R. K. De	MIU
22.	Rough sets and Granular Computing to Image Processing Applications	B. Uma Shankar	MIU
23.	Face Recognition in color images	C.A. Murthy	MIU
24.	Evolutionary computation and data mining.	C.A. Murthy	MIU
25.	Soft Computing approach to watermarking and semantic based retrieval of image and video frames. (Phase-II)	M. K. Kundu	MIU
Physics and Earth Sciences Division			
1.	Depositional systems and sequence stratigraphy of the Vindhyan inlier of the Hosangabad-Bhopal area	C. Chakraborty	GSU
2.	Sediment transportation and sorting processes in sand-pebble mixture in experimental channel and their geological implications	R. Mazumder	GSU
3.	Physicochemical Studies on Organized Assemblies (Microemulsions/ Reverse Micelles) of Mixed Surfactants	B.K. Paul	GSU
4.	Talchir Sedimentation	P.K. Maulik	GSU
5.	Growth and evolution of Meso-Neoproterozoic carbonate platforms in the Chattisgarh and Cuddapah basins, south India: Tectonic and palaeogeographic implications	S. Patranabis Deb	GSU
6.	Geochronological constraints on tectonic assembly and dispersion, in relation to the Eastern Ghats Orogen	S. Bhattacharya	GSU
7.	Diversity of Mesozoic terrestrial tetrapods with special reference to Rewa, Satpura and Damodar basins	D.P. Sengupta	GSU

Projects

Biological Sciences Division			
1.	Natural resource inventorying using satellite imagery and GIS tools and technology intervention at eastern plateau and coastal areas of West Bengal	P. Banik	AERU & BIRU
2.	Introducing Tropical Sugar Beet 'TSB' (*Beta vulgaris* L.) in different places of West Bengal: A Study on Yield Performance and commercial potentialities	S. Barik	AERU
3.	Development and value addition of innovative agro-entomotoxic materials from natural sources	A. Goswami	AERU
4.	Integrated Nutrient Management for Sisal cultivation in laterite soil of Girdih, a Sub-Tropical Plateau Region of India	M. Ghose	AERU & Stat-Math Unit, Kolkata
5.	Mycorrhizal status of Mangroves of the Sundarbans	M. Ghose	AERU
6.	Monitoring of pond biodiversity to assess the ecological status of ponds	A. Dewanji	AERU & ASU
7.	Allelopathy in Natural and Manipulated Ecosystems – with reference to root exudates, leaf leachates and fruit pulp	S. Mandal Biswas	AERU
8.	Exploration of Plankton Dynamics and Associated Ecosystems: Field study, Laboratory Experiment and Mathematical Modeling	J. Chattopadhyay	AERU
9.	Chemical and Microbiological Studies on Haritaki (*Terminalia chebula* Retz.) against Uropathogenic *Escherichia coli*	R. R. Chattopadhyay	AERU
10.	A Moleculer genetic study of couples with recurrent spontaneous abortions	B.M.Reddy	BAU
11.	Diet, Activity and Aging: A Prospective Study among the Elderly of Kolkata	B. Mukhopadhyay	BAU
12.	Elucidation of the functional significance of potentially susceptible genetic variants of the host and virus implicated in epithelial cell carcinoma with special reference to HPV16/18 associated cervical cancer and oral cancer	B.Roy and S. Sengupta	HGU
13.	Studies on Genetic Epidemiology and Diversity in Indian Populations	P.P. Majumder	HGU
14.	Studies on Genomic Diversity and Affinities in Ethnic Populations of Northeast India	P.P. Majumder	HGU
Social Sciences Division			
1.	Generation of Differentiated Electronic Lexicon for Bangla	Probal Dasgupta	LRU
2.	Interlexical Study of Assamese and Boro Nominal Items	Probal Dasgupta	LRU

3.	Labor Productivity in the Indian Steel industry: A Study of the Rail and Structural Mill of the SAIL Plant in Bhilai	E. Somanathan & Rohini Somanathan	Planning Unit, Delhi
4.	Measuring the Burden of Cancer on Households	Abhiroop Mukhopadhyay	Planning Unit, Delhi
5.	Emotional Display Rules and Personality Pattern Across Different Groups of Individuals	Anjali Ghosh	PRU
Library, Documentation and Information Sciences Division			
1.	Retro-Conv. of WCL's Catalog	Tapan Kr. Mondal	Library, Kolkata
2.	Formulation of Archival Description and Authority Records	Krishna Bhattacharya	PCM Museum & Archives, Kolkata
3.	Restoration and Digitization of Photo Archives of ISI	Nibedita Ganguly	Library, Kolkata
4.	Reclassification of selected areas of Library Collections	Sikha Bhowmick	Library, Kolkata
5.	Standard Subject Index	Sutapa Saha	Library, Kolkata
6.	Digital Repository of Contribution of P C Mahalanobis	Ashis Pal	Library, Kolkata

Completed Projects

Sl. No.	Name of the project	Principal Investigator(s)	Unit(s) involved
Physics and Earth Sciences Division			
1.	Sediment transportation and deposition under combined wave and unidirectional currents: experimental & theoretical studies	B. S. Mazumder	PAMU
2.	The corporeal and the Hyper-real algorithmic linguistic simulations	D. Bandyopadhyay	PAMU
Biological Sciences Division			
1.	Molecular genetic perspectives of Tibeto-Burman (TB) speaking Adi tribal cluster of Arunachal Pradesh, India	T.S. Vasulu	BAU
Social Sciences Division			
1.	Does History Matter for Collective Action?	E. Somanathan	Planning Unit Delhi
2.	Combinatorial Auctions and Resource Allocation by the Indian Government	Debasis Mishra & Arunava Sen	Planning Unit Delhi
3.	An Analysis of Short-duration unemployment	Bharat Ramaswami	Planning Unit Delhi
4.	Micro Finance in India: Possibilities and Constraints	Prabal Roy Chowdhury	Planning Unit Delhi
5.	Effects of Credit Constraints on Schooling Decision in Rural India	Tridip Ray	Planning Unit Delhi
6.	Growth and Convergence in the Indian States: A Panel Study	Chetan Ghate, S. Wright & R. Smith	Planning Unit Delhi

Projects

7.	Internal Markets and Grouped Firm Activities	Sanghamitra Das & Sudip Gupta (IBS, Hyderabad)	Planning Unit Delhi
8.	Free-Riding in the Decentralised Voluntary Provision of Local Public Goods Requiring Multiple Inputs: A Theoretical and Experimental Investigation	Priyodorshi Banerjee and Sujoy Chakraborty	Planning Unit Delhi
9.	Impact of Displacement on Income and other Components of Well being	E. Somanathan and Rohini Somanathan (DSE)	Planning Unit Delhi
10.	Post-enumeration survey for the Indian Census: A Methodological perspective.	Arni S.R. Srinivasa Rao	PSU
11.	Self Assessment and its relationship with Academic Achievement and Achievement Motivation among secondary school students	Rumki Gupta	PRU
12.	Orientation training on Questionnaire design for Psychological & Educational Researches	D. Dutta Roy	PRU, CSSC, MIU
13.	Agrarian Relations in India	Madhura Swaminathan	SRU
14.	Process of empowerment of women in rural areas: A case study in Jharkhand State	Bhola Nath Ghosh	SRU
15.	Assessment of literacy programme in Giridih district of Jharkhand State	Suparna Som	SRU

Externally Funded Projects

Ongoing Projects

Sl. no.	Name of the project	Principal Investigator(s)	Unit(s) involved	Funded by
Theoretical Statistics and Mathematics Division				
1.	A study of Asymptotic Properties of Records	Sreela Gangopadhyay	Stat-Math Unit, Kolkata	Dept. of Scinece & Technology (DST), Govt. of India
2.	Non Commutative Geometry and Quantum Groups	Debashish Goswami	Stat-Math Unit, Kolkata	INSA
3.	Random Geometric Graphs	Rahul Roy	Stat-Math Unit, Delhi	DST
4.	Interacting Particle Systems: Scaling Limits and Long Term properties	Siva Athreya	Stat. Math. Unit, Bangalore	CSIR
5.	Dynamic Random Walks on Algebraic Structures	C.R.E. Raja (along with R. Schott of UHP, Nancy)	Stat. Math. Unit, Bangalore	IFIM

Applied Statistics Division				
1.	Universal one-way Hash Family (UOWHF)	Bimal Roy	ASU	WESEE, Ministry of Defence
2.	Research and Development of some Cryptographic Primitives	Bimal Roy	ASU	Ministry of Information Technology
3.	Exploratory Paradigms in Visual Cryptography	Bimal Roy	ASU	WESEE, Ministry of Defence
4.	Robust implementation of a Variant of the Rajndael (AES)	Palash Sarkar	ASU	WESEE, Ministry of Defence
5.	Analysis of Cryptographic Algorithms & Evaluation on Enhancing Network Security Based on Mathematical Science	Bimal Roy	ASU	DST
6.	International Passenger Survey in India 2008-2010	Ashis SenGupta	ASU	Ministry of Tourism, Govt. of India
7.	Language and brain organization in normative multilingualism	Sumitra Purkayastha	BIRU	DST
Computer and Communication Sciences Division				
1.	New Techniques of Fast Image Compression based on Human Vision Systems and Geometric Data Structures.	B. B. Bhattacharya & M. K. Kundu	ACMU MIU	Intel Corporation, USA
2.	Delay Fault Modeling and Test Generation for Power Supply Noise	S. Sur-Kolay & B. B. Bhattacharya	ACMU	Intel Corporation, USA
3.	Development of Online Handwriting Recognition System for Indian Languages	S. K. Parui	CVPR	Dept. of Information Technology (DIT), Govt. of India
4.	Development of Robust Document Analysis and Recognition Systems for Indian Printed Scripts seen	B. B. Chaudhuri	CVPR	DIT
5.	Cross-Language Information Access System (CLIA) seen	M. Mitra	CVPR	DIT
6.	Computational Intelligence Based Advisory System for Remote Welding	N. R. Pal	ECSU	Board of Research in Nuclear Sciences (BRNS), Govt. of India.
7.	To predict the meteorological images from given sequences of images	B. Chanda	ECSU	Indian Space Research Organisation (ISRO).
8.	Computational Methods for microRNA Target Detection and its Role in Cancer Development	S. Bandyopadhyay	MIU	DIT
9.	Advanced Techniques for Remote Sensing Image Processing - Phase II	A. Ghosh	MIU	DIT and University of Trento

Projects

10.	Processing and Analysis of Aircraft Images with Machine Learning Techniques for Locating Objects of Interest	A. Ghosh	MIU	US Army
Physics and Earth Sciences Division				
1.	Stratigraphic analysis of the Chattisgarh succession: Implications on Meso-to-Early Neoproterozoic lithospheric dyamics	S. Patranabis Deb	GSU	DST
2.	Mesozoic Gondwana Vertebrates from Madhya Pradesh, India: an integrated Study on paleobiology.	S. Bandyopadhyay (Co PI)	GSU	DST
3.	Influence of bedforms on turbulent characteristics and its implications to sedimentology: An experimental study	B. S. Mazumder	PAMU	DST
4.	Image processing technique to study the particle behavior in the near wall region of turbulent open channel flow	B. S. Mazumder	PAMU	CSIR
5.	Digital imaging technique for investigations of particle-fluid interactions due to turbulent flow	Anindita Bhattacharya, (DST Fast Track Young Scientist)	PAMU	DST
Biological Sciences Division				
1.	Farm household Survey (Purulia District) for Study of Agricultural Development and Poverty in Remote Rural Villages in Eastern India	P. Banik	AERU	East-West Center, USA
2.	Development of information on agricultural and horticultural production and their marking using RS and GIS in some district of West Bengal	P. Banik	AERU	DST, West Bengal
3.	Studies on Environmental and Ecological Aspects of Mangrove Biology	M. Ghose	AERU	University of Western Sydney, Australia.
4.	Development of agro-entomotoxic nanoparticles and their use in medical science: applied and basic aspects	A. Goswami	AERU	Department of Biotechnology, Govt. of India
5.	Designing, and studying mode of action and biosafety of nanopesticides	A. Goswami	AERU	ICAR (NAIP), India
6.	Process for the protein-assisted nanocomposite synthesis of silica-protease/chitinase-humic acid (Si-Protease/Chitinase-Has) as bioencapsulated pesticides	A.Goswami (as co-PI)	AERU	Department of Biotechnology, Govt. of India

7.	Physical Growth, Body Composition and Nutritional Status of the Bengali School aged children, Adolescents and Young adults of Calcutta, India. Effects of Socioeconomic factors on secular trends.	P. Dasgupta	BAU	The NHF, The Netherlands
8.	Molecular genetic studies on Type-2 diabetes and diabetic retinopathy	P. P. Majumder	HGU	Department of Biotechnology, Govt. of India
9.	DNA Sequence Variation in Human Populations of India: Assessing the Roles of Evolutionary History and Gene Function, with Special Reference to Complex Diseases	P. P. Majumder	HGU	Department of Biotechnology, Govt. of India
10.	Statistical Methods For Mapping Multivariate Phenotypes	S. Ghosh	HGU	Fogarty International Center, NIH
11.	Polymorphisms in CYP1A1, CYP2E1, NAT drug-metabolizing genes and risk of tobacco-related oral cavity precancer and cancer in India.	B. Roy	HGU	DST
12.	Host-virus interactions at the genetic and epigenetic levels in HPV related cervical cancer in Indian women	S. Sengupta	HGU	Department of Biotechnology, Govt. of India
13.	Chronic exposure to environmental toxins and risk to human health	S. Sengupta and B. Roy	HGU	Ministry of Environment and Forests, Govt. of India
14.	Statistics in Genetic Medicine: Developing Methods for Quantitative Trait Locus Mapping and Estimating Genotype-Environment Interactions	S. Ghosh	HGU	ICMR
Social Sciences Division				
1.	Estimating Poverty at the District Level: A Methodological study	Amita Majumder	ERU	United Nations Development Programmes and Government of India (UNDP & GoI)
2.	Survey of Present Status of Model Steel Villages (MSVs) – evaluation and monitoring	Snigdha Chakrabarti	ERU	Steel Authority of India
3.	ISI-ERU & SINP-CAMCS Collaboration: The Kolkata Paise Restaurant Problem and Resource Utilization	Manipuspak Mitra	ERU	Saha Institute of Nuclear Physics (SINP)
4.	Construction and Analysis of Regional Variations of Social Development Indices in India	Buddhadeb Ghosh	ERU	Ministry of Statistics and Programme Implementation, Government of India (MOSPI, GoI)

Projects

5.	A Demand Forecasting Model for Construction Equipments Marketed by L & T	Nityananda Sarkar	ERU	Larson & Toubro
6.	Impact of Economic Reform on Tribal Poverty	Kunal Chattopadhyay	ERU	NABARD
7.	Development of Methodology Towards Measurement of Poverty	Manoranjan Pal	ERU	MOSPI
8.	Estimation of Probability of Sparse events and Construction of Confidence Intervals	Arni S.R. Srinivasa Rao	PSU, BIRU	CSIR, Mathematical Sciences
9.	Molecular epidemiology and development of Reagents for Diagnostics and Vaccines	Arni S.R. Srinivasa Rao	PSU	DBT, New Delhi.
Statistical Quality Control and Operations Research Division				
1.	Six Sigma Black Belt Training	U H Acharya, A Roy Chowdhury, Somnath Ray and E V Gijo	SQC & OR Unit, Bangalore	TATA BP Solar India Ltd., Bangalore
2.	Process qualification requirements	Sanjit Ray	SQC & OR Unit, Bangalore	J K Industries Limited (Vikrant Tyres Ltd.), Mysore
3.	Six Sigma Black Belt Training	Boby John	SQC & OR Unit, Bangalore	Infosys BPO Limited, Bangalore
4.	ISO 9000/QS 9000 Audits	P K Perumallu	SQC & OR Unit, Bangalore	NVT Quality Certification Pvt Ltd., Bangalore
5.	Six Sigma Implementation	A Roy Chowdhury	SQC & OR Unit, Bangalore	L & T, Mysore
6.	Process Excellence/Six Sigma Implementation	Sanjit Ray	SQC & OR Unit, Bangalore	Triveni Engineering Limited
7.	Guidance/training for the implementation of six sigma	K K Chowdhury	SQC & OR Unit, Bangalore	TUV Academy, Germany- Iran
8.	Six Sigma Green Belt training	E V Gijo	SQC & OR Unit, Bangalore	Quality Management Services, Trivandrum
9.	TQM including Six Sigma Green Belt	P K Perumallu, K K Chowdhury, U H Acharya, A Roy Chowdhury, Somnath Ray, Sanjit Ray, I.Islam, E V Gijo, Boby John	SQC & OR Unit, Bangalore	National Academy for Defence Production (Nagpur) 14th - 26th July 2008

10.	Training on 'Statistical Process Control' (SPC)	U H Acharya, A Roy Chowdhury	SQC & OR Unit, Bangalore	National Engg Industries Ltd., Jaipur
11.	Development of Robust Procedure for estimation and audit of agricultural power consumption	G S R Murthy, A L N Murthy	SQC & OR Unit, Hyderabad	A P Transco Ltd.
12.	Analytics related to Strategic Management	Amitava Banerjee	SQC & OR Unit Kolkata	Infosys Technologies Ltd. Bangalore
13.	Analytics related to Strategic Management	Amitava Banerjee	SQC & OR Unit Kolkata	Patni Computer Systems Limited, Mumbai
14.	Implementation of Quality and Environmental Management System	Ranjan Sett	SQC & OR Unit Kolkata	DIC India Limited Kolkata
15.	Training and Implementation of SQC Techniques	Anup Majumdar, Prasun Das, Abhijit Gupta	SQC & OR Unit Kolkata	NALCO, Damanjodi
16.	Six Sigma Implementation	A. Sarkar	SQC & OR Unit, Mumbai	Larsen & Toubro Ltd
17.	Training on Six Sigma Green Belt	A. Sarkar	SQC & OR Unit, Mumbai	ICICI Bank
18.	Training on Six Sigma Green Belt	A. Sarkar	SQC & OR Unit, Mumbai	ICICI Lombard Insurance
19.	Six Sigma Implementation	A. Sarkar	SQC & OR Unit, Mumbai & Bangalore	HDFC Standard Life Insurance
20.	Six Sigma Implementation	A. Sarkar	SQC & OR Unit, Mumbai & Bangalore	Enercon India Pvt. Ltd.
21.	Process improvement projects	A. Sarkar	SQC & OR Unit, Mumbai	Adventity BPO Ltd.
22.	Six Sigma Assignment	S Rath	SQC & OR Unit, Pune	RIL
23.	Application of Design of Experiment in Nano-Particle project	S Rath	SQC & OR Unit, Pune	ARAI
24.	DOE Using Taguchi Methods	S Rath	SQC & OR Unit, Pune	Ispat Industries Ltd.
25.	SPC Training Programmes	S Rath	SQC & OR Unit, Pune	HEG Ltd., Bhopal

Completed Projects

Sl. no.	Name of the project	Principal Investigator(s)	Unit(s) involved	Funded by
Theoretical Statistics and Mathematics Division				
1.	Swarnajayanthi Fellowship	B.V. Rajarama Bhat	Stat-Math Unit, Bangalore	DST

Projects

Applied Statistics Division				
1.	Accountability of Some Traditionally Managed Natural Resources in the Practice of Ethodietetics and Ethnomedicine	Tapas Samanta	ASU	National Innovation Fundation, Ahmedabad
Social Sciences Division				
1.	International Workshop on Studying Village Economies in India	V. K. Ramachandran and Madhura Swaminathan	SRU	Planning Commission, Indian Council of Social Science Research
Statistical Quality Control and Operations Research Division				
1.	Six Sigma Black Belt Training	Sanjit Ray	SQC & OR Unit, Bangalore	Reliance Industries Limited, Vadodara
2.	Six Sigma Green Belt Training	E. V. Gijo	SQC Unit, Bangalore	Sasken Communication Technologies Limited, Bangalore
3.	Training & Six Sigma Implementation	U. H. Acharya A. Roy Chowdhury Somnath Ray E. V. Gljo	SQC & OR Unit, Bangalore	WeP Peripherals Limited, Bangalore
4.	Training Program & Consultancy on Statistical Techniques for Software Metrics Analysis	Boby John	SQC & OR Unit, Bangalore	Robert Bosch India Ltd., Bangalore
5.	Training & Implementation of Statistical Methods for Quality	U. H. Acharya, E. V. Gijo	SQC & OR Unit, Bangalore	ITC Limited, Coimbatore
6.	Green Belt Training	A. R. Chowdhury	SQC & OR Unit, Bangalore	Praxair India Ltd., Bangalore
7.	Training & Six Sigma Implementation	A. Roy Chowdhury	SQC & OR Unit, Bangalore	Reliance Industries Limited, Allahabad
8.	Training & Six Sigma Implementation	Sanjit Ray	SQC & OR Unit, Bangalore	Reliance Industries Limited, Orissa
9.	Training & Six Sigma Implementation	P. K. Perumallu	SQC & OR Unit, Bangalore	Reliance Industries Limited, Hoshiarpur
10.	Training & Six Sigma Implementation	U. H. Acharya	SQC & OR Unit, Bangalore	Reliance Industries Limited, Nagpur
11.	Six Sigma Black Belt Training	U. H. Acharya, A. Roy Chowdhury, Somnath Ray, E V Gijo	SQC & OR Unit, Bangalore	Bharat Earth Movers Limited, Bangalore

12.	Implementation of Six Sigma	U. H. Acharya, E. V. Gijo	SQC & OR Unit, Bangalore	L.G. Balakrishnan & Bros. Ltd., Coimbatore
13.	Implementation of Six Sigma	U. H. Acharya, A. R. Chowdhury, E.V. Gijo, Somnath Ray	SQC & OR Unit, Bangalore	Motor Industries Company Limited, Bangalore
14	Developing a Demand Forecasting Model	K. K. Chowdhury, Nithyananda Sarkar	SQC Unit Bangalore & ERU	Larsen & Toubro Limited, Bangalore
15.	Six Sigma Implementation	K K Chowdhury, P.K. Perumallu, U. H. Acharya, A R Chowdhury Somnath Ray, Sanjit Ray, E.V. Gijo, Ashok Sarkar	SQC & OR Unit, Bangalore and Mumbai	Ashok Leyland Ltd., Chennai
16.	Data Evaluation and Estimation of the Vehicle Crossing Volume	P. K. Perumallu	SQC & O R Unit, Bangalore	Meher Co. Turkey
17.	Six Sigma Master Black Belt Program 29 April to 9May 2008	A. Roy Chowdhury, Somnath Ray	SQC & O R Unit, Bangalore	General Training
18.	Six Sigma Black Belt (with lean) for IT/ITES Industries 23 – 27 April & 18 – 21 June 2008	Boby John, K.K. Chowdhury	SQC & O R Unit, Bangalore	General Training
19.	Statistical Techniques for Software metric Analysis	Boby John	SQC & OR Unit, Bangalore	Unisys Global Services Limited, Bangalore
20.	Statistical Techniques for Data Mining & Business Analytics (7 - 8 Aug 2008)	Boby John, U. H. Acharya	SQC & OR Unit, Bangalore	General Training
21.	Master Black Belt (20-30 Aug 2008)	A.R. Chowdhury, Somnath Ray	SQC & OR Unit, Bangalore	General Training
22.	Black Belt05 (8-13 Sept-2008 & 10 – 15 November 2008)	U. H. Acharya, Sanjit Ray	SQC & OR Unit, Bangalore	General Training
23.	Statistical Models & Techniques for Quantitative Project Management (18 - 19 September 2008)	Boby John, I. Islam	SQC & OR Unit, Bangalore	General Training
24.	Statistical Techniques for Data Mining & Business Analytics (30 & 31 Oct. 2008)	Boby John, P. K. Perumallu	SQC & OR Unit, Bangalore	General Training
25.	SQC Consultancy	Boby John	SQC & O R Unit, Bangalore	Quality Plus, Bangalore
26.	Six Sigma Black Belt (with lean) for IT/ITES Industries 25-29 Nov 2008 & 6 – 10 January 2009	Boby John, I. Islam	SQC & OR Unit, Bangalore	General Training

Projects

27.	Program on Statistical Methods	Boby John	SQC & OR Unit, Bangalore	Huawei Tec. India Pvt. Ltd., Bangalore
28.	Training on Six Sigma Black Belt	Boby John, U H Acharya, K K Chowdhury	SQC & OR Unit, Bangalore	IBM BPO, Bangalore
29.	Program on SPC/Process Capability & Test of Hypothesis	U. H. Acharya, A. Roy Chowdhury	SQC & OR Unit, Bangalore	TVS Motor Co. Hosur
30.	Six Sigma BB (06) from 15-20 Dec 2008 & Feb 16-21, 2009	P. K. Perumallu, E. V. Gijo	SQC & OR Unit, Bangalore	General Training
31.	Statistical Techniques for Quantitative Project Management	Boby John	SQC & OR Unit, Bangalore	Cognizant Technology Solutions India Pvt. Ltd.
32.	Six Sigma Green Belt	E. V. Gijo	SQC & OR Unit, Bangalore	Yell Adworks Ltd., (Pindar Set) Bangalore
33.	Six sigma Green Belt 24-31 January & 7,14,21 Feb 2008	Somnath Ray, I. Islam	SQC & OR Unit, Bangalore	General Training
34.	MBB Programme from 26/01/09 to 06/02/09	U. H. Acharya, K.K. Chowdhury	SQC & OR Unit, Bangalore	General Training
35.	Program on Six Sigma Green Belt tools & techniques	Boby John	SQC & OR Unit, Bangalore	Wipro Technologies, Bangalore
36.	Guidance on Statistical Analysis	Boby John	SQC & OR Unit, Bangalore	Indian Tobacco Technology Center, Bangalore
37.	Training Program on Six Sigma Black Belt	D. Sampangi Raman	SQC & OR Unit, Chennai	Wheels India Limited, Padi, Chennai
38.	SPC Training Program	D. Sampangi Raman	SQC & OR Unit, Chennai	JSW Steel Limited, Salem
39.	SPC Training Program	D. Sampangi Raman	SQC & OR Unit, Chennai	Rane Holdings Limited, Chennai
40.	Application of Statistical Method	D. Sampangi Raman	SQC & OR Unit, Chennai	Lucas-TVS, Padi, Chennai
41.	Training Program on Six Sigma (Black Belt)	D.Sampangi Raman, Surajit Pal, G. Ravindran	SQC & OR Unit, Chennai	Vodafone Essar South Limited, Chennai
42.	Six Sigma Green Belt Training Programmes and QFD Programme	S M Subhani	SQC & OR Unit, Hyderabad	Amara Raja Batteries Ltd., Tirupathi
43.	Statistical Process Control, MSA & FMEA	S M Subhani	SQC & OR Unit, Hyderabad	Lokesh Machines Ltd
44.	DOE & Six Sigma focus in Food sector	S M Subhani	SQC & OR Unit, Hyderabad	A P Foods

45.	Quality and Process Improvement	G Murali Rao	SQC & OR Unit, Hyderabad	Quislex Legal Services Pvt. Ltd.
46.	Training programmes on Quality Management	ALN Murthy, G Murali Rao	SQC & OR Unit, Hyderabad	BHEL, Corporate Quality
47.	Programme on SPC	ALN Murthy, G Murali Rao	SQC & OR Unit, Hyderabad	Solar Semiconductor
48.	Providing Statistical Training to TCL Officers	Anup Majumdar	SQC & OR Unit Kolkata	TATA Communications Limited
49.	Six Sigma Black Belt Certification Training	S. K. Majumdar	SQC & OR Unit Kolkata	e-Nxt Financials Limited, Mumbai
50.	Improving Quality of Irradiated Cables Adopting Six Sigma Approach	Arup Ranjan Mukhopadhyay, Nandini Das	SQC & OR Unit Kolkata	NICCO Cable Division
51.	Training of Simple QC Tools	Anup Majumdar	SQC & OR Unit Kolkata	Britannia Industries Ltd., Kolkata

North East Projects

Ongoing Projects

Sl. no.	Name of the project	Principal Investigator(s)	Unit(s) involved
Biological Sciences Division			
1.	Status of Austro-Asiatic Tribes in the Peopling of India	B.M. Reddy	BAU
2.	Studies on Genomic Diversity and Affinities in Ethnic Populations of Northeast India	P.P. Majumder	HGU

Completed

Sl. no.	Name of the project	Principal Investigator(s)	Unit(s) involved
Biological Sciences Division			
1.	Adolescents reproductive health: Bio-cuitural dimensions	S. Mukhopadhyay	BAU
2.	Genetic affinity and diversity among Adi-tribes of Arunachal Pradesh	T.S. Vasulu	BAU

4. SYMPOSIA, CONFERENCES, WORKSHOPS, LECTURES AND SEMINARS ORGANISED

Symposia and Conferences

7th International Conference on "*Advances in Pattern Recognition*": ECSU, Kolkata, February 3–6, 2009.

4th Annual International Conference on "*Economic Growth and Development*": Planning Unit, Delhi Centre, December 17-18, 2008.

International Conference on "*Studying Village Economies in India: A Colloquium on Methodology*": SRU, held at Chalsa, West Bengal, December 21-24, 2008.

Workshops and Training Programmes

Workshop on "*Facilitation the exchange of scientific information leading to joint research projects and publication*": Department of Statistics and Applied Probability of National University of Singapore, Institute of Mathematical Sciences of National University of Singapore and Stat-Math Unit, Kolkata, ISI, November 18-19, 2008.

Third Workshop on "*Probability and Stochastic Processes III*": Stat-Math Unit, Kolkata, November 20-24, 2008.

Workshop on "*Topology and Geometry of Foliations*": Stat-Math Unit, Kolkata, November 24-December 6, 2008.

Workshop on "*Statistical Methods in Medical and Health sciences*" (under North-East Programme): Stat-Math Unit, Kolkata, held at NEHU, Shillong, February 19-21, 2009.

Workshop on "*Group Theory*": Stat-Math Unit, Bangalore, May 12–31, 2008.

Training program on "*Advanced Training in Mathematics for Lecturers (ATML) in Functional Analysis*": Stat-Math Unit, Bangalore, June 2–14, 2008.

"*Nurture Program of the NBHM*": Stat-Math Unit, Bangalore, June 16-July 4, 2008.

Workshop on "*Reinforced Random Walks and Random walk in Random Environments*": Stat-Math Unit, Bangalore, December 5–8, 2008.

Mini-Workshop on "*Product Systems and Independence in Quantum Dynamics*": Stat-Math Unit, Bangalore & Mathematisches Forschungszentrum Oberwolfach, Besancon, France, February 15-21, 2009.

A Training programme for the latest batch (ISS XXIX) of Indian Statistical Services (ISS) probationers on "*Recent Developments in Statistical Methods, Theory of Sample Surveys and Small Area Estimation*": Stat-Math Unit, Bangalore, March 2-13, 2009.

Workshop on "*Statistical Inference, Parametric & Non-parametric Approaches Using Statistical Software Packages*" (under North-East Programme): ASU, held at MRMD Department, Suryamaninagar Campus, Tripura University, Tripura, February 9-13, 2009.

Workshop on "*Winter School on Computer Applications in Statistics*": ASU, Kolkata, March 9-31, 2009.

2nd Workshop on "*Nano-Computing & Biochips*" (under North-East Programme): ACMU, Kolkata, February 16-17, 2009.

3rd Workshop on "*Algorithms and Computation (WALCOM - 2009)*": ACMU, Kolkata, February 18-20, 2009.

First Workshop on "*Forum for Information Retrieval Evaluation*": CVPR Unit, Kolkata, December 12-14, 2008.

Workshop on "*Language and Signal Processing*" (under North-East Programme): CVPR Unit, ISI, held at Computer Centre, Tripura University, Suryamaninagar, Tripura, February 2-6, 2009.

7th Workshop on "*Computational Information Processing*" (under North-East Programme): ECSU, Kolkata, September 23–25, 2008.

8th Workshop on "Computational Information Processing" (under North-East Programme): ECSU, Kolkata, held at Tripura University, Agartala, March 23–27, 2009.

Winter School on "Image Processing and Machine Vision": MIU, Kolkata, held at SMIT, Majitar, Rangpo, Sikkim, March 9-13, 2009.

International Workshop on "*Econophys – Kolkata – IV*": PAMU, Kolkata in collaboration with CAMCS, SINP, March 9–13, 2009.

Four weeks' Training Program for ISS Probationers on "*Macro and Microeconomics*": Planning Unit, Delhi Centre, April 2008.

Workshop on "*Psycho-social Support for Disaster Survivors*": PRU, ISI, Kolkata, March 30, 2009.

Training Programme on "*Six Sigma Master Black Belt*": SQC & OR Unit, Bangalore, August, 2008.

Training Programme on "*Quantitative Techniques for Project Management*": SQC & OR Unit, Bangalore, August, 2008.

Training Programme on "*Six Sigma Master Black Belt*": SQC & OR Unit, Bangalore, Jan-Feb, 2008.

Training Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Bangalore, Sep-Nov, 2008.

Training Programme on "*Quantitative Techniques for Project Management*": SQC & OR Unit, Bangalore, October, 2008.

Training Programme on "*Six Sigma Black Belt Certification*": SQC & OR Unit, Bangalore, Nov 2008 – Jan 2009.

Training Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Bangalore, Dec 2008 – Feb 2009.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Chennai, May 5-9, 2008.

Training Programme on "*Six Sigma Master Black Belt*": SQC & OR Unit, Chennai, May 19 – 30, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Chennai, August 10th, 16th, 17th, 23rd, 24th, 2008.

Training Programme on "*Six Sigma Master Black Belt*": SQC & OR Unit, Chennai, September-October 2008.

Training Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Chennai, September 28-December 6, 2008.

Workshop on "*Winter School on Operations Research & its Applications*": SQC & OR Unit, Chennai, February 16-27, 2009.

Training Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Chennai, February 28.

Training Programme on "*Six Sigma Master Black Belt*": SQC & OR Unit, Delhi with Cadbury India Ltd. held at Bhind (M.P.), April 3-5, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Delhi, April 15–17, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Delhi, April 16–18, 2008.

Training Programme on "*First Moduel on Six Sigma Black Belt*": SQC & OR Unit, Delhi, August 6 – 8, 2008.

Training Programme on "*Second Moduel on Six Sigma Black Belt*": SQC & OR Unit, Delhi, September 9-12, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Delhi, September 24-26, 2008.

Training Programme on "*Third Moduel on Six Sigma Black Belt*": SQC & OR Unit, Delhi, October 21-24, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Delhi, December 3-5, 2008.

Training Programme on "*Third Moduel on Six Sigma Black Belt*": SQC & OR Unit, Delhi, December 18–20, 2008.

Training Programme on "*Environmental Data Interpretation, Compilation, Analysis, Presentation and Reporting* Organizing Unit": SQC & OR Unit, Delhi, sponsored by Central Pollution Control Board, January 19-23, 2009.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Delhi, February 10–12, 2009.

Training Programme on "*First Moduel on Six Sigma Master Black Belt*": SQC & OR Unit, Delhi, February 16–21, 2009.

Training Programme on "*Role Of Statistical Techniques For Transition From ISO 9001:2000 to ISO 9001:2008*": SQC & OR Unit Delhi, March 1 –19, 2009.

Training Programme on "*Second Moduel on Six Sigma Master Black Belt*": SQC & OR Unit, Delhi, March 16–20, 2009.

Training programme on "*Interlab Comparison and Proficiency Testing Programme for Environmental Testing Laboratories*": SQC & OR Unit Delhi, sponsored by Central Pollution Control Board, March 17–19, 2009.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, May 6-8, 2008 & May 21-22, 2008.

Training Programme on*"Quality Management": SQC* & OR Unit, Hyderabad with *BHEL*, CQ, May 27, July 9, & September, 2008.

Training Programme on "*Quality Function Deployment*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, June 10, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, June 12-14, 2008 & June 24-25, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, July 15-18, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, July 23-24, 2008.

Training Programme on *"Quality and Process Improvement"*: SQC & OR Unit, Hyderabad with M/s. Quislex Legal Services Pvt. Ltd., July-October 2008.

Training Programme on *"Statistical Process Control"*: SQC & OR Unit, Hyderabad with M/s. Solar Semiconductor, September 23-25, 2008.

Training Programme on *"DOE in Food sector": SQC* & OR Unit, Hyderabad with M/s. A P Foods, September 27, 2008.

Training Programme on *"Six Sigma Food sector"*: SQC & OR Unit, Hyderabad with M/s. A P Foods, September 27, 2008.

Training Programme on *"Statistical Process Control": SQC* & OR Unit, Hyderabad with M/s. Lokesh Machines Ltd, November 6-7, 2008.

Training Programme on *"Measurement System Analysis & FMEA": SQC* & OR Unit, Hyderabad with M/s. Lokesh Machines Ltd, Hyderabad, November 13-15, 2008.

Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad with M/s. Amararaja Batteries, December 11-13, 2008, December 19-20, 2008 & January 29, 2009.

Training Programme on *"Six Sigma Black Belt"*: SQC & OR Unit, Kolkata with e-next Solutions, Mumbai, July 14-21, 2008.

Training Programme on *"Statistical Techniques for Continuous Improvement"*: SQC & OR Unit, Kolkata with Tata Communications, Pune, July 14-21, 2008.

Training Programme on *"Statistical Process Control"*: SQC & OR Unit, Kolkata with NALCO, Damanjodi, July 23-25, 2008.

Workshop on "*The SQC & OR Practices - Methods and Applications Using Software*": SQC & OR Unit, Kolkata and Regional Institute of Medical Sciences, held at Imphal, October 20-21, 2008.

Workshop on "*The SQC & OR Practices - Methods and Applications Using Software*": SQC & OR Unit, Kolkata and Kohima Science College, held at Kohima, October 24-25, 2008.

Conferences and Seminars

Workshop on "*The SQC & OR Practices - Methods and Applications Using Software*": SQC & OR Unit, Kolkata and Pachhunga University College, held at Aizawal, November 17-18, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with Larsen & Toubro Limited, April 7-10, 2008.

Top Management Programme on "*Data Analysis*": SQC & OR Unit, Mumbai with HDFC Std Life Insurance, May 9-10, 2008.

General Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai, May 12-16, 2008.

General Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Mumbai with May 27-30, June 23-26, July 27-30, Aug 27-29, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Bank, June 3-7, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with Larsen & Toubro Limited, June 16-20, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, July 3-5 & Sept 18-20, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, July 7-12, 2008.

Training programme on "*Six Sigma Champion*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, July 11-12, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, July 14-16 (Part-2), 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, July 17-19 & Oct 14-16, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with Larsen & Toubro Limited, July 21-23 (Part-2), 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with Larsen & Toubro Limited, August 11-14, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Bank, August 20-23, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Bank, September 10-13, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, September 15-20, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Bank, September 24-27, 2008.

Training programme on "*Six Sigma Champion*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, October 3-4, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with HDFC Standard Life Insurance, November 10-15, 2008.

Training programme on "*Six Sigma Green Belt-DFSS*": SQC & OR Unit, Mumbai with Larsen & Toubro Limited, Nov 17-18, 2008 & Feb 11-12, 2009.

General Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai, Nov 24-28, 2008.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Lombard Insurance, Dec 16-17, 2008 & Jan 6-7 2009.

Training programme on "*Six Sigma Green Belt*": SQC & OR Unit, Mumbai with ICICI Bank, December 19-23, 2008.

Workshop on "*Six Sigma in Clinical research*": SQC & OR Unit, Mumbai with CREMA, January 13, 2009.

General Programme on "*Six Sigma Black Belt*": SQC & OR Unit, Mumbai with January 27-30, February 24-27, March 25-27, 2009.

Training programme on *"Six Sigma"* An Executive Overview: SQC & OR Unit, Pune, April 4-5, 2008.

Training programme on *"Six Sigma"* An Executive Overview: SQC & OR Unit, Pune, August 22-23, 2008.

Training Programme on "*Transistion to ISO-9001: 2008 Quality Management System*": SQC & OR Unit, Pune, January 22, 2009.

Training Programme on "*Statistical Process Control*": SQC & OR Unit, Pune, February 26, 2009.

Regional Training and Workshop on "*Building Institutional Archives and Digital Libraries*": Library, Documentation and Information Science Division, Kolkata, Sikkim Manipal Institute of Technology & International Council for Science: Committee on Data for Science & Technology held at Rangpo, East Sikkim, August 19-22, 2008.

Workshop on "*Data Mining and Data Warehousing (DmDw'08)*": Centre for Soft Computing Research, Kolkata, September 15-20, 2008.

Lectures and Seminars

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Athreya, K.B., Iowa State University (10.06.2008): Scaling Limits of Branching Markov Process.

Athreya, K.B., Iowa State University (13.06.2008): What happens to the unit ball in n dimensions as n gets large and some other interesting math problems.

Athreya, K.B., Iowa State University (12.06.2008): Scaling limits of branching Markov Processes.

Conferences and Seminars

Athreya, K. B., Iowa State University & IISc., Bangalore (26.02.2009): Size biasing with applications to Markov chains and branching processes.

Banerjee, Moulinath, University of Michigan, USA (18.08.2008): Inconsistency of the bootstrap in problems exhibiting cube root asymptotics.

Banica, Teodor, University of Toulouse, France (27.01.2009): Quantum permutations and complex Hadamard matrices.

Basu, Samik, Harvard University (15.01.2009): Stable homotopy theory and Thom spectra.

Bhatwadekar, S.M., TIFR (16.03.2009): Examples of non-isomorphic surfaces which are stably isomorphic.

Chaudhuri, Sanjay, National University of Singapore (08.08.2008): Testing equality of covariance matrices of multivariate normal populations.

Dalawat, C.S., Harish-Chandra Research Institute, Allahabad (16.09.2008): Congruent numbers.

Dani, S.G., TIFR, Mumbai (17.12.2008): On some atypical large sets of real number numbers involved in Deophantine approximation and geometry.

Dash, Saroj Kumar, Institute of Mathematics and its Applications, Bhubaneswar (25.11.2008): Convergence in mean of some random Fourier series.

Deshouillers, J.M., University de Bordeaux, France (11.12.2008): Harmonic analysis in the study of some inverse additive problems.

Ganguly, Arnab, University of Wisconsin, Madison (16.01.2009): Error analysis of the simulation method for a jump type Markov process.

Gongopadhyay, Krishnendu, TIFR (30.06.2008): z-Classes of isometries of a quadratic space.

Guha, Mohar, University of Michigan, USA (11.08.2008): Front propagation in a noisy, nonsmooth, excitable medium.

Lescope, Christine, UJF, Grenoble, France (22.10.2008): Various aspects of the linking number.

Lescope, Christine, UJF, Grenoble, France (24.10.2008): The Casson invariant as the cube of the linking number.

Lescope, Christine, UJF, Grenoble, France (27.10.2008): The standard parallelisation of a punctured homology z/2- sphere.

Lescope, Christine, UJF, Grenoble, France (29.10.2008): On the Alexander polynomial.

Lescope, Christine, UJF, Grenoble, France (31.10.2008): Surgeries. A proof of the Casson surgery formula from "the Kontsevich-Kuperberg-Thurston definition".

Lescope, Christine, UJF, Grenoble, France (03.11.2008): Feynman diagrams and a construction of a universal finite type invariant for homology spheres.

Menon, Govind, Brown University (02.06.2008): Burgers turbulence and stochastic coalescence.

Parui, Sanjay, National Institute of Science Education and Research, Bhubaneswar (09.02.2009): Analyticity of the schrodinger propagator on the Heisenberg group.

Ramasubramanian, K., Cell for Indian Science and Technology in Sanskrit Department of HSS, IIT Bombay (15.12.2008): Calculus in prose and poetry: Contribution of the Kerala school.

Rej, Abhijnan, MPI for Maths, Bonn (14.07.2008): Supergeometry and periods from parametrized Feynman integrals.

Rej, Abhijnan, MPI for Maths, Bonn (07.07.2008): Algebraic geometry of Feynman graphs.

Roy, Parthanil, Michigan State University (07.01.2009): Hill estimator for tempered power laws.

Sane, Sarang S., School of Mathematics, TIFR (04.03.2009): Projective Modules and Euler Classes.

Sen, Arusharka, Concordia University, Canada (04.08.2008): An eigenfunction problem and the multivariate Kaplan-Meier estimator.

Sen, Bodhisattva, Columbia University, USA (12.01.2009): Detecting streaming motion in Leo 1 using threshold models.

Skalski, Adam, University of Lancaster, U.K. (09.06.2008): Discrete and continuous quantum stochastic evolutions on locally compact quantum groups.

Sinha, Kaneenika, University of Alberta, CANADA (19.12.2008): "Vertical" Sato-Tate Conjecture and Applications.

Sunder, V.S., Institute of Mathematical Science, Chennai (03.11.2008): C* – Algebras: the Gelfand Naimark theorems.

Sunder, V.S., Institute of Mathematical Science, Chennai (04.11.2008): K-theory of C* - algebras.

Sunder, V.S., Institute of Mathematical Science, Chennai (05.11.2008): Von Neumann algebras.

Sunder, V.S., Institute of Mathematical Science, Chennai (06.11.2008): $\Pi_1$factors and their subfactors.

Sunder, V.S., Institute of Mathematical Science, Chennai (07.11.2008): The Jones polynomial invariant of knots.

Uribe, Bernardo, CINVESTAV, Mexico (21.11.2008): Orbifold sring topology.

Stat-Math Unit, Delhi

Athreya, Krishna B., Iowa State University, USA and IISc, Bangalore (03.03.2009): Size biasing with applications to Markov chains and branching processes.

Athreya, Krishna B., Iowa State University, USA and IISc, Bangalore (04.03.2009): Preferential attachment random graphs.

Behera, Biswaranjan, Indian Institute of Technology, Delhi (11.02.2009): Invariance of wavelet subspaces under groups of translation operators.

Dabeer, Onkar, Tata Institute of Fundamental Research, Mumbai (15.04.2008): An overview of single and multiuser information theory.

Dabeer, Onkar, Tata Institute of Fundamental Research, Mumbai (16.04.2008): How much can we push uncoordinated access?

Geeta, Indian Institute of Technology, Delhi (18.03.2009): Postage stamp problem.

Gupta, Ved Prakash, Institute of Mathematical Sciences, Chennai (06.08.2008): Planar algebras and subfactors.

Gupta, Ved Prakash, Institute of Mathematical Sciences, Chennai (17.09.2008): Examples of planar algebras and subfactors.

Kattumannil, Sudheesh Kumar, University of Hyderabad (03.09.2008): Chernoff-type inequalities: Origin, Evolution and Recent Developments.

Kundu, Debasis, Indian Institute of Technology, Kanpur (09.09.2008): Bivariate generalized exponential distribution and some extensions.

Kundu, Debasis, Indian Institute of Technology, Kanpur (10.09.2008): Bayesian inference and life testing plan for the Weibull and other lifetime distributions in presence of progressive censoring.

Keane, Mike, Wesleyan University, USA (12.12.2008): The hitting time theorem.

Khare, Kshitij Deepak, Stanford University, USA (07.01.2009): Rates of convergence of some classes of Markov chains with polynomial eigenfunctions.

Mazumdar, Ravi, University of Waterloo, USA (23.07.2008): Multidimensional diffusions with state dependent reflection.

Madiman, Mokshay, Yale University, USA (20.01.2009): A new look at the compound poisson distribution and compound poisson approximation using entropy.

Nitsure, Nitin, Tata Institute for Fundamental Research, Mumbai (24.09.2008): From differential manifolds to differential stacks.

Pande, Aftab, Cornell University, USA (13.08.2008): Modular forms, elliptic curves and Galois representations.

Rangarajan, Govindan, Indian Institute of Sciences, Bangalore (01.04.2008): Time series analysis using nonparametric Granger casuality.

Rangarajan, Govindan, Indian Institute of Sciences, Bangalore (02.04.2008): Synchronized chaos and generalized turing pattern in coupled dynamical systems.

Rakesh, University of Delaware (28.08.2008): The d-th polarization constant of R^d.

Ramana, Surya, Harish-Chandra Research Institute, Allahabad (14.01.2009): Spacing out with vandermonde.

Rath, Purusottam, Queen's University (01.10.2008): The gamma function and its variants.

Sarkar, Deepayan, Fred Hutchinson Cancer Research Center, USA (25.02.2009): Assessing copy number variation using Genome-wide alignments.

Shah, Riddhi, Jawaharlal Nehru University, Delhi (26.11.2008): Distal actions on groups and shifted convolution property of probability measures.

Singh, Anupam Kumar, Institute of Mathematical Sciences, Chennai (11.04.2008): Conjugacy classes of centralizers in algebraic groups.

Singh, Ajit Iqbal, INSA Senior Scientist, Delhi (08.10.2008): The extent to which the two-by-two matrices hold the key.

Sivasubramanian, Sivaramakrishnan, Indian Institute of Technology, Mumbai (18.02.2009): Analogs of a theorem of Graham, Hoffman and Hosoya.

Toth, Balint, Institute of Mathematics Technical University, Budapest, Hungary (10.12.2008): Self-repelling random walk.

Valdamani, Sreekar, Technion, Tel Aviv (07.05.2008): On the diffusion of shape.

Varadhan, S. R. Srinivasa, Courant Institute of Mathematical Sciences, New York University, USA (03.02.2009): Random walks in random environments.

Varadhan, S. R. Srinivasa, Courant Institute of Mathematical Sciences, New York University, USA (04.02.2009): Homogenization.(Indian Academy of Science Platinum Jubilee Lecture)

Stat-Math Unit, Bangalore

Athreya, K.B., Iowa State University, USA and Indian Institute of Science, Bangalore (24.06.2008): Preferential Attachment Random graphs with general weight function and general input sequence.

Athreya, Krishna B., Iowa State University, USA and Indian Institute of Science, Bangalore (02.02.2009): Size biasing with applications to Markov chains and branching processes.

Athreya, Krishna B., Iowa State University, USA and Indian Institute of Science, Bangalore (12.03.2009): An introduction to the raga classification of Indian classical music.

Bhaskara, Rao., K.P.S., Indiana State University (21.06.2008): Sign pattern matrices.

Dales, H.G., University of Leeds, UK (07.01.2009): Second dual of the measure algebra.

Dutta, Sudipta, Indian Institute of Technology, Kanpur (05.03.2009): Hereditary semi-embeddings and G_\delta embeddings of banach spaces.

Guivarc'h, Y., Universite de Rennes (11.12.2008): Convergence to stable laws for affine random walks and spectral gap properties.

Gupta, Ved Prakash, Institute of Mathematical Sciences, Chennai (03.06.2008): Planar Algebra of the subgroup subfactor.

Kannan, Ravi, Microsoft Research, Bangalore (25.09.2008): A new Probability Inequality and Concentration Results.

Karandikar, R.L., Cranes Software International Limited, Bangalore (15.05.2008): Copula's and their role in mathematical finance.

Conferences and Seminars

Karandikar, R.L., Cranes Software International Limited, Bangalore (17.06.2008): Randomness and probability.

Karn, Anil Kumar, Deen Dayal Upadhyaya College, New Delhi (11.06.2008): An introduction to the abstract theory of Operator spaces.

Karn, Anil Kumar, Deen Dayal Upadhyaya College, New Delhi (24.06.2008): Adjoining of an order unit to a matrix crdered space.

Krishna Kumar, V., Amrita Vishwa Vidyapeetham, Kerala (23.01.2009): The Geometry of Weyl's Limit Classifications.

McIntosh, Alan, Australian National University, Australia (11.11.2008): Solvability of some elliptic PDEs with square integrable boundary data.

Nadkarni, M.G., Mumbai University, Mumbai (22.05.2008): Copulas and group actions.

O' Farrell, Anthony, NUI Maynooth, Ireland (09.01.2009): Aspects of Reversibility.

Olla, Stefano, Universite Paris Dauphine, France (13.03.2009): From Hamiltonian dynamics to heat equation: a weak coupling approach.

Panorska, Anna K., University of Nevada, Reno (12.02.2009): Precise bivariate distribution of the sum and max of n i.i.d exponential random variables.

Pragacz, Piotr, Institute of Mathematics, Polish Academy of Sciences (16.03.2009): Thom polynomials and Schur functions.

Pranesacher, C.R., Indian Institute of Science, Bangalore (25.06.2008): Fixed Dance Numbers with Variable Dance Partners.

Ramaswamy, M., Tata Institute of Fundamental Research, Bangalore (05.06.2008): Applications of Functional Analysis in Differential equations.

Rao, Asha, Royal Melbourne Institute, Melbourne (16.12.2008): Using Algebra to study Quantum State Determination.

Senthamaraikannan, S., Chennai Mathematical Institute, Chennai (06.06.2008): Projective normality of quotient varieties modulo finite groups.

Shashidhara, L.S., Indian Institute of Science Education and Research, Pune (25.03.2009): Remembering Charles Darwin: Understanding human origin and life.

Sholapurkar, Deepak, University of Pune, Pune (12.06.2008): Some special types of sequences and Operator Theory.

Singhi, N.M., Tata Institute of Fundamental Research, Mumbai (19.06.2008): Error correcting codes.

Skalski, Adam, University of Lancaster, UK (19.06.2008): How noncommutative is noncommutative topological entropy?

Srikanth, P.N., TIFR Centre for Applicable Mathematics, Bangalore (18.06.2008): Some aspects of Non-linear Analysis.

Stroock, Dan, Massachusetts Institute of Technology, USA (19.01.2009): Wiener space revisited.

Thangavelu, S., Indian Institute of Science, Bangalore (01.07.2008): A proof from the Book.

Varadhan, S.R.S., Courant Institute of Mathematical Sciences, New York (16.02.2009 & 17.02.2009): Random Walk in Random Environments.

Vittal, P.R., Madras School of Economics, Chennai (15.01.2009): Product densities, moments, cumulants, combinants and Bell polynomials - their interrelationships and applications in stochastic processes.

Applied Statistics Division

Applied Statistics Unit

Banerjee, S., Division of Biostatistics, University of Minnesota, Minneapolis, USA (13.01.2009): Coregionalized Single and Multiresolution Spatially Varying Growth Curve Modeling with Application to Weed Growth.

Basu, S., Northern Illinois University, USA (16.12.2008): Bayesian Semiparametric Models Based on Dirichlet Process Mixtures Andmodel Comparison.

Chakraborty, Sourav, University of Chicago, Technion, Haifa (24.10.2008): Property Testing of Graph Isomorphism and Isomorphism under Transitive Group Action.

Edward J. Stanek III, Department of Public Health, University of Massachusetts – Amherst, USA (31.10.2008): Meta Analysis of Soul Ingestion Intake for Childhood Risk Assessment.

Edward J. Stanek III, Department of Public Health, University of Massachusetts – Amherst, USA (21.10.2008): Statistics and Art: Sampling, Response Error, Mixed Models, Missing Data, and Inference.

Hanagal, David D., Department of Statistics, University of Pune (16.01.2009): Frailty Models in Hierarchical Likelihood.

Kulkarni, H.V., Shivaji University, Kolhapur (14.11.2008): Nonparametric Estimation of a Bivariate Mean Residual Life Function (BMRLF).

Koul Hira, L., Michigan State University, USA (17.02.2009): Model Diagnostics Via Martingale Transforms.

Mukhopadhyay, P., Ramkrishna Mission Residential College, Narendrapur (24.10.2008): Zero- an eternal enigma.

Panorska, A., Department of Mathematics & Statistics, University of Nevada - Reno, USA (10.02.2009): Precise Bivariate Distribution of the Sum and Max of n i.i.d. Exponential Random Variables.

Roy Chaudhuri, D.K., Department of Mathematics, Ohio State University, USA (26.02.2009): Some Recent Results on Steiner 3-Designs.

Sahu, S.K., University of Southampton, U.K. (12.08.2008): Fusing point and a real level space-time data with application to wet deposition.

Sandeep, Sen, CS Department, IIT Delhi (17.10.2008): Approximation Algorithm for Geometric Clustering in Arbitrary Dimensions.

Special Lecture Series on Statistics

Rao, BLS Prakash, University of Hyderabad (30.03.2009): Parameter estimation for linear stochastic different equations driven by fractional Brownian sheet.

Sen, P., Ministry of Statistics and Programme Implementation, (30.03.2009).

Vaman, H.J., University of Mangalore (30.03.2009): Control Schemes in the Presence of Autocorrelation.

Bayesian Interdisciplinary Research Unit

Banerjee, Moulinath & Mukherjee, Debasri, Department of Statistics, University of Michigan Ann Arbor, Michigan, USA & Department of Economics, Western Michigan University Kalamazoo, Michigan, USA (07.01.2009): Semiparametric modeling of discrete data under shape restrictions with applications to education and health data.

Banerjee Sudipto (09.01.2009), Division of Biostatistics, School of Public Health, University of Minneapolis, Minnesota, USA (09.01.2009): Hierarchical spatial modeling of additive and dominance Genetic variance for large spatial trial datasets.

Chakraborty, Sounak, Department of Statistics University of Missouri-Columbia Columbia, MO, USA (21.08.2008): Bayesian Semi-supervised Support Vector Machine for Improved Prediction.

Dass, Sarat, Department of Statistics and Probability Michigan State University East Lansing, Michigan, USA (18.12.2008): A Bayesian analysis of hierarchical mixtures with application to clustering fingerprints.

Ray, Siddheswar, Clayton School of Information Technology Monash University, Clayton, Melbourne, Australia (23.10.2008): Two Relevance Feedback Approaches for Content Based Image Retrieval.

Sen, P. K, Departments of Statistics & Operations Research and Biostatistics University of North Carolina at Chapel Hill, USA (26.06.2008): Whither Biostochastics in computational Biology and Bioinformatics?

Shmuéli, Galit, Department of Decision, Operations & Information Technologies Robert H. Smith School of Business, University of Maryland College Park, MD, USA (25.09.2008): A Flexible Regression Model for Count Data.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Buyya, Rajkumar, University of Melbourne, Australia (29.12.2008): Cloud and Grid Computing.

Chakraborty, Amlan, University of Calcutta (29.9.2008): Synthesis of Quantum Computing Architectures.

Ghosh, Subir K., TIFR, Mumbai (3.7.2008): Exploring Unknown Polygonal Environments with discrete visibility.

Krishnamurthy, Ramesh, Simon Fraser University (3.4.2008): The Capacited Max-k-cut problem.

Laskar, Renu, Clemson University, South Carolina, USA (3.12.2008): Minimal Ranking and a rank number of Rook's graph.

Sen, Arunabha, Arizona State University, Tempe, USA (09.01.2009): A Hitchhiker's Guide to networks science.

Computer Vision and Pattern Recognition Unit

Raghavan, Prabhakar, Yahoo Labs and Stanford University, USA (16.03.2009): Hard science problems at the core of web search.

Documentation Research and Training Centre

Agostini, Alessandro, University of Trento, Italy, October to December, 2008: Logical Modeling, OWL, C-OWL, etc.

Amba, S, CLRI, Chennai (3.12.2008 - 6.12.2008): Series of lectures to M.S (LIS) Programme.

Asundi. A.Y., University of Bangalore, April to November, 2008: Series of lectures to M.S (LIS) Programme.

Bottomley, Gesine, Wissenschaftskolleg zu Berlin, Germany (12.6.2008): The Library Services, Networks and Open Access: The Example of the Institute for Advanced Study Berlin.

Chattamvelli, Rajan, Visiting Scientist, DRTC, September, 2008 to March, 2009: Data Mining.

Johnson, Keith, Stanford Digital Library, USA (26.3.2009): Pitfalls of Metadata.

National Seminar on "Spatial Information Retrieval, Analysis, Reasoning and Modelling", Documentation Research and Training Centre (DRTC) Unit, Bangalore, March, 18-20, 2009

Sampalli, Tara, Nova Scotia Environmental Health Centre, Canada (1.1.2009): Boundary Objects in the Multidisciplinary Care Management of Chronic Conditions.

Vargh, Rebecca B., University of North Carolina at Chapel Hill, USA (4.12.2008): Career Competencies for Information Professionals and Special Librarians of the 21st Century: Developing professional skills & competencies during and after formal LIS Education.

Weibel, Stuart L., Online Computer Library Inc. (OCLC), Dublin, Ohio, USA (26.3.2009): Dublin Core Metadata Overview.

Electronics and Communication Sciences Unit

Basu, Anup, University of Alberta, Canada (22.12.2008): Perceptually Adaptive Multimedia.

Dutta Majumder, Debashish, Pitsburgh, USA (18.3.2009): Guidelines, Principles and Best Practices in Industrial Software Quality Assurance.

Physics and Earth Science Division

Physics and Applied Mathematics Unit

Abraham, Ralph, Department of Mathematics, University of California, USA (10.02.2009): Space-time condensed from a network.

Bhamidipati, Chandrasekhar, Instituto de Fisica Teorica (15.01.2009): Attractor mechanism and black hole entropy.

Bhatt, B. S., Department of Mathematics, University of West Indies (30.06.2008): Switching of prey species in the presence of predator interference.

Bose, S. K., S. N. Bose National Centre for Basic Sciences, Kolkata (4.08.2008): Decelerated surge profiles over adversely sloping bed.

Chakrabarti, A., Department of Mathematics, IISc. Bangalore (10.07.2008): Some aspects of integral equations and their methods of solution.

Ghosh, Sibasish, Institute of Mathematical Sciences, Chennai (15.05.2008): Dynamics of open quantum systems and applications.

Ghosh, Sibasish, Institute of Mathematical Sciences, Chennai (27.01.2009): Entanglement sudden death and energy exchange.

Guha, Abhijit, Department of Aerospace Engineering, University of Bristol, U. K. (14.08.2008): Thermo-fluid dynamic aspects of gas-particle and vapour-droplet flows.

Maiti, Dilip K, Department of Mathematics, BITS, Pilani, Rajasthan (20.06.2008): Stable / unstable stratification in thermosolutal convection in a lid-driven square cavity.

Roy, S. M., Raja Ramanna Fellow, School of Physical Sciences, Jawarharlal Nehru University, New Delhi (30.12.2008): Testing realistic causal quantum mechanics symmetric in position and momentum.

Shankar, D., National Institute of Oceanography, Dona Paula, Goa (4.12.2008): Wind-forced circulation of North Indian Ocean.

Solari, Luca, Department of Civil and Environmental Engineering, University of Florence, Italy (21.11.2008): Local high slope effects on sediment transport and fluvial bedform dynamics.

Solari, Luca, Department of Civil and Environmental Engineering, University of Florence, Italy (25.11.2008): Field monitoring and modeling sediment transport.

Biological Sciences Division

Biological Anthropology Unit

Mascie, Taylor, C.G.N. Department of Biological Anthropology, University of Cambridge, UK (6.1.2009): The impact of cash-for-work programs on maternal and child nutritional status in Bangladesh.

Mojumder, A., Health Nutrition an Exercise Sciences, North Dakota State University, USA (21.1.2009): Go Red - North Dakota.

Human Genetics Unit

Sikder, N., Genomic Instability Section, Genetic and Molecular Biology Branch, National Human Genome Research Institute NIH, USA (31.12.2008): Evolutionary conserved pathway suppresses genomic instability.

Mukhopadhyay, D., Department of Biochemistry and Molecular Biology, Tumor Angiogenesis, Vascular Biology and Nanotechnology Laboratory, Mayo Clinic Foundation, Rochester, Minnesota, USA (23.12.2008): Targeting Angiogenesis in Cancer Therapeutics: Past, Present and Future.

Dhara, S., Hematology, Johns Hopkins University School of Medicine, Baltimore, USA (19.12.2008): Hedgehog Pathway Inhibition in Cancer: Questions and Concerns.

Krishna, S., National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore (20.11.2008): Can stemness be induced in human epithelial tumors?

Mukhopadhyay, R., Tata Memorial Centre, Advanced Centre for Treatment, Research and Education in Cancer, Navi Mumbai (June, 2008): Recent Genetic Selection: Lentivirus vectors as cloning tools.

Social Sciences Division

Economic Research Unit

Bag, Parimal Kanti, National University of Singapore, Department of Economics, Singapore, (5.1.2009): Communication and Authority with Multiple Sources of Uncertainty.

Banerjee, Sanjay, Essex University, UK (13.8.2008): Corporate Governance Information Production and Collusion.

Bera, K. Anil, Department of Economics, University of Illinois, USA (28.7.2008): Birth of a Nonlinear Model.

Chaudhuri, Ananish, Department of Economics, University of Auckland, New Zealand (27.1.2009): Social Learning and Conditional Cooperation in a Laboratory Public Goods Game.

Chowdhury. M. Subhasish, Purdue University, USA (06.8.2008): Linear Tullock Contests: A Generalized Structure and the Existence of Multiple Equilibria.

D'Ambrosio, Conchita, Universita di Milano-Bicocca and DIW Berlin, Italy (15.1.2009): Poverty and Time.

Gangopadhyay, Kausik, Visiting Scientist, Economic Research Unit, Kolkata (9.7.2008): Women's Labor Supply: Is Mother's Time at Home Investment or Consumption?

Ghosh, Aurobindo, Singapore Management University, Singapore, (26.12.2008): Risking Returns: Moving from Public to Private Equity.

Lahiri, Kajal, University at Albany, SUNY, USA (23.1.2009): Learning and Heterogeneity in GDP and Inflation Forecasts.

Marjit, Sugata, Centre for Studies in Social Sciences, Kolkata (16.7.2008): Fraudulent Financial Practice and Competitive Discipline.

Mukherjee, Debasri, Department of Economics, Western Michigan University, USA (21.8.2008): Empirics of Foreign Aid: A Semi Parametric Approach.

Mukherjee, Diganta, ICFAI Business School, Kolkata (10.9.2008): Teaching Assessment Trade-off and Performance Related Pay in Education.

Rao, D.S. Prasada, School of Economics, The University of Queensland, Australia (19.12.2008): Stochastic Approach to Index Numbers for Multilateral Price Comparisons and their Standard Errors.

Ray, Indrajit, Department of Economics, University of Birmingham, UK (12.12.2008): Coordination and Cheap Talk.

Ray, Ranjan, Monash University, Australia (16.1.2009): Evaluating the Distributional Implications of Price Movements: Methodology, Application and Australian Evidence.

Sahu, Sohini, University at Albany, SUNY, USA (7.1.2009): Transition Accounting for India in a Multi-sector Dynamic General Equilibrium Model.

Sengupta, Soumitra, Lamron Analysts, Kolkata (12.8.2008): Quantitative Trading Methods.

Linguistic Research Unit

Thomson, Hanne-Ruth, SOAS, University College London, UK (13.6.08): Teaching Bengali to Foreign Learners: From a Foreigner's Perspective.

Planning Unit

Ambec, Stefan, University College, London (30.03.2009): On The Looting Nations.

Baland, Jean-Marie, University of Namur and Creed (24.10.2009): Land and power: Theory and Evidence from Chile.

Bandyopadhyay, Subhayu, Federal Reserve Bank of St. Louise (28.07.2008): The Interplay between preemptive and Defensive Counter terrorism Measures: A Two Stage Game.

Barbera, Salvador, Universitat Autonoma de Bacelona (16.01.2009): Individual vs. Group Strategy-Proofness: When do they coincide?

Basu, Kaushik C., Marks Professor of International Studies, Professor of Economics and Director, Center for Analytic Economics, Cornell University (17.07.2008): Identity and Altruism: The Moral Basis of Prosperity and Oppression.

Bhalotra, Sonia, Bristol University (12.01.2009): The Intergenerational Correlation of Health in Developing Countries.

Chakraborty, Shankha, University of Oregon (17.04.2008): Diseases and Development: A Theory Infection Dynamics and Economic Behavior.

Chakraborty, Tanika, Washington University in St. Louis (01.10.2008): English Language Premium: Evidence from a Policy Experiment in India.

Chan, Jimy, Shanghai University of Finance and Economics (13.02.2009): Optimal Efficiency-Wage Contracts with Subjective Evaluation.

Chaudhuri, Annanish, University of Auckland (06.02.2009): Credible Assignments and Performance Bonuses in Minimum Effort Coordination Game.

Cheng, Leonard, Hong Kong University of Science and Technology (12.12.2008): China's Outward Foreign Direct Investment.

Clist, Paul, University of Nottingham (29.08.2008): Aid and Tax Revenue: Signs of a Positive Effect since the 1980s.

Dimitrov, Dinko, University of Munich (27.02.2009): Coalitional Matching.

Dubash, Navroz, Jawaharlal Nehru University, New Delhi (25.04.2008): Institutional Transport as Political Opportunity: The Practice and Politics of Indian Electricity Regulation.

Glomm, Gerhard, Indiana University (16.12.2008): Public Budget Composition, Fiscal (De) Centralization and Welfare.

Granot, Daniel, University of British Columbia (15.01.2009): On Some Cost Allocation Problems arising from Graph Optimization Problems.

Guha, Ashok, Jawaharlal Nehru University (retired) (13.03.2009): Utility Functions, Future Consumption Targets and Subsistence Thresholds.

Hoff, Karla, World Bank (25.07.2008): Caste and Punishment: The Role of Caste Status in Norm Enforcement.

Howes Stephen, Australian National University (19.11.2008): The Garmaut Climate Change Review: What Shape and Prospects for an Effective International Agreement on Climate Change Review?

Jain, Tarun, University of Virginia (15.12.2008): Where There is a Will: Fertility Behaviour and Sex Bias in Large Families.

Laslier, Jean-Francois, Ecole Polytechnique, Paris (09.01.2009): Interpersonal Comparisons of Utility in Bargaining: Evidence from a Transcontinental Ultimatum Game.

Merlin, Vincent, CNRS and University of Caen (20.02.2009): Majority Efficient Representation of the Citizens in a Federal Union.

Mookherjee, Dilip, Professor of Economics and Director, Institute of Economic Development, Boston University (17.07.2008): Distributive Impact of Reforms in Credit Enforcement: Evidence from Indian Debt Recovery Tribunals.

Nadkarni, M.G., University of Mumbai (28.11.2008): An Investors Martingale Walk.

Nandeibam, Shasikanta, University of Bath (30.09.2008): On Probabilistic Rationalizability.

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5. Sankhya

The internationally renowned journal, Sankhya was founded by Professor P. C. Mahalanobis in 1933 and began publication under his editorship. It is devoted to original research articles in Applied Statistics, Mathematical Statistics and Probability. Reviews and discussion articles in areas of current research activity are also published. Many seminal articles in the above areas have appeared in Sankhya and these include contributions from scientists within the Institute as well as outside. Sankhya receives articles from all over the world and publishes only those which pass the rigorous peer review process.

During 2003 (Vol. – 64) to 2007 (Vol. -69), Sankhya has been published in a single series four times a year in February, May, August and November. Certain issues came out as a special issue devoted to particular field.

From 2008 (Vol. – 70), Sankhya is being published in two series i. e. Series A and Series B. The coverage of Series A primarily includes such areas as Probability Theory (including Stochastic Processes) and Mathematical Statistics, while Series B is catering to Applied and Interdisciplinary Statistics (including Applied Probability, Applied Stochastic Processes, Econometrics and Statistical Computing).

The following issues of Sankhya were published during April, 2008 to March, 2009:

- May, 2007 : Volume 69 - Part II
- August, 2007 : Volume 69 - Part III
- November, 2007 : Volume 69 - Part IV

6. SCIENTIFIC PAPERS AND PUBLICATIONS

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Chattopadhyay, A. and Mukherjee, D. P.: Pattern generation using level set based curve evolution, *Advances in Intelligent Information Processing Tools and Applications*, B. Chanda and C. A. Murthy (eds.), World Scientific, 19-34, 2008.

Dutta Majumder, D., Das, J., De, A.K., Deb, N.C., Chowdhury, S., Basu Mallick, S., Sinha Roy, P.K., Chatterjee, S.K. and Sen, A.K.: Echo patterns in SODAR during winter over Calcutta, *Pattern Directed Information Analysis*, D. Dutta Majumder and B Chanda (eds.), New Age International, New Delhi, 246-250, 2009.

Mandal, S., Chowdhury, S.P., Das, A.K. and Chanda, B.: A complete system for document image segmentation, *Pattern Directed Information Analysis*, D. Dutta Majumder and B. Chanda (eds.), New Age International, New Delhi, 430-453, 2009.

Mukherjee, D. P.: Image segmentation using level set analysis, *Pattern Directed Information Analysis*, D. Dutta Majumder and B. Chanda (eds.), New Age International, New Delhi, 381-391, 2009.

Mukhopadhyay, S. and Chanda, B.: Local contrast enhancement of colour imagesusing multi-scale morphology, *Pattern Directed Information Analysis,* D. Dutta Majumder and B. Chanda (eds.), New Age International, New Delhi, 287-312, 2009.

Sen, A.K., Chatterjee, S.K., Das, J., De, A.K., Chowdhury, S., Deb, N.C., Dutta Majumder, D., Basu Mallick, S. and Sinha Roy, P.K.: Diffraction patterns as observed in TV signal propagation, *Pattern Directed Information Analysis*, D. Dutta Majumder and B Chanda (eds.), New Age International, New Delhi, 240-245, 2009.

Machine Intelligence Unit, Kolkata

Barman, B., Mitra, S. and Pedrycz, W.: Shadowed clustering for speech data and medical image segmentation, Lecture Notes in Computer Sciences 5306, J. Grzymala-Busse et al. (eds.), Springer Verlag, Berlin, 475-484, 2008.

Chanda, B. and Murthy, C.A.: Advances in Intelligent Information Processing: Tools and applications, *Statistical Science and Interdisciplinary Research*, Indian Statistical Institute Platinum Jubilee series - Vol. 2, Chanda, B. and Murthy, C.A. (eds.), World-Scientific, Singapore, 213-241, 2008.

Das, R. and Mitra, S.: Gene interaction sub-networks and soft computing, *Human-Centric Information Processing Through Granular Modelling,* A. Bargiela and W. Pedrycz (eds.), Springer Verlag, Berlin, 313-327, 2008.

Maji, P. and Pal, S.K.: Rough-fuzzy hybridization for protein sequence analysis, *Advances in Intelligent Information Processing: Tools and Applications,* B. Chanda and C. A. Murthy (eds.), World Scientific, 243-275, 2008.

Maji, P. and Chaudhuri, P.P.: Fault diagnosis of electronic circuits using cellular automata based pattern classifier, *Soft Computing Applications in Industry*, Bhanu Prasad (ed.), Springer-Verlag, Berlin, 225-246, 2008.

Biological Sciences Division

Agricultural and Ecological Research Unit

Bairagi, N., Pal, S., Chatterjee, S. and Chattopadhyay, J.: Nutrient, non-toxic phytoplankton, toxic phytoplankton and zooplankton interaction in an open marine system, *Aspects of Mathematical Modeling*, R. J. Hosking, and E.Venturino (eds.), Birkhaeuser Publication, 41-63, 2008.

Biological Anthropology Unit

Chakrabarty, S., Pal, M., Bharati, S., Bharati, P.: Chronic energy deficiency among tribal communities of Orissa, India, *Health and Nutritional Problems of Indigenous Populations*, K. Bose (ed.), Kamala-Raj Enterprise, New Delhi, 95 – 101, 2008.

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Reddy, B.M. and Kumar, V.: Origins of the Austro-Asiatic Populations, *Handbook of Human Molecular Evolution*, Volume – 1, Cooper DN and Kehrer-Sawatzki-H (eds.), John Wiley & Sons Ltd., Chichester, 507 – 515, 2008.

Sarkar, S. and Mukhopadhyay, B.: Age trends in blood pressures and obesity among the urban Bhutias of Skkim, *Health and Nutritional Problems of Indigenous Populations*, K. Bose (ed.), Kamal Raj Enterprise, New Delhi, 59-66, 2008.

Biological Anthropology Unit

Majumder, P.P.: Peopling of India: Insights from genetics, *Encyclopedia of Life Sciences*, John Wiley & Sons Ltd, Chichester, 1-5, 2008.

Social Sciences Division

Economic Research Unit

Bourguignon, F. and Chakravarty, Satya R.: Multidimensional poverty orderings: theory and applications, *Arguments for a Better World-Essays in Honor of Amartya Sen (Volume I: Ethics, Welfare and Measurement)*, Kaushik Basu and Ravi Kanbur (eds.), Oxford University Press, New York, 337-361, 2008.

Chakrabarty, S., Pal, M., Bharati, S. and Bharati, P.: Chronic energy deficiency among tribal communities of Orissa, India, *Health and Nutritional Problems of Indigenous Populations*, Kaushik Bose (Guest ed.), Kamla-Raj Enterprises, Delhi, India, 95-101, 2008.

Chakraborty, Brati Sankar and Abhirup, Sarkar: Trade, wage inequality and the vent for surplus, *Contemporary and Emerging Issues in Trade Theory and Policy*, S. Marjit and E.Yu (eds.), Emerald Group Publishing Limited, UK, 251-273, 2008.

Maiti, Pulakesh, Ghosh, J.K. and Bera, Anil: Indian Statistical Institute—numbers and beyond (1931-1947), *History of Indian Science, Philosophy and Culture - Volume1*, Center for Studies in Civilisation, Government of India, 2009.

Marjit, S., Kabiraj, T. and Mukherjee, A.: Quota as a competitive device, *Globalization, International Trade and Economic Dynamics: Essays in Memory of Koji*, T. Kamihigashi and L. Zhao (eds.), Shimomura, Springer-Verlag, 151-159, 2008.

Linguistic Research Unit

Dasgupta, Probal: The ubiquitous complementizer, *Linguistic Theory and South Asian Languages*, Josef Bayer, Tanmoy Bhattacharya, M.T. Hany Babu (eds.), John Benjamins, Amsterdam, 163-173, 2007 [de facto 2008].

Dasgupta, Probal: Nirbishesh nijanter unki, *Bangla Bhasha-Projukti: Nana Katha,* Anupam Basu (ed.), Bhasha Projukti Gabeshona Porishad, Kolkata, 20-24, 2009.

Dasgupta, Probal: Antauparolo, *Jarlibro de UEA,* Roy McCoy (ed.), Universala Esperanto-Asocio, Rotterdam, 6-7, 2008.

Dash, Niladri Sekhar: Bengali Linguistics at the Threshold of the Twenty-First Century, *Indo-Aryan Languages*, Omkar Nath Koul (ed.), CIIL, Mysore, 2008.

Dash, Niladri Sekhar: Techniques of Text Corpus Processing, *Readings in Quantitative Linguistics*, Panchanan Mohanty, Reinhard Köhler (eds.), Indian Institute of Language Studies, New Delhi, 81-115, 2008.

Dash, Niladri Sekhar: Linguistic works in Bengali (2001-2007): a brief review, *Annual Review of South Asian Languages and Linguistics*, Rajendra Singh (ed.), Mouton de Gruyter, Berlin, 217-235, 2008.

Planning Unit

Ghate, Chetan: Entry for The time inconsistency problem, *The Princeton Encyclopedia of the World Economy*, Ramkishen Rajan and Kenneth Reinert (eds.), Princeton University Press, 2009.

Mukhopadhyay, Abhiroop and *ChandraSekhar, S.*: Socio-economic Heterogeneity in Urban India, *The New Global Frontier: Urbanization, Poverty and Environment in the 21st Century*, George Martin, Gordon McGranahan, Mark Montgomery and Rogelio Fernandez-Castilla (eds.), Earthscan, New York, 317-334, 2008.

Ray, Tridip, Das, Sanghamitra and Mukhopadhyay, Abhiroop: Economic Cost of HIV and AIDS in India, *HIV and AIDS in South Asia: An Economic Development Risk,* Markus Haacker and Mariam Claeson (eds.), Chapter 4, The World Bank, Washington, DC, 123-154, 2009.

Population Studies Unit

Datta, Pranati: Demographic Scenario of Tribal Population in India and Madhya Pradesh, *Population and Health, India 2007*, Alak Ranjan (ed.), Shyam Institute, Bhopal, Madhya Pradesh, 21-36, 2008.

Datta, Pranati: Nepali Female Migration and Trafficking, *Migrating Women: Opportunities and Vulnerabilities,* Asis Kumar Pain (ed.), The ICFAI University Press, Hyderabad, India, 109-123, 2008.

Datta, Pranati: Dynamics of Urbanisation in India, *Urbanisation: Issues and Perspectives*, J.R Dholakia (ed.), The ICFAI University Press, Hyderabad, 16-38, 2008.

De, Partha, Bhattacharya, B.N., Dhar, Arpita: Deprivation and Neonatal Mortality: An Approach to Evaluate Reasons behind the Deprivation Leading to Mortality, *Population, Poverty and Health: Analytical Approaches*, K.K. Singh, R.C.Yadava and Arvind Pandey (eds.), Hindusthan Publishers, New Delhi, 111-131, 2009.

Psychology Research Unit

Dutta Roy, D. and Panda, Amrita: Attitude towards school infrastructure among girls of primary schools: A Survey in West Bengal, *Women, Education and Development: Perspectives, Issues and Concerns*, Rajarshi Roy (ed.), Shipra Publications, New Delhi, 160-175, 2009.

Dutta Roy, D.: Making organization innovative, *Innovation and Technology Management*, S.P. Mukherjee, H.S. Ray and H.S. Maiti (eds.), Macmillan India Ltd., Delhi, 47-53, 2008.

Dutta Roy, D.: Taxonomic approach in Job analysis, *Psychological assessment in Personnel selection,* S. Subramony and S.B. Raj (eds.), Defense Institute of Psychological Research, Delhi, 25-29, 2008.

Sociogical Research Unit

Ghosh, Bholanath and De, Utpal: Process of Empowerment of Women: A Comparative study of Tripura and Meghalaya, *Women Emancipation: Focus North-East*, Asok Kumar Roy and B.Datta Roy (eds.), North-east India Council for Social Science Research, Om Publications, Shillong, New Delhi, 265 –287, 2008.

Ghosh, Bholanath, Pal, M and Bharati, P.: Women in decision making: experiences from two states in north east India, *Women empowerment movements in North-east India*, L.S. Gassah (ed.), Omsons Publications, New Delhi, 198 –215, 2008.

Ghosh, Bholanath, and Karmarkar, R.: Problems of Tribal Identity in North – Eastern Region, *Contemporary social problems in India - Vol 1*, Ruby Sain (ed.), Readers Service, Kolkata, 125-132, 2008.

Ghosh, Bholanath, Pal, M. and Bharati, P.: Some aspects of gender differences in two states of northeast India, *Women Speak*, Ghosh, Bholanath and Dutta Subhabrata (eds.), Mittal Publications, New Delhi, 99-114, 2008.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Delhi

Neogy, S.K., Das, A.K. and Das, P.: Complementarity Problem involving a Vertical Block Matrix and its Solution using Neural Network Model, *Mathematical Programming and Game Theory for decision making*, S. K. Neogy, R. B. Bapat, A. K. Das and T. Parthasarathy (eds.), ISI Platinum Jubilee Series on Statistical Science andInterdisciplinary Research, - Vol. 1, 113—130, 2008.

Neogy, S.K., Das, A.K. and Gupta, A.: On a Mixture Class of Stochastic Game with Ordered Field Property, *Mathematical Programming and Game Theory for decision making,* S. K. Neogy, R. B. Bapat, A.K. Das and T. Parthasarathy (eds.), ISI Platinum Jubilee Series on Statistical Science and Interdisciplinary Research - Vol. 1, 451—477, 2008.

Center for Soft Computing Research: A National Facility

Mitra, S. and Barman, B.: Rough-fuzzy clustering: An application to medical imager, *Rough Sets and Knowledge Technology*, G. Wang, T. Li, J.W.G. Busse, D. Miao, A. Skowron, Y.Y. Yao (eds.), LNAI 5009, Springer Verlag, Berlin, 300-307, 2008.

7. VISITING SCIENTISTS

A number of distinguished scientists from India and abroad participated in the research, training and other scientific activities of the Institute during the year. Some of them came to the Institute on invitation and spent fairly long periods in the Institute to assist in the regular research and teaching programmes, while others came for short periods and gave lectures and seminars. Most of them were available for consultation by the faculty members of the Institute. Names of the visiting scientists are given below.

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Athreya, K.B., Iowa State University, USA, February 25 - 28, 2009.

Bergsma, Wicher, London School of Economics, January 11 - 24, 2009.

Bhatwadekar, S.M., School of Mathematics, Tata Institute of Fundamental Research, March 16 - 23, 2009.

Biswas, Indranil, School of Mathematics, Tata Institute of Fundamental Research, May 26 - June 04, 2008.

Dash, Saroj Kumar, Institute of Mathematics & Applications, Bhubaneswar, August 12 - November 12, 2008.

Deshouillers, J.M., University of Bordeaux, France, December 10 - 12, 2008.

Dutta, Santanu, Tezpur University, July 2007 - August 2008.

Gangopadhyay, Krishnendu, Tata Institute of Fundamental Research, June 25 - July 01, 2008.

Lescope, Christine, University of Grenoble, France, October 21 - November 06, 2008.

Rej, Abhijnan, Max-Planck-Institut Fiir Mathematik, Bonn, Germany, July 01 - August 15, 2008.

Roy, Amit, Tata Institute of Fundamental Research (Retd.) September 30 - October 01, 2008.

Sane, S. Sarang, School of Mathematics, Tata Institute of Fundamental Research, March 04 - 06, 2009.

Sinha, Kaneeika, University of Alberta, Canada, December 18 - 20, 2008,

Sunder, V.S., Institute of Mathematical Sciences, Chennai, November 02 - 08, 2008.

Uribe, Bernardo, Max Plank Institute for Mathematics, Germany, November 16 - 23, 2008.

Stat-Math Unit, Delhi

Athreya, Krishna B., Iowa State University, USA, March 1 - 7, 2009.

Chaubey, Yogendra P., Concordia University, Canada, November 10 - December 11, 2008.

Dabeer, Onkar, Tata Institute of Fundamental Research, Mumbai, India, April 14 - 17, 2008.

Gupta, Ved Prakash, Institute of Mathematical Sciences, Chennai, India, June 19 - 30, 2008 and July 1 - November 30, 2008.

Jain, Tanvi, Indian Institute of Technology, Delhi, June 13 - 30, 2008.

Keane Mike, Wesleyan University, USA, December 8 - 15, 2008.

Kundu, Debashsis, Indian Institute of Technology, Kanpur, India, September 8 - 12, 2008.

Kattumannil, Sudheesh Kumar, Cochin University of Science and Technology, Cochin, India, March 17 - July 31, 2008.

Khaledi, Bahaedin, Razi University, Iran, March 12 - April 6, 2008.

Mazumdar, Ravi, University of Waterloo, USA, July 22 - 24, 2008.

Nitsure, Nitin, Tata Institute of Fundamental Research, Mumbai, India, September 23 - 25, 2008.

Parida, Pradip Kumar, Indian Institute of Technology, Kharagpur, April 30 - August 28, 2008.

Rakesh, University of Delaware, USA, August 28 - 29, 2008.

Rangarajan, Govindan, Indian Institute of Science, Bangalore, India, April 1-2, 2008.

Rajeev, Himachal Pradesh University, Shimla, January 15 - February 15, 2009.

Sano, Takashi, Yamagata University, Yamagata city, Japan, March 7 - August 27, 2008.

Sharma, Rajesh, Himachal Pradesh University, Shimla, January 15 - February 15, 2009.

Singh, Anupam Kumar, Institute of Mathematical Sciences, Chennai, India, April 9 - 20, 2008.

Sivaramakrishnan, S., Indian Institute of Technology, Mumbai, February 13 - 22, 2009.

Sankaran, P. G., Cochin University of Science and Technology, Cochin, India, June 8 - 13, 2008.

Sundar, S., Institute of Mathematical Sciences, Chennai, India, June, 2008 - December 31, 2008.

Toth Balint, Institute of Mathematics, Technical University, Budapest, Hungary December 8 - 15, 2008.

V. B., Kiran Kumar, Cochin University of Science and Technology, Cochin, May 25 - July 25, 2008.

Valdamani, Sreekar, Technion, Tel Aviv, May 2 - 9, 2008.

Stat-Math Unit, Bangalore

Bandhyopadhyay, Sudipto, Indian Institute of Technology, Kanpur, March 1 – 6, 2009.

Karn, Anil Kumar, Deen Dayal Upadhyaya College, New Delhi, June 2008.

Kodiyalam, Vijay, Institute of Mathematical Sciences, Chennai, May – July, 2008.

Navada, Gowri, Periyar University, Salem, May 2008.

Nadkarni, M.G., Mumbai University, Mumbai, April 2008 and August – September 2008.

Panigrahi, Pratima, Indian Institute of Technology, Kharagpur, December 2008.

Schott, R., University of Henri Poincare, February 2009.

Shah, Riddhi, Jawaharlal Nehru University, New Delhi, July 2008.

Singhi, N.M., Tata Institute for Fundamental Research, Mumbai, June 2008.

Skalski, Adam, Lancaster University, United Kingdom, June 2008.

Souradeep, Tarun, Inter University Centre for Astronomy and Astrophysics, Pune, March 23 – 25 2009.

Srinivasan, R., Chennai Mathematical Institute, November – December 2008.

Vadlamani, Sreekar, Industrial Engineering and Management, Technion, Haifa, April – May, 2008.

Varadhan, S.R.S., Courant Institute of Mathematical Sciences, February 16 - 17 2009.

Vijayarajan, A. K., National Institute of Technology, Kerala, June – July 2008.

Vittal, P.R., University of Madras, Chennai, December 2008.

Applied Statistics Division

Applied Statistics Unit

Stenak Ed, School of Public Health Sciences, University of Massachusetts, USA, September 5 - November 2, 2008.

Bayesian and Interdisciplinary Research Unit

Ray, Siddheswar, Monash University, Melbourne, September 30, 2008 - December 31, 2008.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Buyya, Rajkumar, University of Melbourne, Australia, December 29, 2008.

Chakrabarti, Amlan, University of Calcutta, India, June 10 - 23, 2008.

Das, Gautam K., Tor Anumana P. Ltd, India, May 23, 2008.

Ghosh, Subir K., Tata Institute of Fundamental Research, Mumbai, India, June 3, 2008.

Krishnamurty, Ramesh, Simon Fraser University, Canada, April 03, 2008.

Laskar, Renu, Clemson University, South Carolina, USA, December 3, 2008.

Computer Vision and Pattern Recognition Unit

Cancedda, Nicola, Xerox Research Centre Europe, France, December 15 - 17, 2008.

Harman, Donna, National Institute of Standards and Technology, USA, December 7 - 15, 2008.

Merino, Carlos, Instituto Tecnológico de Canarias, Spain, September, 2008..

Documentation, Research and Training Centre

Agostini, Alessandro, University of Trento, Italy, September 29 - December, 2008.

Amba, S., CLRI, Chennai, December 3 - 6, 2008.

Asundi, A.Y., University of Bangalore, April - November 2008.

Bottomley, Gesine, Wissenschaftskolleg zu Berlin, June 12, 2008.

Johnson, Keith, Stanford Digital Library, USA, March 26 - 29, 2009.

Maltese, Vicenzo, University of Trento, Italy, July 30 - September 1, 2008.

Sampalli, Tara, Nova Soctia Environmental Health Centre, Canada, December 25, 2008 - January 6, 2009.

Vargh, Rebecca B., University of North Carolina at Chapel Hill, USA, December 2 - 9, 2009.

Weibel, Stuart L., Online Computer Library Inc., (OCLC), Dublin, Ohio, March.26 - 29, 2009.

Machine Intelligence Unit

Diener, Marc and Diener, Francine, University of Nice, France, March 12 - 14, 2009.

Gupta, Madan M., University of Saskatchewan, Canada, December 22, 2008.

Goswami, Ambarish, Honda Research Institute, California, USA, December 15, 2008.

Physics and Earth Sciences Division

Geological Studies Unit

Basu, A., Department of Geological Sciences, Indiana University, Bloomington, Indiana, USA, February 10 – 18, 2009.

Desojo, J. B., Fossils Vertebrates, Museo Argentino de Ciencia Naturales, Buenos Aires, Argentina, October 15 - 24, 2008.

Novas, F., Fossils Vertebrates, Museo Argentino de Ciencia Naturales, Buenos Aires, Argentina, August 18 - 26, 2008.

Wilson, J. A., Department of Geological Sciences, University of Michigan, Ann Arbor, USA, May 19 - 23, 2008.

Physics and Applied Mathematics Unit

Abraham, Ralph, Department of Mathematics, University of California, Santa Cruz, USA, February 2 – 13, 2009.

Bhamidipati, Chandrasekhar, Instituto de Fisica Teorica, Sao Paolo, Brazil, January 13 – 16, 2009.

Bhatt, B. S., Department of Mathematics, University of West Indies, June 27 - July 1, 2008.

Bhattacharya, J., Department of Mathematics, IIT Kharagpur, May 1 - November 30, 2008.

Bose, S. K., S. N. Bose National Centre for Basic Sciences, Kolkata, July 1 – 31, 2008.

Solari, L., Department of Civil Engineering, University of Florence, Italy, November 20 – 28, 2008.

Social Sciences Division

Economic Research Unit

Bag, Parimal Kanti, Department of Economic, National University of Singapore, December 22, 2008 – January 5, 2009.

Bera, Anil K., Department of Economics, University of Illinois, USA, July 27 – August 4, 2008.

Bose, Amitava, Indian Institute of Management, Kolkata, January 1 – March 31, 2008 and January 1 – March, 2009.

Chakraborty, Bikas K., Centre for Applied Mathematics & Computational Science, Saha Institute of Nuclear Physics, Kolkara, August 31, 2008 - March, 2009.

Chatterjee, Kalyan, Department of Economics, The Pennsylvania State University, USA, December 22, 2008 – January 02, 2009.

Conchita, D'Ambrosio, Universita di Milano-Bicocca and DIW, Berlin, Italy, January 4 – 15, 2009.

Gangopadhyay, Kausik, 51/19 Dumdum Road, Kolkata - 700074, May 7 - December 31, 2008 and January –March, 2009.

Ghosh, Aurobindo, School of Economics and Social Sciences, Singapore Management University, December 18 – 28, 2008.

Marjit, Sugata, Center for Studies in Social Sciences Patuli, Kolkata, August 1 – December 31, 2008 and January 1 – May 31, 2009.

Sengupta, Sarbajit, Department of Economics, Visva Bharati, Santiniketan, January1 – March 31, 2008 and January – March, 2009.

Linguistic Research Unit

Thomson, Hanne-Ruth, School of Oriental and African Studies, University College London, June 8 - 19, 2008.

Ghosh, Rajat, English Language Centre, Majan University College, Ruwi, July 22 - 24, 2008.

Planning Unit

Bandyopadhyay, Shubhayu, Federal Reserve Bank of St. Louise, July 24 - 28, 2008.

Basu, Kaushik, Cornell University, USA, December 14, 2008 - January 2, 2009.

Basu, Kaushik, Cornell University, USA, April - July, 2008.

Bhatt, Pallavi, Mohyal Educational and Research Institute of Technology (MERIT), New Delhi, India, July 21 - November 30, 2008.

Chakraborty, Subir K., Indiana University, USA, February 22 - March, 2009.

Chan, H.C.J., Sanghai School of Finance & Economics, Japan, February 1 - 15, 2009.

Chaudhury, Basudeb, Centre de Sciences Humaines, January – March, 2009.

Dhillon, Amrita, University of Warwick, UK, March, 2008.

Dmitrov, Dinko, University of Munich, February 23 - March 7, 2009.

Dreze, Jack, University of Belgium, Belgium, February 2 - 6, 2009.

Dutta, Bhaskar, University of Warwick, UK, April 2008 - March 31, 2009.

Easwaran, Mukesh, University of British Columbia, Canada, November 11 - December 12, 2008.

Ghosh, Parikshit, Canada, July– November, 2008.

Glomm, Gerhard, Indiana University, USA, December 11 - 21, 2008.

Gravel, Nicolas, Greqam Marseille, France, September 16 - 22, 2008.

Guha, Ashok Sanjay, Jawaharlal Nehru University (Retired), India, September 30 - October 1, 2008.

Hatlebakk, Magnus, C Michelson Institute, University of Bergen, March 8 - 14, 2009.

Kar, Anirban, University of Warwick, UK, April 6 - 15, 2008.

Laslier, J.F., Ecole Polytechnique, Paris, December 29, 2008 - January 9, 2009.

Visiting Scientists

Majumdar, Dipjyoti, Concordia University, USA, August 12 - 24, 2008.

Mukhopadhyay, Bappaditya, Management Development Institute, India, July 21 - November 30, 2008.

Rakshit, Mihir, Investment Information and Credit Rating Agency Ltd., Kolkata, India, April 18 - 25, 2008.

Robinson, Peter, University of New South Wales, Sydney, August 3 - 7, 2008.

Roy, Jaideep, Brunel University, Middlesex, July 18 - November 3, 2008.

Sethi, Rajiv, Bremond College, USA, August 12 - 28, 2008.

Thi Muih Ngo, University of Namur, February 26 - March 18, 2009.

Wadhawa, Wilima, India, July 23 - December 31, 2008.

Population Studies Unit

Roy T.K., International Institute for Population Sciences, Mumbai, February, 2009.

Psychology Research Unit

Bernstein, Bonnie, California Institute of Integral studies, January 9, 2009.

Bhadra, Subhashis, Disaster Mental Health, American Red Cross, Delhi, March 30, 2009.

Brown, Jennifer, Department of Psychology, Guilford, Surrey, UK, December 8, 2008.

Campbell, Elizabeth A., British Psychological Society, University of Glasgow, UK, December 8, 2008.

Chakraborty, Sohini, Sanved, Kolkata, January 9, 2009.

Das, Nagendranath, Administrative Training Institute, Salt Lake, Kolkata, March 30, 2009.

Deb, Shibnath, University of Calcutta, Kolkata, December 22, 2008.

Ghosh, Malati, Institute of Post Graduate Medical Education and Research, Kolkata, March 30, 2009.

Goswami, Sangeeta, Mind India, Guwahati, Assam, March 25, 2009.

Mathur, Purnima, Department of HSS, Indian Institute of Technology, Delhi, April 24, 2008.

Ray, Tapas Kumar, SEVAC, March 30, 2009.

Sharma, N.K., Indian Institute of Technology, Kanpur, September 1, 2008.

Sociological Research Unit

Thomas, Jayan Jose, National University of Singapore, April 15 - July 15, 2008.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Chennai

Parthasarathy T., SQC & OR Unit, Chennai (under INSA Senior Scientist Scheme).

SQC & OR Unit, Delhi

Rakhee, Banasthali Vidyapith, India, May 19 - June 25, 2008.

Krishnamurathy, Nagarajan, Chennai Mathematical Institute, India, August 17 - September 29, 2008.

SQC & OR Unit, Hyderabad

Arthanari, Tiru S., University of Auckland, New Zealand, March 20 - 28, 2009.

Center for Soft Computing Research: A National Facility

Deshpande, A., College of Engineering, Pune, July 4, 2008.

Ray, S., Monash University, Australia, December 1 - 24, 2008.

Goswami, A., Honda Research Institute, USA, December 22, 2008.

Mandal A. S., Central Electronics Engineering Research Institute, Pilani, January 19, 2009.

8. HONOURS AND AWARDS

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Barua, Rana
Selected: Member, Academic Advisory Board of Jagadish Bose National Science Talent Scholarship (JBNSTS), 2008.

Bose, Arup
Awarded: J.C. Bose Fellowship of Department of Science and Technology (DST), 2008.

Chaudhuri, Probal
Elected: Fellow of Indian National Science Academy (INSA), 2008.

Ghosh, Anil Kumar
Selected: Award of Indian National Science Academy Medal for Young Scientists, 2009.

Maulik, Krishanu
Selected: Associate of Indian Academy of Science, Bangalore, 2008.
Awarded: Microsoft Research Young Faculty Award, 2008.

Stat-Math Unit, Delhi

Bandyopadhyay, Antar
Awarded: Microsoft Research Young Faculty from Microsoft Research and ISI.

Bapat, R.B.
Awarded: J.C. Bose National Fellowship from Department of Science and Technology.

Stat-Math Unit, Bangalore

Athreya, Siva
Awarded: (i) Scopus Young Scientist Award, Elsevier; (ii) Homi Bhaba Fellowship.

Applied Statistics Division

Bayesian and Interdisciplinary Research Unit

Basu, Ayanendranath
Elected: Fellow National Academy of Sciences, India (Allahabad).

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Bhattacharya, Bhargab B.
Awarded: TechnoMentor, India Semiconductor Association, 2008.

Computer Vision and Pattern Recognition Unit

Garain, U.
Awarded: Google Guest from Google Inc., 2008.

Electronics and Communication Sciences Unit

Chanda, B.
Elected: Fellow of International Association of Pattern Recognition, 2008.

Machine Intelligence Unit

Maji, P.
Awarded: Microsoft Young Faculty Award, Microsoft Research Labrotary India (MSR), 2008.

Mitra, S.
Elected: Fellow of National Academy of Sciences, Allahabad, 2008.
Listed in Lilavati's Daughters: The Women Scientists of India, R. Godbole and R. Ramaswamy (eds.) Indian Academy of Sciences, Bangalore, pages 196-197, 2008.

Physics and Earth Sciences Division

Geological Studies Unit

Saha, Dilip
Awarded: National Mineral Award (2007) in the area of Basic Geosciences.

Physics and Applied Mathematics Unit

Bhattacharya, Anindita
Awarded: DST Fast Track Young Scientist Fellowship, New Delhi, 2008

Mandal, B.N.
Elected: as a Platinum Jubilee Fellow of National Academy of Sciences, Allahabad, 2009.

Pal, Supratik
Elected: Life Member of Indian Association for General Relativity and Gravitation, Pune, 2009.

Biological Sciences Division

Human Genetics Unit

Ghosh, Saurabh
Awarded: Suraj Kali Jain Award from the Indian Society for Medical Stastistics.

Social Sciences Division

Linguistic Research Unit

Dasgupta Probal
Selected: National Visiting Professor of Philosophy for 2008-09 by the Indian Council of Philosophical Research, Delhi.

Planning Unit

Roy Chowdhury, Prabal
Selected: Inclusion in the Marquis-who's-who 2009 for overall contribution to academics.

Sociological Research Unit

Chakroborty Aniruddha
Nominated: Member of Child Welfare Committee (North 24 Parganas District) by Government of West Bengal. .

Swaminathan, Madhura
Nominated: Member of the First Executive Council of Sikkim University.

Social Sciences Division

SQC & OR Unit, Hyderabad

Murthy, A.L.N.
Selected: Member of South Central Regional Committee of AICTE, New Delhi.

Murthy, G.S.R.
Selected: Member of the Rajiv Gandhi National Quality Award Evaluation Committee – Western zone.

9. EDITORIAL AND OTHER SCIENTIFIC ASSIGNMENTS

EDITORIAL ASSIGNMENTS

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Goswami, A. (Editor): *Sankhya*, Series A, 2008.

Stat-Math Unit, Delhi

Bhatia, R. (Senior Editor): *Linear Algebra and Its Applications*, Elsevier, 2008; (Managing Editor) *Texts and Readings in Mathematics*, Hindustan Book Co., 2008.

Bhatt, Abhay Gopal (Co-editor): *Sankhya*, Indian Statistical Institute, 2008.

Dewan, Isha (Associate Editor): *Computational Statistics and Data Analysis*, 2008; *Journal of Indian statistical Association*, 2008

Roy, Rahul (Associate Editor): *Journal of Applied Mathematics*, 2008; (Co-Editor): *Sankhya*, 2008.

Stat-Math Unit, Bangalore

Delampady, M. (Editor): *Perspectives in Mathematical Sciences*, Vol. I; *Probability and Statistics and Pure Mathematics*, Vol. II, World Scientific; *Statistical Science and Interdisciplinary Research*, Vol. 7 & 8, 2009.

Rajeev, B. (Editor): *Perspectives in Mathematical Sciences*, Vol. I; *Probability and Statistics and Pure Mathematics*, Vol. II, World Scientific; *Statistical Science and Interdisciplinary Research*, Vol. 7 and 8, 2009.

Ramasubramanian, S. (Co-Editor): *Sankhya*, Series A.

Rao, T.S.S.R.K. (Editor): *Perspectives in Mathematical Sciences*, Vol. I; *Probability and Statistics and Pure Mathematics*, Vol. II, World Scientific; *Statistical Science and Interdisciplinary Research*, Vol. 7 and 8, 2009; *Lectures on Operator Theory*, Ramanujan Mathematical Society Lecture Notes, 8, 2009.

Sastry, N.S.N. (Editor): *Perspectives in Mathematical Sciences*, Vol. I; *Probability and Statistics and Pure Mathematics*; Vol II, World Scientific; *Statistical Science and Interdisciplinary Research*, Vol. 7 and 8, 2009.

Applied Statistics Division

Applied Statistics Unit

Biswas, A. (Associate Editor): *Sequential Analysis*, 2008-09; (Associate Editor): *Communications in Statistics.*

Editorial and other Assignments

Bayesian Interdisciplinary Research Unit

Basu, Ayanandranath (Editor): *Sankhya*, Series B, 2008-09; (Associate Editor) *Journal of Statistical Planning and Inference*, 2009.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Bhattacharya, B.B. (Editor): *Journal of Circuits, Systems*; Computers and Journal of Electronics Testing Theory and Applications (JETTA).

Sinha, B.P. (Editor): *Journal of Parallel and Distributed Computing.*

Sur-Kolay, S. (Associate Editor): *IEEE Transactions on VLSI Systems (TVLSI)*, 2008.

Computer Vision and Pattern Recognition Unit

Chaudhuri, B.B. (Associate Editor): *International Journal of Pattern Recognition and Artificial Intelligence; International Journal of Document Analysis and Recognition; Pattern Recognition; International Journal of Computer Vision; Vivek; The Institution of Electronics and Telecommunication Engineers (IETE) Technical Journal.*

Pal, U. (Associate Editor): *Electronic Journal on Computer Vision and Image Analysis; International Journal of Computer; Mathematical Sciences and Applications.*

Documentation Research Unit

Sagar, B.S.D. (Associate Editor): *Dynamics in Nature and Society*, 2008; (Guest Editor) *International Journal of Remote Sensing*, 2009.

Electronics and Communication Sciences Unit

Pal, N.R. (Editor-in-Chief): *IEEE Transactions on Fuzzy Systems*; (Associate Editor) *IEEE Transactions on Systems*, Man and Cybernetics – B; (Associate Editor) *Fuzzy Information and Engineering*, Springer; (Editor) *International Journal of Approximate Reasoning.*

Machine Intelligence Unit

De, R.K. (Associate Editor): *Far East Journal of Experimental and Theoretical Artificial Intelligence (FEJETAI).*

Ghosh, A. (Associate Editor): *International Journal of Knowledge Engineering and Soft Data Paradigms; International Journal of Soft Computing and Bioinformatics.*

Maji, P. (Guest editor): *Fundamenta Informaticae*, Vol. 87(2), 2008.

Mitra, S. (Associate Editor): Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery (WIRE DMKD); *Neurocomputing; Journal of Computational Intelligence in Bioinformatics (JCIB)*; (Guest Editor) *Information Fusion*, Vol. 10(3), 2009.

Pal, S.K. (Associate Editor): *Pattern Recognition Letters; International Journal of Pattern Recognition & Artificial Intelligence; Applied Intelligence; Information Sciences; Fuzzy Sets and Systems; Fundamenta Informaticae; Lecture Notes on Computer Science Transactions on Rough Sets; International Journal of Computational Intelligence and Applications; IET Image Processing; Journal Intelligent Information Systems and Proceedings INSA-A*; (Editor-in-Chief) *International Journal of Signal Processing; Image Processing and Pattern Recognition*; (Book Series Editor) *Frontiers in Artificial Intelligence and Applications,* IOS Press; *Statistical Science and Interdisciplinary Research*, World Scientific.

Physics and Earth Sciences Division

Geological Studies Unit

Saha, D. (Editor): *Indian Journal of Geology*, Vol. 78, No.1-4 2009.

Biological Sciences Division

Agricultural and Ecological Research Unit

Banik, Pabitra (Associate Editor): *World Journal of Agricultural Sciences*; *International Digital Organization for Scientific Information.*

Social Sciences Division

Economic Research Unit

Chakravarty, Satya R. (Member, Advisory Board): *Book Series 'Economic Studies in Inequality, Social Exclusion and Well-Being'*, Springer, New York; (Associate Editor): *Economics Journal*, Kiel Institute for the World Economy, Germany.

Linguistic Research Unit

Dasgupta, Probal (Joint Editor): *Language Problems and Language Planning*, Vol. 33, 2008-09.

Dash, Niladri Sekhar (Editor): *Special Issue on Corpus Linguistics of Language Forum*, Vol. 35, No. 2, 2009; (Member, Editorial Board): *Language Forum*; (Member, Editorial Board): *Indian Journal of Applied Linguistics.*

Planning Unit

Ghate, Chetan (Policy Editor): *Indian Growth and Development Review*, UK.

Ramaswami, Bharat. (Co-Editor): *Indian Growth and Development Review*, Vol. 1(1&2), Emerald Group Publishing Limited, UK.

Editorial and other Assignments

Roy Chowdhury, Prabal (Co-editor): *Indian Growth and Development Review.*

Somanathan, E. (Associate Editor): *Environment and Development Economics.*

Population Studies Unit

Pathak, Prasanta (Assistant Editor): *Indian Journal of Regional Science*, Vol. XXXX, 2008.

Sociological Research Unit

Ramachandran, V.K. (Contributing Editor): *Journal of Agrarian Change*, Basic Blackwell Publishers.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Bangalore

Acharya, U.H. (Editor in Chief): Newsletter of SQC & OR Division.

John, Boby (Associate Editors): Newsletter of SQC & OR Division.

Ray, Somnath (Associate Editors): Newsletter of SQC & OR Division.

SQC & OR Unit, Kolkata

Das, Arup Kumar (One of editors): Conference Volume *International Symposium on Mathematical Programming and Game Theory for Decision Making*, World Scientific.

SCIENTIFIC ASSIGNMENTS/ACADEMIC VISITS ABROAD

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Dasgupta, Ratan:
Second ISI-ISSAS and ISM-ISSAS joint statistical conference, Taipei, Taiwan, June 19–20, 2008.

Poddar, Mainak:
Seoul National University, Korea, October 10-17, 2008.

Stat-Math Unit, Delhi

Bandyopadhyay, Antar:
(1) Institute for Mathematical Sciences (IMS), the National University of Singapore (NUS) and the Department of Statistics and Applied Probability, NUS, Singapore, April 1-4, 2008; (2) Institute

Mathematical Sciences, the National University of Singapore, the Department of Mathematics and Department of Statistics and Applied Probability, NUS, Singapore, May 26-July 18, 2008; (3) 7th World Congress of the Bernoulli Society, NUS, Singapore, July 14-19, 2008; (4) Institutonacional de Mathmatica Pure e Aplicada (IMPA), Rio de Janeiro, Brazil, July 26-August 4, 2008.

Bapat, R.B.:
(1) International Mathematical Olympiad, Madrid, Spain, July 10-22, 2008; (2) 17th International Workshop on Matrices and Statistics, Tomar, Portugal, July 23-26, 2008; (3) University of Coimbra, Portugal, July 27-31, 2008; (4) Plenary Talk, MAT-TRIAD 2009 conference, Poland, March 23-27, 2009.

Bhatia, Rajendra:
(1) University of Nairobi, Kenya, December 1-15, 2008; (2) Manchester Institute of Mathematical Sciences, University of Manchester, UK, May 10-16, 2008; (3) Department of Engineering Physics and Mathematics, Helsinki University of Technology, Finland, September 1-12, 2008.

Nandi, Swagata:
National University of Singapore, Singapore, November 17-20, 2008.

Pal, Arup Kumar:
Department of Mathematics, Ishfahan University of Technology, June 6-13, 2008.

Roy, Rahul:
(1) Department of Electrical and Computer Engineering, University of Waterloo, Canada, May 20-June 27, 2008; (2) Department of Statistics, University of Sao Paulo, Brazil, July 28-October 13, 2008.

Sarkar, Anish:
National University of Singapore, Singapore, November 17-19, 2008.

Thakur, Maneesh:
Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, June 17-July 19, 2008.

Stat-Math Unit, Bangalore

Athreya, Siva:
(1) National University of Singapore, Singapore, July 14–19, 2008; (2) Institute of Pure and Applied Mathematics, Rio de Janeiro, Brazil, July 21–August 4, 2008; (3) Department of Mathematics, York University, Toronto, Canada, September 5–19, 2008.

Raja, C. Robinson Edward:
(1) IFIM project, University Henri Poincare, Nancy, France, October, 2008; (2) University of Rennes 1, Rennes, France, October, 2008.

Rajarama Bhat, B.V.:
(1) Department of Mathematics, Lancaster University, UK, July 14-27, 2008; (2) First Indo-Brazil Math. Symposium, IMPA, Rio de Janeiro, Brazil, July 28-August 4, 2008; (3) Universities of Milan, Campobasso & Rome and Hammamet, Tunisia, September 24–October 12, 2008; (4) MFO, Oberwolfach, Germany, February 16-21, 2009; (5) Visited Prof. Uwe Franz, Besancon, France, February 22-28, 2009; (6) Department of Mathematics, UK, February 28-March 6, 2009.

Sury, B.:
(1) London Mathematical Society scheme, University of Glasgow, University of Edinburgh, University of Manchester, Imperial College, London, June, 2008; (2) Max-Planck-Institut-fur-Mathematik, Bonn, Germany, February 2–March 31, 2009.

Applied Statistics Division

Applied Statistics Unit

Biswas, A.:
(1) National University of Singapore, Singapore Management University and Chonnam National University, Gwangju, Korea, May-June, 2008; (2) University of Malaya, Kuala Lumpur, Malaysia, February, 2009; (3) ISCB Conference, Copenhagen, Denmark, August, 2008; (4) London School of Economics, U.K., November 2008; (5) Joint ISI-Academia Sinica-ISM conference, June, 2008.

Bose, Mausumi:
National University of Singapore, November 2008.

Dewanji, A.:
R. Samual McLaughlin Centre for Population Risk Assessment (Institute of Population Health), University of Ottawa, Canada, May-July, 2008.

Bayesian Interdisciplinary Research Unit

Basu, Ayanendranath:
(1) Academia Sinica, Taipei, Taiwan, 19-20 June, 2008; (2) Penn State University, Department of Statistics, USA, August 15, 2008 –March 31, 2009.

Purkayastha, Sumitra:
(1) Department of Mathematics and Statistics, McGill University and Montreal Neurological Institute, Montreal, Canada, April 1-June 11, 2008.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Bhattacharya, B.B.:
Asian Test Symposium (ATS), Sapporo, Japan, November 23-29, 2008.

Mukhopadhyaya, K.:
(1) 20th Canadian Conference on Computational Geometry, University of Montreal and University of Ottawa, Canada, July 14-August 11, 2008; (2) University of Windsor, Canada, August 16–September 9, 2008.

Nandy, S. C.:
Technical Program Committee of 2nd Workshop on Algorithms and Computation (WALCOM 2008), Dhaka, Bangladesh, February 18-20, 2009.

Sur-Kolay, S.:
(1) Intel Asia Academic Forum, Taipei, Taiwan, October 20-23, 2008; (2) Department of Electrical Engineering, National Taiwan University, Taipei, October 23, 2008; (3) Department of Computer Science, National Tsing-Hua University, Hsinchu, Taiwan, October 24, 2008; (4) Session Chair at International Conference on Electronic Design, Penang, Malaysia, December 1-3, 2008.

Computer Vision and Pattern Recognition Unit

Chaudhuri, B. B.:
(1) International Conference on Frontiers in Handwriting Recognition, Montreal and University of Concordia, Canada, August 18-22, 2008; (2) University of Buffalo, Iowa State University and University of Michigan, Dearborn, USA, August 22-September 5, 2008; (3) National University of Singapore, November 15-22, 2008.

Garain, U.:
(1) Nanyang Technological University, Singapore, July 24, 2008; (2) Laboratoire LITIS, Université de Rouen, France, October 16–December 10, 2008.

Mitra, M.:
Delivered tutorial, ACM SIGIR Conference, Singapore, July 18-25, 2008.

Pal, U.:
(1) Faculty of Information Science and Technology, Multi-media University, Melaka, Malaysia, May 29-30, 2008; (2) School of Information and Communication Technology, Griffith University, Gold Coast Campus, Australia, June 1-13, 2008; (3) School of Information and Communication Technology, Griffith University, Nathan Campus, Australia, June 11, 2008; (4) School of Information Technology and Electrical Engineering, University of Queensland, St. Lucia, Brisbane, Australia, June 13, 2008; (5) Graduate School Engineering, Mie University, Tsu, Mie, Japan, August 25-September 27, 2008.

Documentation, Research and Training Centre

Madalli, D.P.:
(1) Research under the East West Programme, University of Trento and UNFAO, Rome, Italy, April 21-May 23, 2008; (2) Invited speaker, Conference on Asian Semantic Web School (ASWS2008), Asian Institute of Technology, Thailand, December 3-9, 2008; (3) Delivered lecture on "Bridging the Divide: towards Vision 2020, 3rd GRL2020 Workshop on "Creating a Research Library that Preserves the Past, Present and Curates the Future", Taipei, Taiwan, February 23-26, 2009; (4) Living Knowledge Project Kick-off Meeting, University of Trento, Italy, February 3-6, 2009.

Prasad, A.R.D.:
(1) Resource Person of pilot project on "The establishment of a National Framework of Institutional e-repositories in Science & Technology", National Science Foundation, Sri Lanka, May 12-18, 2008; (2) 3rd GRL2020 Workshop on "Creating a Research Library that Preserves the Past, Present and Curates the Future", Taipei, Taiwan, February 23-26, 2009; (3) Thai National AGRIS Centre, Bangkok, Thailand, February 26-March 6, 2009; (4) Living Knowledge Project Kick-off Meeting, University of Trento, Italy, February 3-6, 2009.

Raghavan K.S:
(1) Presented a paper, 10th International ISKO Conference, Montreal, Canada and Research discussion and lecture, School of Information and Library Science, University of North Carolina, USA, August 5-14, 2008; (2) International Conference on ALIEP-2009, Japan, March 3-11, 2009.

Rao, R.I.K.:
Delivered a Keynote paper at 4th International Conference on Webometrics and attended the COLLNET Meeting at Humboldt University, Berlin, Germany, July 28-August 3, 2008.

Electronics and Communication Sciences Unit

Mukherjee, D.P.:
(1) Visiting Professor, Department of Computing Science, University of Alberta, Edmonton, Canada, June-July, 2008.

Pal, N. R.:
(1) Invited one-day seminar on Computational Intelligence in Biomedical Engineering, Chiang Mai University, Chiang Mai, Thailand, May 23, 2008; (2) Plenary speech at the 2008 IEEE Conference on Soft Computing in Industrial Applications, SMCia/08, Japan, June 25-27, 2008; (3) Invited talk at the 7th International Conference of Bioinformatics, InCoB, 2008, Taiwan, October 2008; (4) Chair Professor, National Chiao Tung University, Hsinchu, Taiwan, June 9-December 12, 2008.

Machine Intelligence Unit

Bandyopadhyay, S.:
(1) Sapienza University of Rome, Rome, Italy, May-June 2008; (2) Invited lecture, Dept. of Mathematics and Computer Science, University of Palermo and Dept. of Computer Science, University of Pisa, Italy, June 2008; (3) Invited lecture, Machine Learning Group, Department of Computer Science, University of Waikato, Hamilton, and Department of Electrical and Computer (ECE) Engineering, University of Auckland, New Zealand, November 24, 2008.

De, R.K.:
Delivered lecture, Department of Biotechnology, Turku, Finland, August 26-September 2, 2008.

Ghosh, A.:
(1) Hannan University, October 10-November 8, 2008.

Kundu, M.K.:
Member of the Scientific Board for the International Consortium for Interdisciplinary Science (ICIS), Palermo, Italy, 2008-09.

Mitra, S.:
(1) Plenary talk and panel discussion at International Forum on Knowledge Technology (IFKT 2008), Chongqing, China and Chongqing University of Posts & Telecommunications, Chongqing, China, May 12-16, 2008; (2) Zhejiang University of Technology, Hangzhou, China, May 17-31, 2008; (3) Editorial Board Meeting, John Wiley Headquarters, New Jersey, USA, September 27-30, 2008; Cleveland State University, Ohio, USA, October 1-14, 2008.

Pal, S.K.:
(1) 7th International Symposium on Methodologies for Intelligent Systems, York University, Canada, May 20-23, 2008; (2) University of Manitoba, Canada, May 23-27, 2008; (3) Brock University, Canada, May 27, 2008; (4) INSA-Brazil Academy of Science Collaboration, Brazil, June 23-26, 2008; (5) INSEAD, France, June 28-29, 2008; (6) Plenary talk, 2008 IEEE conference on Granular Computing, Hanghou, China, August 25-28, 2008; (7) TWAS meeting, Mexico City, Mexico, November 8-13, 2008; (8) Keynote talk, 2008 International Symposium on Signal Processing, Image Processing and Pattern Recognition (SIP 2008), Hainan Island, China, December 13-15, 2008; (9) University of Trento, Italy, February 3-10, 2009.

Physics and Earth Sciences Division

Geological Studies Unit

Bandyopadhyay, Saswati:
(1) Attend and presented a paper at the 3rd Latin American Congress of Vertebrate Paleontology, Argentina, September 17-October 17 2008; (2) For collaborative research, Natural History Museum, University College of London and Oxford University Museum, UK, September 17-October 16, 2008.

Das, S.S.:
Boyscast Fellowship, DST, Smithsonian Institution, Washington DC, USA, April 2008-March 2009,

Ghosh, P.:
Present invited paper in the River To Rock Record conference, Aberdeen, U.K., January 12-14, 2009.

Mazumder, Rajat:
(1) JSPS Visiting Scientist (collaborative research with Prof. Makoto Arima), Yokohama National University; (2) Discussions on research-related problems with Dr. Tomohiro Sekiguchi, Flume Laboratory, Terrestrial Environmental Research Centre, University of Tsukuba; (3) Delivered a lecture on Palaeoproterozoic Sedimentation and volcanism in the Singhbhum crustal province, India, Department of Earth Sciences, Chiba University; (4) Yokohama National University and Institute of Solid State Physics, University of Tokyo; (5) Field work (New research collaboration with Prof. Makoto Arima), Tanzawa mountain belt and Arasaki-Jogashima arc (Miura peninsula), Japan; (6) Study penecontemporaneously deformed sedimentary succession (Misaki Formation) of the Miura and Boso peninsula, Tsukuba University, Japan, April 1-May 24 2008.

Patranabis-Deb, S.:
(1) Collaborative work on Crustal evolution of peninsular India with Profs. Abhijit Basu and J. Sheiber, Indiana University, USA, May-June, 2008; (2) Starting a new collaboration on Geochemistry of the Precambrian carbonate-evaporite succession from the Chattisgarh and Kurnool basin and its implications for the Proterozoic marine evolution with Dr. Linda C. Kah, University of Tennessee, USA, June 11–July 15, 2008.

Physics and Applied Mathematics Unit

Das, Pradip Kumar:
(1) Wroclaw University, Poland, August 11–23, 2008; (2) Chungbuk National University, Korea, January 10 – 25, 2009.

Ghosh, Subir:
Paul Verlain University of Metz, France, April 20–June 18, 2008.

Roy, Pinaki:
Atomic and Molecular Applied Physics (FAMA) Laboratories of the Metropolican University of Mexico-Azc, September 22–October 26, 2008.

Roychoudhury, Rajkumar, Emeritus Scientist, (CSIR):
(1) University of Valladolid, Spain, June 22–July 26, 2008; (2) Universite de Libre Brussels, Belgium, September 15–October 14, 2008.

Roy, Sisir:
(1) Trailles Foundations, Nice, France, May 5–9, 2008; (2) University of Arkansas, USA, June 9–August 7, 2008.

Biological Sciences Division

Agricultural and Ecological Research Unit

Banik, P.:
Bangladesh Rural Advancement Committee and University of Agriculture, Maimansingh, Bangladesh, February 8-13, 2009.

Das, S.:
Department of Biosciences, National SunYat-sen University, Kaohsiung, Taiwan, China, April-June 2008.

Biological Anthropology Unit

Bharati, P.:
National Statistical Office (NSO), Mongolia, December 1-8, 2008.

Dasgupta, P.:
Department of Anthropology, University of Ankara, Turkey, April 7-May6, 2008.

Human Genetics Unit

Ghosh, S.:
(1) Erasmus University, Rotterdam, Netherlands and Psychiatrische Zurich, Switzerland, April 8-19, 2008; (2) Washington University School of Medicine, St. Louis and National Institutes of Health, Bethesda, USA, May 26–30, 2008; (3) International Biometric Society Conference, Dublin, Ireland, July 14-18, 2008; (4) International Genetic Epidemiology Society Meeting and Genetic Analysis Workshop, St. Louis, USA, September 13-17, 2008; (5) American Society of Human Genetics Meeting, Philadelphia, USA, November 12-16, 2008.

Majumder, P.P.:
(1) USA, April 2-5, 2008, Berlin, Germany, July 12-16, 2008; (2) Washington, D.C, USA, November 15-19, 2008; (3) Singapore, March 22-24, 2009.

Sengupta, S.:
(1) University of Wisconsin, Madison, Wisconsin, USA, July 22-27, 2008; (2) McArdle Laboratory of Cancer Research, University of Wisconsin, Madison, USA, July 28-29, 2008.

Social Sciences Division

Economic Research Unit

Mitra, Manipushpak:
(1) University of Concordia, Canada, USA, June 17–22, 2008; (2) University of Queen's, Canada, USA, June 23–26, 2008; (3) Academic Research and Seminar, Seoul National University, Seoul, South Korea, September 9 –12, 2008.

Neogi, Chiranjib:
International Conference on 'Uses of Frontier Efficiency Methodologies for Performance Measurement in the Financial Services Sector' organized by IDEAs, Imperial College, London, U.K., July 4–8, 2008 .

Linguistic Research Unit

Dasgupta, Probal:
(1) Invited Lecture on 'La modalité subjonctive et la transparence en bangla', Department of Linguistics, University of Paris VII, France, April 14, 2008; (2) Invited Lecture on 'Maldiskriminacia Esperanto', Union Française pour l'Espéranto, Paris, France, April 15, 2008; (3) Invited Lecture on 'La leksika kerno de Esperanto', Société pour l'Espéranto à Lille, Lille, France, April 17, 2008; (4) Invited Lecture on 'Conceptualization kernel studies as a cognitive science enterprise', Department of Linguistics, University of Amsterdam, Amsterdam, Netherlands, April 18, 2008; (5) Invited Lecture on 'Subjunctives in Bangla', Department of Linguistics, University of Utrecht, Utrecht, Netherlands, April 21, 2008; (6) Presidential remarks, Symposium on Linguistic Rights (organized by Universal Esperanto Association, Rotterdam with United Nations), Geneva, Switzerland, April 24, 2008; (7) Invited Lecture on 'Historio por malfermi la estontecon', Universal Esperanto Association, Rotterdam, Netherlands, April 26, 2008; (8) Presidential remarks, 93rd World Congress of Esperanto (organized by Universal Esperanto Association), Rotterdam, Netherlands, July 19-26, 2008; (9) Invited Lecture on 'La progresoj en la Esperanta pedagogio kaj lingvistiko', Foreign Languages College, Communication University of China, Beijing, China, December 10, 2008; (10) Presentation on recent results in Esperanto lexicology, Department of Applied Linguistics, Free University of Brussels, Brussels, Belgium, March 26, 2009.

Planning Unit

Das, S.P.:
City University of Hong Kong, April 1-May 31, 2008.

Ghate, Chetan:
Max Planck Institute of Economics, Jena, Germany, June 12-July 18, 2008.

Mishra, Debasis:
Maastricht and Tilburg Universities, June 19-August 8, 2008.

Mukhopadyay, Abhiroop:
University of Aix-Marseille II (Mediterranean), France, May 2-June 30, 2008.

Ramaswami, Bharat:
(1) Waseda University, Tokyo, Japan, May 12-July 4, 2008; (2) University of California, Berkeley, January 19-23, 2009.

Ray, Tridip:
Hong Kong University of Science and Technology, Kowloon, Hong Kong, January 29-March 31, 2009.

Sen, Arunava:
(1) University of York, UK, June, 2008(1 week); (2) Concordia University, Canada, June, 2008(2 weeks); (3) University of Padua, Italy, June-July 2008(1week); (4) Far East Econometric Society Meeting, Singapore, July 15-22, 2008; (5) Seoul National University, South Korea, March 2009(1 week).

Somanathan, E.:
(1) Nicholas School of the Environment and Earth Sciences, Duke University and South Asian Network for development and Environmental Economics, May 14-July 4, 2008; (2) European Development Network (EUDN)/Agence, Francaise de Development (AFD), Paris, November 11-14, 2008; (3) South Asian Network for Development and Environmental Economics, Kathmandu, December 9-12, 2008; (4) Global Development Network Conference, Kuwait, February 2-6, 2009.

Editorial and other Assignments

Sociological Research Unit

Ramachandran, V.K.:
Presentation of Paper, International conference on Globalisation and Labour: China, India and the West, University of Northern British Colombia and Simon Fraser University, Prince George, Canada, September 19–21, 2008.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Bangalore

Chowdhury, K.K.:
TUV-Iran for training and implementation of Six Sigma, RWTUV Academy Iran-Germany, Teheran, Iran, February 7-15, 2009.

Perumallu P. K,:
Conduct NXP for Philippines and NXP Shanghai for ISO/TS 16949 Certification, Hazel Groove, UK, Philippines and Shanghai, November 16-28, 2008.

Sanjit, Ray:
TUV-Iran for training and implementation of Six Sigma, RWTUV Academy Iran-Germany, Teheran, Iran, May 1-10, 2009.

SCIENTIFIC ASSIGNMENTS/ ACADEMIC VISITS IN INDIA

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Kolkata

Barua, R.:
(1) Gave an invited talk entitled Pairing-free Identity-Based Encryption Systems at Workshop on Cryptography at Institute of Mathematics and Applications, Bhubaneshwar, December 5-6, 2008; (2) Chaired a session at INDOCRYPT 2008 at IIT Kharagpur, December 14-17, 2008.

Datta, Mahuya:
(1) Attended and delivered lectures in Annual meeting of the Ramanujan Mathematical Society at IIT, Kanpur, May 19-21, 2008; (2) Attended the International Workshop and Conference on mapping class groups, North Eastern Hill University, Shillong, June 16-29, 2008.

Dutta, Amartya Kumar:
(1) Visited School of Mathematics, Tata Institute of Fundamental Research for collaboration with S.M. Bhatwadekar, August 1-September 15, 2008; (2) Visited Department of Mathematics, IIT, Mumbai and gave the following talks: (i) On codimension-one A1-fibrations, September 16, 2008, (ii) In finite generation of Noetherian algebras September 18, 2008, (iii) History of ancient Indian Mathematics: some thoughts, September 16-20 September, 2008; (3) Participated in the International conference on Affine Algebraic Geometry at Bangalore and delivered an invited talk "On commutative algebras which are locally A1 in codimension-one", December 22-28, 2008; (4) Gave lectures on ancient Indian

mathematics and astronomy at the Ramakrishna Mission Institute of Culture on April 19, 2008, May 2, 2008, February 7, 2009 and February 10, 2009; (5) Gave a talk on "Mathematics in Vedic and post-Vedic Literature" in a workshop organised at the Rabindra Bharati University, March 13, 2009.

Maulik, Krishanu:
(1) Visited and collaborated with Yahoo! Labs in Bangalore, September 22-26, 2008; (2) Attended the 74th Annual Meeting of Indian Academy of Sciences at IIT, Delhi, October 30-November 2, 2008; (3) Presented a talk at the Young Scientist Session and interacted with DST officials at Indian Science Congress, North Eastern Hill University, Shillong, January 4-6, 2009; (4) Attended Infosys award in Mathematical Sciences at National Institute of Advanced Studies, Bangalore, February 16-19, 2009.

Poddar, Mainak:
(1) Gave a colloquium lecture at IIT, Kanpur, September 27-30, 2008; (2) Visited Tripura University to speak at a conference, November 13-14, 2008.

Stat-Math Unit, Delhi

Bhatia, R.:
(1) Indian Institute of Technology, Kanpur, May 18-21, 2008; (2) Himachal Pradesh University, Shimla, November 9-12, 2008.

Nandi, S.:
(1) Department of Mathematics and Statistics, IIT Kanpur, June 1-10, 2008; (2) Department of Mechanical Engineering, Visvesvaraya National Institute of Technology, Nagpur, December 22-23, 2008.

Thakur, Maneesh:
(1) Indian Institute of Science Education and Research, Pune, March 9-13, 2009; (2) Indian Institute of Science, Bangalore (under IMI Programme), March 16-21, 2009.

Stat-Math Unit, Bangalore

Kulkarni, Upendra:
(1) Lectured in Annual Foundation School, Central University, Hyderabad, May 5-11, 2008; (2) Attended lecture series on Categories and Sheaves, Chennai Mathematical Institute, January 27-February 6, 2009.

Rajarama Bhat, B.V.:
Participated in the Third National Frontiers of Science (NATFOS) Symposium, Indian National Science Academy, New Delhi, January 21-22, 2009.

Rajeev, B.:
(1) Lectured in an Instructional Workshop on Stochastic Processes, Amrita University, Kollam, Kerala, December 2008; (2) Attended and gave an invited talk the International Conference on Stochastic Processes in honour of Prof. S.R.S. Varadhan, Cochin University of Science and Technology, Kochi, Kerala, February 5-10, 2009.

Ramasubramanin, S.:
(1) Lectured in an Instructional Workshop on Stochastic Processes, Amrita University, Kollam, Kerala, December 2008; (2) Attended and gave an invited talk the International Conference on Stochastic Processes in honour of Prof. S.R.S. Varadhan, Cochin University of Science and Technology, Kochi, Kerala, February 5-9, 2009.

Editorial and other Assignments

Sastry, N.S.N.:
Invited speaker at the Indian Mathematical Society, held at University of Allahabad, December 26, 2008-January 1, 2009.

Applied Statistics Division

Applied Statistics Unit

Sarkar, P.:
Indian Mathematical Science, July 2008, IIT-Delhi, January–March, 2009.

Bayesian Interdisciplinary Research Unit

Adhikary, Arun Kumar:
(1) Andhra University, Vishakapatnam, January 3-8, 2008; (2) Tezpur University, Assam, March 30–31, 2009.

Sumitra Purkayastha:
National Brain Research Centre, Manesar, Haryana, March 24—26, 2009.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit

Bhattacharya, B. B.:
Program Committee member of International Workshop on Combinatorial Image Processing (IWCIA 2008), New York, USA, May, 2008.

Das, N.:
(1) Member of the advisory committee of Workshop on Mobile Systems WOMS 2008, Kolkata, July 10-12, 2008; (2) Organizing co-chair of Electronic Devices, Communications and Computers (EDCC), Kolkata, June 20, 2008; (3) Chair for the WIE (Women in Engineering) Affinity Group of IEEE Calcutta Section, Kolkata, 2009.

Das, S.:
Program co-chair for 3rd Workshop on Algorithms and Computation (WALCOM 2009), ISI, Kolkata, February 18-20, 2009.

Dattagupta, J.:
Expert Commmittee on National Ubiquitous Computing Research Initiative, Department of Information Technology, R&D in IT Group, Ministry of Communication and Information Technology, Govt. of India, 2008-09.

Sinha, B. P.:
(1) Member of the steering committee of International Conference on Distributed Computing & Networking, January 3-6, 2009; (2) Member of the Governing Body, University Institute of Technology, Burdwan, 2008-09.

Sur-Kolay, S.:
(1) Invited Lecture at IEEE CASCAL08 - Advances on VLSI Circuits, Nano Devices and Communication Systems, IEEE Calcutta Section, August 2008; (2) Invited lecture at National Workshop on Recent Trends in VLSI Design & Microelectronics, Bengal Engineering and Science University, January 2009; (3) Series of four invited lectures, VLSI Society of India, Bangalore, March 2009; (4) Invited lecture on Intellectual Property Protection of VLSI Design, at IEEE CASCOM 09 - Advances on Nano Electronics & Communication Systems, IEEE Calcutta Section, March 2009.

Computer Vision and Pattern Recognition Unit

Pal, U.:
Chaired a technical session, International Conference on Cognition and Recognition, University of Mysore, April 10-12, 2008.

Palit, S.:
Delivered lecture, National Seminar on Image Classification and Pattern Recognition, Vidyasagar University, Midnapore, March 26-27, 2009.

Mitra,M.:
(1) Delivered lecture, Summer School on Natural Language Processing and Text Mining, IIT Kharagpur, June 28, 2008; (2) Delivered lecture, IIM Ahmedabad, July 5, 2008; (3) Delivered lecture, Workshop on Ontology, NLP, IE and IR, IIT Bombay, July 16, 2008.

Documentation, Research and Training Centre

Krishnamurthy, M.:
(1) Keynote address at National Workshop on "Web Technology for Effective management of Library and Information Services", NITTE, Udupi, February 26, 2009; (2) Invited lecture at the workshop on Engineering Librarianship 2009, NITTE, Bangalore, February 27, 2009.

Madalli, D. P.:
(1) Invited address at 7th Annual Meeting of Asia Pacific Business School Library Directors Group, Indian School of Business, Hyderabad, November 4, 2008; (2) Invited lecture at ILA-TISS 2008, Mumbai, November 12, 2008; (3) Special lecture at "National Symposium on Open Access and Building Institutional Repositories", National Aerospace Laboratory, Bangalore, January 22, 2009.

Prasad, A.R.D.:
(1) Expert for UMS-LC Committee, North-Eastern Hill University, Shillong, July 9-11, 2008; (2) Conduct Pre-Seminar for Ph.D. students, University of Pune, October 17, 2008; (3) Invited lecture at ILA-TISS 2008, Mumbai, November 12, 2008; (4) Conference at IGF, Hyderabad, December 3-5, 2008; (5) Resource person at National Seminar on "Open Source Library Solutions, Banaras Hindu University, Varanasi, January 15-16, 2009; (6) Special lecture at "National Symposium on Open Access and Building Institutional Repositories", National Aerospace Laboratory, Bangalore, January 22, 2009; (7) National Seminar on "Open Access to Textual and Multimedia Contents, Bridging the Digital Divide", INFLIBNET, New Delhi, January 29-30, 2009; (8) Indo-US Workshop, University of Pune, Pune, March 23-25, 2009.

Raghavan, K.S.:
(1) Conducted Viva-Voce, University of Madras, April 28, 2008; (2) Resource person for ISRO Libraries Workshop, ISRO, Trivandrum, May 15-16, 2008; (3) M.Phil Via-voce Examination, Kerala University, November 3-4, 2008; (4) Board of Study Meeting, IGNOU, New Delhi, August 27-29, 2008 and March 26, 2009; (5) Meeting, CIIL, Mysore, November 19-20, and December 15-16, 2008; (6) Meeting of Board of Appointments, IGNOU, New Delhi, January 2, 2009; (7) Invited lecture in

Editorial and other Assignments
Refresher Course, University of Kerala, Trivandrum, January 16, 2009; (8) Seminar, University of Madras, March 20, 2009.

Rao, R.I. K.:
(1) Technical Advisory Committee, DSIR, New Delhi, July 21, 2008; (2) Meeting.to evaluate a DSIR Project "Developing an electronic directory of Institutions", NAL, Bangalore, August 13, 2008; (3) Invited to deliver a Series of invited lectures on "Elements of Statisticss as applicable to Information Management", ISIM, University of Mysore, Mysore, September 16, 2008; (4) Invited lecture on "Web 2.0 and its evaluation", University of Mysore, Mysore, December 5, 2008; (5) Delivered Sarada Ranganathan Endowment lectures 2008 on "Growth of Literature and Measures of Scientific Productivity", Sarada Ranganathan Endowment for Library Science, Bangalore, December 18-20, 2008.

Sagar, B. S. D.:
Delivered series of invited lectures, College of Engineering, University of Andhra, October 6-10, 2008.

Electronics and Communication Sciences Unit

Chanda, B.:
(1) Seminar lecture, Dr. B. C. Roy Engineering College, Durgapur, September 13, 2008; (2) Invited lecture at Annual Seminar on Spatial Information Retrieval, Analysis, Reasoning and Modeling, DRTC, ISI, Bangalore, March 18-20, 2009; (3) Area Chair of the Sixth Indian Conference on Computer Vision, Graphics, and Image Processing, Bhubaneshwar, December, 2008; (4) Programme Chair of the Seventh International Conference on Advances in Pattern Recognition, Kolkata, 2009.

De, A. K.:
Programme Director of Eighth North-East Workshop on Computational Information Processing, Tripura University, Agartala, March 23–27, 2009.

Mukherjee, D. P.:
Invited talk at Workshop on Advances in Signal and Image Processing, JNTU Kakinada, Andhra Pradesh, October 21-22, 2008.

Machine Intelligence Unit

Bandyopadhyay, S.:
(1) Invited lecture at National Institute of Pharmaceutical Education and Research (NIPER), Mohali, India, July 7, 2008; (2) Invited lecture at Winter School on Data Mining, Department of Computer Science and Engineering, NIT Durgapur, January 7-8, 2009; (3) Invited lecture at MHRD/AICTE Summer School on Bioinformatics, NIT Durgapur, July 11, 2008; (4) Invited lecture at Open Source Drug Discover (OSDD) Meet, Jawaharlal Nehru University, New Delhi, February 20, 2009; (4) IEEE WIE Lecture, Kolkata, March 4, 2009; (5) Invited lecture at Staff Development Program (SDP), RCC Institute of Information Technology, Kolkata, March 12, 2009; (6) Invited lecture at Indian Statistical Institute, Bangalore, March 18, 2009; (7) Invited lecture at IMTECH, Chandigarh, March 23, 2009.

Biswas, S.:
(1) Program co-ordinator, ISI-SMIT Winter School on Image Processing and Vision, Majitar, Rangpo, Sikkim, March 9-13, 2009; (2) PC member of ICIT '08, Bhubaneswar, December, 2008.

Kundu, M. K.:
(1) Member of the Selection committee for Science Academies (INSA, ISA, NASI) Summer Research Fellowship Programme, 2008-09; (2) Member of the Ph.D committee in Radio Physics and

Electronics, Calcutta University, Kolkata, 2008-09; (3) Member of the Academic Council of the Indian School of Mines University, Dhanbad, 2008-09; (4) Member of the Senate of the National Institute of Technology, Durgapur, 2008-09; (5) Invited lecture, DST Sponsored Workshop on Data Mining and Data Warehousing, Center for Soft Computing Research, Indian Statistical Institute, Kolkata, September, 2008; (6) Invited lecture, IEEE International Workshop on Recent Trends in Image and Video Processing, West Bengal University of Technology (WBUT), Kolkata, December, 2008; (7) Member of the National Advisory Committee, 2nd National Seminar on Recent Advances on Information Technology (RAIT2009), ISMU, Dhanbad, February, 2009; (5) Invited lecture, ISI-SMIT Winter School on Image Processing and Machine Vision, Majitar, Rangpo, Sikim, March, 2009; (8) Member of the National Advisory Committee for the IEEE International Conference on Advance Computing (ICAC2009), TU, Patiala, March, 2009.

Ghosh, A.:
(1) Delivered lecture, Utkal University, Bhubaneswar, December 5-8, 2008 and March 25-31 2009; (2) Conducted M. Tech (CS) viva voice, NIT Rourkela, June 7-8, 2008; (3) Delivered lecture, National Symposium, C. V. Raman College of Engg., Bhubaneswar, November 17, 2008; (4) Acted as expert for selection of faculty College of Engg, Bhubaneswar, December 27- 28, 2008; (5) Acted as track chair, International Conference on Information Technology (ICIT 2009), Bhubaneswar, December, 2008.

Ghosh, K.:
(1) Joint program co-ordinator of ISI-SMIT Winter School on Image Processing and Vision, Majitar, Rangpo, Sikkim, March 9-13, 2009; (2) Delivered lecture at NSEC, Kolkata, March 27, 2009.

Mitra, S.:
(1) Invited lecture at TEQUIP Seminar, Kalyani Government Engineering College, April 30, 2008; (2) Invited lecture at MHRD-AICTE Summer School on Bioinformatics, National Institute of Technology, Durgapur, July 12, 2008; (3) Invited lecture at DST Workshop on Data Mining and Data Warehousing, Center for Soft Computing Research, ISI Kolkata, September 15-16, 2008; (4) Invited lecture at Seacom Engineering College, Howrah, November 8, 2008; (5) Invited lecture at National Institute of Technology, Silchar, December 18, 2008; (6) Invited lecture at IEEE Workshop on Soft Computing Issues and Applications in Wireless Networking and Mobile Computing, Govt. College of Engineering and Ceramics Technology, Kolkata, March 7, 2009; (7) Invited lecture at First Indo-Japan Conference on Science and Technology of Facial Expression Analysis, CDAC, Kolkata, March 12, 2009; (8) Treasurer, IEEE WIE, Calcutta Section, Kolkta, 2008-09.

Uma Shankar, B.
IASc-INSA-NASI Summer Research Fellowship, Department of Electrical Engineering, IIT Bombay, July 7-September 4, 2008.

Physics and Earth Sciences Division

Physics and Applied Mathematics Unit

Ghosh, Subir:
Institute of Mathematical Sciences, Chennai, December 19–24, 2008.

Kar, Guruprasad:
Institute of Mathematical Sciences, Chennai, November 16-December 3, 2008.

Mazumder, B. S.:
(1) Bengal Engineering and Science University (BESU), Howrah, April 8, 2008; (2) Delivered S.N. Gupta Memorial Lecture at National Institute of Technology (NIT), Jaipur, December 15-16, 2008.

Editorial and other Assignments

Pal, Supratik:
(1) Jamia Millia Islamia University, March 11-12, 2008; (2) Harish-Chandra Research Institute, Allahabad, September 15-19, 2008; (3) Centre for Theoretical Studies, Indian Institute of Technology, Kharagpur, November 17-21, 2008; (4) North Bengal University, Siliguri, March 16-17, 2009.

Roy, Ashim K.:
S.N. Bose National Centre for Basic Sciences, Kolkata, November 5 – December 19, 2008.

Biological Sciences Division

Biological Anthropology Unit

Mukhopadhyay, B.:
North Eastern Hill University, Shillong, January 3-7, 2009.

Reddy, B.M.:
Indira Gandhi National Centre for the Arts, New Delhi, March 17-20, 2009.

Roy, S.K.:
North Bengal University, Darjeeling, April 26-29, 2008.

Mukhopadhyay, S.:
(1) Jadavpur University, School of Women's Studies, December 21-23, 2008; (2) Andhra University, Department of Anthropology, January 30-31, 2009.

Human Genetics Unit

Ghosh, S.:
Indian Society of Human Genetics Meeting, New Delhi, March 17-20, 2009.

Majumder, P.P.:
(1) National Institute for Research in Reproductive Health, Mumbai, April 14, 2008; (2) National Institute of Advanced Study, Bangalore, July 24, 2008; (3) Participated and co-organized the Conference of the Human Genome Organisation, and delivered an invited on Natural Selection and our Innate Immune System, Hyderabad, September 27-30, 2008; (4) S.N. Bose Centre for National Sciences, Kolkata, December 14, 2008; (5) Madras Diabetes Research Foundation, Chennai, January 4, 2009, (6) Delivered a Plenary Talk in Asia-ARVO 2009 entitled Peeking into the Future Through Open Windows of the Past, Hyderabad, January 14-15, 2009.

Roy, B.:
Pt. Ravishankar Shukla University, Raipur, January 19-27, 2009.

Sengupta, S.:
Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram, Kerala, November 1-3, 2008.

Social Sciences Division

Economic Research Unit

Chakrabarti, Snigdha:
Department of Business Management, University of Calcutta, March 6–13, 2009.

Chakravarty, Satya R.:
(1) Invited Lecture at the International Conference 'Growth, Inequality and Institutions' organized by the The Centre for International Governance Innovation, Canada and National Institute for Public Finance and Policy, Jawaharlal Nehru University, New Delhi, November 27-29, 2008; (2) Evaluation of a Ph.D. thesis proposal and a seminar, Indira Gandhi Institute of Development Research, Mumbai, February 03 – 05, 2009; (3) Evaluation of a Ph.D. thesis proposal, Indira Gandhi Institute of Development Research, Mumbai, March 26 – 27, 2009.

Maiti, Pulakesh:
Invited talk entitled "Estimation of measurement variance component of the total Error of an estimator", Department of Statistics, Aligarh Muslim University, December 28–30, 2008.

Majumder, Amita:
Member, Technical Advisory Committee for Preparation of Gender Development Index/ Gender Empowerment Measure, Ministry of Women and Child Development, UNDP and Indian Institute of Public Administration (IIPA), New Delhi, February 20, 2009.

Sarkar, Nityananda:
Delivered lectures on 'Modern time Series Analysis', Gauhati University, Assam, January 1-3, 2009.

Linguistic Research Unit

Dasgupta, Probal:
(1) The Formal Study of Language: Special Lectures & Special Lecture 2, 'Towards a Substantivist Syntax of Nouns and Verbs' School of Language Sciences, English and Foreign Languages University, Hyderabad, August 25, 2008; (2) Seminar on Centenary Celebration: Contributions of Claude Lévi-Strauss (Keynote Address, 'Revisiting the Archimedean structuralist'), Asiatic Society, Kolkata, 18 December 2008; (3) National Seminar on Globalisation and Challenges to Indian Languages (Valedictory Address, 'Contextualizing language domain loss in sociolinguistics', AJMVPS's New Arts, Commerce and Science College, Ahmednagar, Maharashtra, December 20, 2008; (4) Special lectures delivered as ICPR Annual National Visiting Professor of Philosophy, 'Philosophy and languages', Department of Philosophy, Jadavpur University, with the Indian Council of Philosophical Research, January 14-16, 2009; (5) 9th Comparative Literature Association of India Biennial International Conference,Centre for Comparative Literature (Plenary Lecture, 'Postnational forms of literary knowledge'), University of Hyderabad, with English and Foreign Languages University, Hyderabad, January 28, 2009; (6) Special lectures delivered as ICPR Annual National Visiting Professor of Philosophy, 'Translation and the substantivist theory of language', Department of Philosophy, Visvabharati with the Indian Council of Philosophical Research, February 14-15, 2009; (7) Special lectures delivered as ICPR Annual National Visiting Professor of Philosophy, 'Philosophy and a substantivist linguistic theory', Department of Sanskrit, University of Madras with the Indian Council of Philosophical Research, 23-24 February 2009; (8) International Conference of Generative Linguistics in the Old World – Asia (Plenary Lecture, 'Discourse and generative grammar'), Department of Linguistics and Contemporary English, English and Foreign Languages University with GLOW-Asia, February 25, 2009; (9) Special lectures delivered as ICPR Annual National Visiting Professor of Philosophy, 'Naming and some philosophical implications of multiple linguistic

characterization', Centre for Philosophical and Aesthetic Studies, English and Foreign Languages University, 26-28 February 2009.

Dash, Niladri Sekhar:
Resource person for "Field Methodology and Development of Language Corpus" at the Training Programme on Mother Tongue Survey of India conducted by the Office of the Registrar General, Language Division, Ministry of Home Affairs, Govt. of India, Kolkata, May 2008.

Ganguly, Shubhasree:
participated in the panel discussion on the Process of Globalization and Present Status of the Southeast Asian Languages organized by Cheena Bhavan, Visvabharati, Santiniketan, December 20-22, 2008.

Planning Unit

Banerjee, Priyodorshi:
(1) Centre for Advanced Studies, Department of Economics, Jadavpur University, June 2-27, 2008; (2) Centre for Advanced Studies, Department of Economics, Jadavpur University, December 18-January 3, 2009.

Roy Chowdhury, Prabal:
Indian Econometric Society Meeting, Guwahati, January 8–10, 2009.

Population Studies Unit

Rao, Arni S.R. Srinivasa:
(1) Banaras Hindu University, September 29-30, 2008; (2) International Convention on Mathematical Sciences, ICMS, Delhi, December 18-20, 2008; (3) Invited Talk at Pre-ICM (International Congress of Mathematicians), Indian Institute of Science, January, 8-11,2009.

Pathak, Prasanta:
Indian Institute of Health Management Research, September 3-10, 2008.

Psychology Research Unit

Basak, Rituparna:
Christ University, Bangalore, February 13-14, 2009.

Dutta Roy, D.:
(1) lecture on "Psychological Stress Management"Central Bureau of Investigation, Regional Training center, Kolkata, May 6, 2008; (2) Chairing session in the 2-day National seminar on "Building Organizational core competence through workers education" organized by CBWE, June 25, 2008; (3) conduct sessions related to "Self-efficacy, Veracity and aspects of positive psychology related to leadership" at the MHRD/AICTE sponsored summer school on practical leadership, Vinod Gupta School of Management, July 1-2, 2008 and July 18, 2008; (4) Chairing one session at the 2-day National Conference on 'Behaviour modification Skills for Teachers of Higher Education' at the UGC-Academic staff College, Manasagangotri, Mysore, August 8-9, 2008; (5) Invited lecture titled

"Innovative Leadership simulation Process", Indian Institute of Plantation Management Bangalore, August 8, 2008; (6) Conducted workshop on "Training impact evaluation", CBWE, Guwahati, September 15, 2008; (7) Gave talk on "Career challenges in Psychology", Department of Psychology, Guwahati University, September 16, 2008; (8) Gave lecture titled "Principles of Questionnaire Design for Survey Researches", Department of Statistics, Guwahati University, September 16, 2008; (9) Gave lecture on "Principles of Questionnaire Design for Psychological and Educational Researches", Mind India, September 20, 2008; (10) Gave lecture on "Multivariate Statistical Models", NIPCCD, September 22, 2008; (11) Gave lecture on "Application of Statistics in Psychiatric Research", Department of Psychiatry, Guwahati Medical College and Hospital, September 24, 2008; (12) Conducted workshop on 'Vocational Service Career Guidance' at the Center of Rotary Club of Calcutta North Suburban (Code 3291 of Rotary International District), October 25, 2008; (13) Invited lecture on "Teachers' Burnout & Stress Management: Approaches & Strategies", NITTTR, Kolkata, Block- FC, Sector-III, Salt Lake City, Kolkata, November 4, 2008; (14) Invited to conduct workshop on "Workshop on Questionnaire Development for Psychological and Educational Researches" at the Indian Institute of Psychometry, Kolkata, November 7, 2008; (15) Invited as advisor for workshop on "Questionnaire development to assess different dimensions of Private Tuition" at "State council of Educational research and Training", Kolkata, November 10, 2008; (16) Invited to conduct workshop on "Data Analysis by SPSS" at the Indian Institute of Psychometry, Kolkata, November 15, 2008; (17) Gave lecture on "Retirement Counseling", Indian Oil Company, Kolkata, November 27, 2008; (18) Gave lecture on "QUESTIONNAIRE: TOOL FOR MANAGING SURVEY QUALITY", Omeo Kumar Das Institute of Social Change and Development, Guwahati, December 4, 2008; (19) Gave lecture on "Retirement Counseling", Indian Oil Company, Kolkata, December 5, 2009; (20) Invited lecture in the short term Training program on 'Students' guidance and counseling' on "Guidance & Counseling :The Student database system", National Institute of Technical Teachers' Training and Research, Block-FC, Sector -III, Saltlake City, Kolkata, February 17, 2009; (21) Invited to give training on Questionnaire development and Multivariate Statistics in the 2-days workshop on "Psychological Research: Questionnaire Development & application of statistical Tools" at the Department of Clinical Psychology, Sri Ramchandra University, Chennai, February 21-22, 2009; (22) Invited by the Calcutta Metropolitan Institute of Gerontology to give talk on Geriatric Psychology in the Institute, March 4, 2009; (23) Invited by the Calcutta Metropolitan Institute of Gerontology to give talk on Role of Psychologist on Geriatric care in the Institute, March 6, 2009; (24) Invited by the Department of Bengali, West Bengal State University, Barasat, to give seminar on "Moner Shushrushay Rabindrasangeet" in the International conference, March 13, 2009; (25) Moulana Azad College, Aurangabad, January 30–February 1, 2009; (26) Chaired a session at the 13th National and 44th International Conference of the Indian Academy of Applied Psychology, Baba Sahab Ambedkar Marathwada University, Aurangabad, January 30-February 1, 2009; (27) Gave two invited lectures to Overseas Teachers Education Programme at the Department of Educational Technology, National Institute of Technical Teachers' Training & Research, Chennai, February 25-26, 2009.

Karmakar, R.:
Dr. Rafiq Zakaria Campus, Moulana Azad College, Aurangabad, January 30–February 1, 2009.

Shaikh, F.A.:
Department of Psychology, Christ College, Bangalore, February 13-14, 2009.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Bangalore

Chowdhur, K.K.:
Taught 2 credit course on Quantitative Techniques for post graduate program students (Visiting Faculty), Indian Institute of Management, Indore, January 13-March 31, 2009.

Editorial and other Assignments

Acharya, U. H.:
Team Leader for the assessment of companies in south zone for Rajiv Gandhi National Quality Award, Nirmala Collece (under Mahatma Gandhi university), Cochin, February 24-25, 2009.

Perumallu, P.K.:
Invited talks on Taguchi designs and Reliability at NIT Suratkal, Regional Engineering College, Suratkal, Karnataka, August 11-14, 2008.

Gijo, E.V.:
Delivered an invited talk on Quality & Six Sigma at Ordnance Factory, Aravnkadu, Ooty, September 8, 2008

SQC & OR Unit, Hyderabad

Murthy, G.S.R.:
(1) Participated in the pre-examination confidential meeting organized by CSIR in the subject Mathematical Sciences, Structural Engineering Research Centre, Taramani, Chennai, September 12-14, 2008; (2) Participated in the evaluation of paper-II of Mathematical Sciences (Statistics) in respect of NET-2008 of CSIR conducted, CSIR Complex, New Delhi, January 19-21, 2009.

Subhani, S.M.:
(1) Acted as a judge during the 21st AP State Level Quality Circle Competitions organized by CII, Hyderabad, October 4, 2008; (2) Acted as a Auditor for the '5th Assessment for CII Excellence Award', Visakhapatnam Steel Plant, October 15, 2008.

SQC & OR Unit, Mumbai

Sarkar, A.:
Chaired a technical session at MAPEXCEL 2008, Mumbai, Oct 16-17, 2008.

Library, Documentation and Information Science Division

Library, Kolkata

Basak, Nanda Dulal:
(1) One day seminar on Indian Journals online organized jointly by IASLIC and Globe Publisher Pvt. Ltd. at Hyatt Regency, Salt lake, October 11, 2008; (2) 23rd National Seminar of IASLIC, Bose Institute, Kolkata, December 10-13, 2008; (3) A seminar on "Public Libraries and Adult Education", Department of Library and Information Science, Rabindra Bharati University, March 27, 2009.

Basu, Tapas:
Enrolled as a Fellow of Federation of Indian Photography (FFIP), Kolkata, September 1, 2008.

B. M. Meera:
Invited lectures (Designing Digital Gateway of Reference resources for a University Library & Open Access Journals Portal: A Practical Demonstration) at the 15th Refresher Course in Library and Information Science organized by the Academic Staff College in collaboration with the Department of Library & Information Science, University of Mysore, Mysore, November 27-December 17, 2008 on the following topics.

Chatterji, Bhomra:
Lecture in Library and Information Science in Bengal Library Association.

Mandal, Tapan Kumar:
One day seminar on Indian Journals online organized jointly by IASLIC and Globe Publisher Pvt. Ltd., Hyatt Regency, Salt lake, October 11, 2008.

Center for Soft Computing Research: A National Facility

Ghosh, K.:
Member, Organizing Committee, ISI-WBUT Complex System 2008, Kolkata, 2008.

Ghosh, S.:
(1) Invited talk, Formal Methods Update Meeting 2008, TRDDC, Pune, July, 2008; (2) Invited talk, Presidency College, Kolkata, August, 2008; (3) Invited talk, National Seminar on Mathematical Approaches to Uncertainty, MUC Women's College, Bardhaman, September, 2008; (4) Invited talk, IIT Kharagpur, October, 2008; (5) Invited talk, Workshop on Logic and Cognition, Jadavpur University, October, 2008; (6) Co-ordinator, Workshop on Logic and Social Interaction during ICLA 2009, Chennai, January 7-8, 2009; (7) Member, Organizing Committee, Third Indian Conference on Logic and Its Applications (ICLA 2009), Chennai, January 7-11, 2009.

PART III. ADMINISTRATION AND OFFICE BEARERS

10. GENERAL ADMINISTRATION

Administrative Services Division

The Administrative Services Division at the headquarters caters to the various needs of the scientific workers in all the scientific units of the Institute engaged in various scientific, research and academic activities and provides them with necessary infrastructural facilities in their pursuit of excellence. The centres at Delhi and Bangalore, each having a number of science units are, by and large, getting administrative support from the administrative units/sections there. The Administrative Division has different units of the Headquarters in Kolkata as mentioned below:

Sl. No.	Name of the Unit	Sl. No.	Name of the Unit
1.	Accounts Section	12.	Canteen
2.	Internal Audit Unit	13.	Despatch
3.	CE (A&F)'s Office	14.	Publication and Printing Unit
4.	Council Section	15.	Binding Unit
5.	Director's Office	16.	Central Office
6.	Engineering Unit	17.	Central Stores
7.	Electrical Maintenance Unit	18.	Security Unit
8.	Estate Office	19.	Telephone Unit
9.	Medical Welfare and Reimbursement Units	20.	Transport Unit
		21.	Guest House
10.	Personnel Unit	22.	Audio-Visual
11.	Public Relations Unit	23.	Tailoring

Apart from the Units mentioned above, there are some small cells dealing with Budget, Import, Travel, House Building Advances, legal matters etc. to take care of the specific needs of the Institute. The Administrative Services Division also looks after the running of hostels for students, research scholars and International Statistical Education Centre (ISEC) trainees and also the running of Canteen for the workers and students of the Institute. The other outlying Units are controlled directly by the headquarters at Kolkata. The Administrative Services Division takes the responsibility for all new construction activities of the Institute at its headquarters and also at outlying centres/branches. A brief report on the construction activity in the current year is narrated in the subsequent paragraphs.

The activities of the Administrative Services in the two Centres, namely Delhi and Bangalore and in other outlying branches of the Institute and Giridih Office, are more or less similar but on a much smaller scale.

Officers of the Institute administration during the year:

Director	:	Sankar Kumar Pal
Professors-in-Charge of Scientific Divisions	:	Rajendra Bhatia (Theoretical Statistics & Mathematics)
		Bimal Kr. Roy (Applied Statistics)
		Abhirup Sarkar (Social Sciences)
		Dilip Saha (Physics & Earth Sciences)
		Bidyut Roy (Biological Sciences)
		Swapan Kumar Parui (Computer & Communication Sciences)

Head, SQC & OR	:	Kalyan Kumar Chowdhury
Head, Delhi Centre	:	R.B. Bapat
Head, Bangalore Centre	:	T.S.S.R.K. Rao
Head, Chennai Centre	:	D. Sampangi Raman (Officiating)
Dean of Studies	:	Aditya Bagchi
Chief Executive (A & F)	:	Dulal Chandra Pal

List of workers who joined/retired/voluntarily retired/resigned/terminated/died during the year

Appointments

Scientific/Technical Workers

Sl. No.	Name		Sl. No.	Name
1.	Upendra Kulkarni		5.	Sabyasachi Bhattacharya
2.	Sagar Sikder		6.	Indranil Mukhopadhyay
3.	Arijit Bishnu		7.	H.S. Manjula
4.	Anil Kumar Ghosh		8.	Prosenjit Das

Non-Scientific Workers

Sl. No.	Name		Sl. No.	Name
1.	Jadab Kumar Pal		6.	Himansu Sekhar Dutta
2.	Arindam Mukherjee		7.	Somnath Bhattachariya
3.	Manoj Kumar Pandey		8.	Arindam Ghosh
4.	Suman Banerjee		9.	Pamli Sengupta
5.	Deepmala			

Retirement/Voluntary Retirement

Scientific/Technical Workers

Sl. No.	Name		Sl. No.	Name
1.	A.K. Chaudhuri		5.	Barun Kr. Mukhopadhyay
2.	Sunanda Chanda		6.	Haradhan Chanda
3.	Amrit Lepcha		7.	Ram Lal
4.	Mrinal Kanti Guha		8.	Lalan Thakur

Non-Scientific Workers

Sl. No.	Name		Sl. No.	Name
1.	Ram Ch. Dhibar		17.	Gopal Pal
2.	Kariram Patra		18.	R. Santhanam
3.	Amulya Kr. Das		19.	Ram Chandra Bose
4.	Ranjita Gupta		20.	Harisadhan Dutta
5.	Narayan Ray		21.	Bhanwar Singh

6.	Netrapal Balmiki		22.	Sudarshan Santra
7.	Santosh Raha		23.	Tara Sankar Nandy
8.	Monmohan Das		24.	Nem Singh
9.	Amar Kumar Chakraborty		25.	Nilu Rani Adhikari
10.	K.G. Kamble		26.	Ratna Guha
11.	Ramlal Prosad		27.	Manik Chandra Paul
12.	Raj Kumar		28.	Archana Chakraborty
13.	Kodai Paswan		29.	Mangat Ram Sharma
14.	Sukumar Roy		30.	Ashis Kr. Das
15.	Mahamaya Dey (Das)		31.	Nibha Bhatnagar
16.	Hari Bhajan Seal		32.	Shantimoy Bondopadhyay

Resignation/Termination

Scientific/Technical Workers

Sl. No.	Name		Sl. No.	Name
1.	Usha Mujoo Munshi		3.	Amitava Choudhury
2.	Ashish Das		4.	Asis Kumar Chattopadhyay

Non-Scientific Workers

Sl. No.	Name		Sl. No.	Name
1.	Abhay Kumar Thakur		4.	Dulal Chandra Pal
2.	Santanu Mandal		5.	Subrata Sardar
3.	Suprabhat Chatterjee			

Death

Scientific/Technical Workers

Sl. No.	Name		Sl. No.	Name
1.	Sanghamitra Das		2.	P. Jaganathan

Non-Scientific Workers

Sl. No.	Name		Sl. No.	Name
1.	Pitambar Behara		5.	Deb Charan Balmiki
2.	Sankar Prasad Banerjee		6.	Aloke Rn. Nath
3.	Ranapratap Singh		7.	Dwijen Mondal
4.	Brahamajit Singh		8.	Toro Marandi

Number of workers in the Institute as on 31 March 2008:

(i)	Scientific and Technical Workers	-	406
(ii)	Non-Scientific Workers	-	771
	Total	:	1177

Breakup of manpower by Gender, Social category and Disability group

Total Strength		Physically Handicapped (PH)	Scheduled Caste (SC)	Scheduled Tribe (ST)
Male	1010	06	116	32
Female	167	Nil	15	01
Total	1117	06	131	33

Budget and Finance

For the year 2008-2009, Section 8(1) Committee recommended Rs.6067 lakhs (Government Grant Rs.5857 lakhs and ISI internal receipt Rs.210 lakhs) under Non-Plan (BE) and Rs.2966.60 lakhs under Plan (BE). The Government approved a sum of Rs.5196.47 lakhs and of Rs.2500 lakhs for Non-Plan and Plan expenditure respectively. At the revised estimate stage, the Institute sought for a grant of Rs.7789.21 lakhs and Rs.3065.20 lakhs under Non-Plan and Plan respectively which also recommended by the Section 8(1) Committee. The Government sanctioned a grant of Rs.7890.21 lakhs (including the unutilized amount of Rs.607.74 lakhs during the financial year 2007-2008) under Non-Plan and the Plan RE allocation was fixed at Rs.2530.94 lakhs (including the unutilized amount of Rs.655.44 lakhs during the financial year 2007-2008). The expenditure during report was well within the budget allocation sanctioned by the Government. The Audited Annual Accounts of the Institute for the year 2008-2009 have been furnished in Part IV of this report.

Major Construction / renovation works taken up by the Institute during 2008 - 2009

Kolkata

Construction of Platinum Jubilee Academic Building at ISI

The Institute started the work of construction of Platinum Jubilee Academic Building during the year 2006-07. The piling work was completed during 2006-07. The structural work of the building has been completed during this year. The finishing works are in progress. The work of interior partitioning, lift, fire fighting, air conditioning are being taken up during this year. It is expected that the building would completed by December, 2009 for occupancy.

An amount of Rs.210.00 lakhs has been paid to the agency and the consultant regarding the subject work.

Underground Motorable Subway between 202 North and 202 South Campus of the Institute

The Institute took the construction of motorable subway between the 202 North and 202 South campus of the Institute in view of avoiding the entry through B.T. Road which is having a huge traffic at all the time, safety ongoing ISEC Building and other future construction works. The work has been completed in all respect and ready for use.

An amount of Rs.128.95 lakhs has been paid to the agency and the consultant regarding the subject work.

Construction of ISEC Building at 202 Campus

The Institute took the construction of ISEC Building at 202 campus with an intention of providing all the facilities under one roof. The building will be having the academic activities, accommodation for the

students, visiting faculty etc. The piling work is completed. The structural work is under progress. About 75% of the structural work is completed. The allied works like air conditioning, installation of lifts, fire fighting and fire alarm system, interior works in the academic floor, hostel etc. will be taken up during 2009 – 2010 and expected to complete the work in all respect by September, 2010.

An amount of Rs.191.00 lakhs has been paid to the agency and the consultant regarding the subject work.

Renovation of 4th floor (East) of R.A. Fisher Bhavan for BIRU

The Institute took the renovation of the 4th floor (East) of the R.A. Fisher Bhavan for providing the necessary infrastructure to the new constituted "Bayesian Interdisciplinary Research Unit". The work is completed in all respect and the respective unit has already occupied the floor and functioning smoothly.

An amount of Rs.20.90 lakhs has been paid to the agency and the consultant regarding the subject work.

Major Renovation Works in the campus

The Institute took the various major repair and renovation works in the campus namely outside repairing & painting of (a) A type quarter, (b) one block of D type quarter at Deluxe Garden campus, (c) Renovation of Economic Research Unit at 6th floor of the Library Building (S.N. Bose Bhavan).

An amount of Rs.25.37 lakhs has been paid to the agency and the consultant regarding the subject work.

Delhi

Land and Construction

A write up on major construction activities during the year 2008 – 2009.

1. Construction of Platinum Jubilee Hostel (partly-work is in progress).
2. Plaster / painting of outer wall of Administration Building including replacement of pipes.
3. Construction of Under Ground Tank etc.
4. Waterproofing of sub-station roof / Plaster, painting of outer wall of canteen / renovation of ISI Canteen.
5. Construction of cement concrete parking and cement concrete road towards new hostel along with the boundary wall.
6. Raising / repairing of boundary wall.
7. Repair / renovation of faculty building, Guest House etc.

Total expenditure incurred – 145.00 lakhs approximately.

Bangalore

During the year 2008-09, the following activities were taken up at Bangalore Centre.

A - Construction:

1. Construction of the Platinum Jubilee Auditorium – the project has progressed satisfactorily.
2. Construction of the additional floor of the faculty block was taken up during the year.
3. The WAC of Bangalore Centre met 5 times during the year 2008-09.
4. The total allocation for construction activities during the year 2008-09 was :-

i)	Platinum Jubilee Auditorium	-	120.80 lakhs
ii)	Additional floor to the faculty block	-	032.12 lakhs
			152.92 lakhs round off
	Total		**153.00 lakhs**

Society Type Activities

Membership: April 2008 – March 2009

1) During the period 154 persons became Ordinary Members of the Institute.
2) 49 Ordinary Members became Life Members of the Institute.

The membership position as on 31 March 2009 is as follows:

Ordinary Members	-	991
Life Members	-	817
Institutional Members	-	05
Total	-	1813

Finance Committee Meetings: The Finance Committee met three times on 10th July, 2008, 04th September, 2008 and 27th October, 2008. Besides the decisions taken on various financial matters, the Finance Committee recommended RE 2008-09 and BE 2009-10 (both Plan and Non-Plan) in its meeting held on 04th September 2008. The Annual Report including Audited Statement of Accounts for the year 2007-08 was considered and recommended in the meeting of the Finance Committee held on 27th October 2008.

Council Meetings: During the period under report (2008-09), the Council met five times on 26th July, 2008, 06th September, 2008, 18th September, 2008, 29th October, 2008, and 22nd February, 2009 to take decisions on various academic and administrative matters of the Institute. The Budget Proposals of the Institute both for Plan and Non-Plan (RE 2008-09 and BE for 2009-10) were considered in the meetings of the Council held on 06th September, 2008, as recommended by the Finance Committee in its meeting held on 04th September 2008. The Annual Report including the Audited Statement of Accounts for the year 2007-08 was considered and approved by the Council in its meeting held on 29th October 2008.

A list containing the names of the President of the Institute, Chairman and members of the Council of the Institute and lists of members of different committees constituted by the Council are given in the Back Cover page and in Chapter 12 respectively.

Annual General Meetings: During the period under report (2008-09), the General Body of the Institute met on 10th September, 2008 and 18th November, 2008. The Annual Report of the Institute for the year 2007-08 and Audited Statement of Accounts for the year 2007-08 together with the Auditor's comments and replies of the Administration thereto were adopted in the meeting of the General Body held on 18th November 2008.

11. LIST OF MEMBERS OF THE ACADEMIC COUNCIL AND OTHER COMMITTEES OF THE INSTITUTE AS ON 31 MARCH 2009

Academic Council

S.K. Pal, Director (Chairman)

Aditya Bagchi, Dean of Studies (Convener)

Theoretical Statistics and Mathematics Division

Somesh Chandra Bagchi, K. Ramamurthy, S.M. Srivastava, Ratan Dasgupta, R.B. Bapat, N.S. Narasimha Sastry, S. Ramasubramanian, T.S.S.R.K. Rao, Rajendra Bhatia, Bhaskar Bagchi, Sunanda Bagchi, Alok Goswami, Pl. Muthuramalingam, V. Pati, Rahul Roy, Probal Chaudhuri, Arup Bose, Rana Barua, Mohana Delampady, B. Rajeev, Abhay Gopal Bhatt, Goutam Mukherjee, B.V. Rajarama Bhat, Gopal Krishna Basak.

Applied Statistics Division

Shibdas Bandyopadhyay, Tapas Kumar Chandra, Pabitra Pal Choudhury, Bimal Kr. Roy, Ashis SenGupta, Anup Dewanji, Rita Saha Ray, Debasis Sengupta, Debapriya Sengupa, Tapas Samanta, Subir Kumar Bhandari, Mausumi Bose, Palash Sarkar, Ayanendranath Basu, Smarajit Bose.

Social Sciences Division

Manabendu Chattopadhyay, Krishna Majumder, N.S.S. Narayana, Monoranjan Pal, Satya Ranjan Chakravarty, Abhirup Sarkar, Nityananda Sarkar, Amita Majumder, Arunava Sen, Bharat Ramaswami, Tarun Kabiraj, Satya P. Das, Madhura Swaminathan, V.K. Ramachandran, Manash Ranjan Gupta, E. Somanathan, Prabal Roy Chowdhury, Probal Dasgupta.

Biological Sciences Division

Monoranjan Ghose, Ranjan Gupta, P.P. Majumder.

Physics and Earth Sciences Division

Subrata Bhattacharyya, Sisir Roy, Bijoy Shingha Mazumder, Dilip Saha, Pinaki Roy, Samarendra Bhattacharya, Chandan Chakraborty, Subir Ghosh.

Computer and Communication Sciences Division

Jayasree Datta Gupta, I.K. Ravichandra Rao, Bhabani Prasad Sinha, Sankar Kumar Pal, Bidyut Baran Chowdhuri, Arun Kumar De, Sambhu Nath Biswas, Bhargab Bikram Bhattacharya, Malay Kr. Kundu, Kumar Sankar Roy, Subhas Chandra Nandy, Nabanita Das, Nikhil Ranjan Pal, Swapan Kr. Parui, Sushmita Mitra, Bhabatosh Chanda, C.A. Murthy, Ashish Ghosh, Dipti Prasad Mukherjee, K.S. Raghavan.

Statistical Quality Control and Operations Research Division

S.S. Handa, S.K. Majumdar, Anup Majumdar, Kalyan Kumar Chowdhury, Ashim Roy Chowdhury, P.K. Perumallu, Amitava Bandyopadhyay, U. Haridas Acharya, G.S.R. Murthy, Dipak Kr. Manna, B. Mohan Reddy, Samir Kr. Neogy.

Library, Documentation and Information Sciences Division

I.K. Ravichandra Rao, K.S. Raghavan.

Computer and Statistical Service Centre (CSSC)

Subhas Ch. Kundu, Debashis Roy, Aditya Bagchi, Amitava Datta.

Member-Secretary, ISEC

Monoranjan Pal.

Other Committees of the Institute

A. Finance Committee

Director (Chairman), Dilip Saha, Bhabani P. Sinha, Ayanendranath Basu, Kalyan K. Chowdhury, Alok Goswami, Somnath Roy, Head, Delhi Centre, Head, Bangalcre Centre, Government Representative (Ministry of Statistics & Programme Implementation), Government Representative (Ministry of Finance), Chief Executive (A & F), Amitava Mukherjee (Convener).

B. Editorial Committee

Editor-in-chief, Sankhya, Series A and Series B:

Professor P.K. Sen (UNC-Chapel Hill, USA)

Joint Editors, Sankhya, Series A:

Professor K.B. Athreya (Iowa State University, USA), Anirban Dasgupta (Purdu University, USA) and Alok Goswami (ISI, Kolkata)]

Joint Editors, Sankhya, Series B:

Malay Ghosh (University of Florida, Gainesville, USA), Bimal K Sinha, (University of Maryland – Baltimore County, USA) and Ayanendranath Basu (ISI, Kolkata)

C. Works Advisory Committees

Kolkata

Sujit Basu (Chairman), Sujit K. Majumdar (Vice-Chairman), Malay K. Kundu, Bidyut Roy, Bhabatosh Chanda, Prabir Chattoraj, Expert (Civil), Expert (Architect), Expert (Electrical Engg.), Chief Executive (A & F), Amitava Mukherjee, In-Charge, E.M.U., M.V. Ramaswamy, Arindam Mukherjee (Convener).

Delhi

T.S. Ratnam (Chairman), R.B. Bapat, Abhay G. Bhat, Chetan Ghate, S.K. Neogy, N. Nagarajan (Electrical), Rajinder Kalla, (Civil), Vishwa Bandhu, S.S. Sethi (Convener).

Bangalore

T. Krishnan (Chairman), M.K. Prapulla Chandra, T.J. Ramamurthy, Chief Engineer (C&B) [or his nominee], Head, Bangalore Centre, Head, Stat-Math Unit, Head, DRTC, Head, SQC & OR Unit, Head, Economic Analysis Unit, P.K. Unnikrishnan (Convener).

D. Ph.D. /D.Sc. Committee

Statistics

Sankar K. Pal, Director (Chairman), Aditya Bagchi, Dean of Studies, P.P. Majumder, Mohan Delampady, Ayanendranath Basu, Anup Dewanji, Satya P. Das, C.A. Murthy, Alok Goswami (Convener).

Mathematics

Sankar K. Pal, Director (Chairman), Aditya Bagchi, Dean of Studies, Rajendra Bhatia, T.S.S.R.K. Rao, Goutam Mukherjee, S.C. Bagchi, B.S. Majumder, P.P. Majumder, B.B. Chaudhuri, Manas Ranjan Gupta, Alok Goswami (Convener).

Computer Science

Sankar K. Pal, Director (Chairman), Aditya Bagchi, Dean of Studies, C.A. Murthy, B.B. Bhattacharya, Nikhil R. Pal, B.B. Chaudhuri, Palash Sarkar, Abhirup Sarkar, P.P. Majumder, Alok Goswami (Convener).

Quantitative Economics

Sankar K. Pal, Director (Chairman), Aditya Bagchi, Dean of Studies, Satya R. Chakraborty, Satya P. Das, Manas Ranjan Gupta, Abhirup Sarkar, Amita Majumder, Nikhil R. Pal, P.P. Majumder, Alok Goswami (Convener).

E. Policy Planning and Evaluation Committee (PPEC)

Chairman of ISI or his nominee (Chairman), Sankar K. Pal, Director (Vice-Chairman), Director General, C.S.O., Financial Advisor, Ministry of Statistics & P.I., N. Mukunda, Obaid Sidique, Amiya Bagchi, Amitava Kundu, J.K. Ghosh, P.P. Majumdar, R.B. Bapat, B.B. Bhattacharya (Convener).

F. Technical Advisory Committees of different Divisions

Theoretical Statistics *and Mathematics Division*

Sankar K. Pal, Director (Chairman), Tathagata Bandyopadhyay, Rahul Mukherjee, M.G. Nadkarni, S.M. Bhatwadekar, Rajendra Bhatia, Professor-in-Charge (Convener).

Applied Statistics Division

Sankar K. Pal, Director (Chairman), S.P. Mukherjee, Rahul Mukherjee, Tathagata Bandyopadhyay, S.K. Mullick, Asim Pal, Bimal K. Roy, Professor-in-Charge (Convener).

Computer and Communication Sciences Division

Sankar K. Pal, Director (Chairman), B.L. Deekshatulu, Arun K. Majumder, Rajeev Sangal, S.K. Sarkar, L.M. Patnaik, Partha P. Chakraborty, N. Balakrishnan, Swapan K. Parui, Professor-in-Charge (Convener).

Physics and Earth Sciences Division

Sankar K. Pal, Director (Chairman), Sampat K. Tandon, Anand Mohan, K.C. Khilar, U.C. Kothyari, Jayanta K. Bhattacharjee, Abinash Khare, Dilip Saha, Professor-in-Charge (Convener).

Biological Sciences Division

Sankar K. Pal, Director (Chairman), V. Nanjundiah, Subrata Sinha, R. Khongsdier, P.K. Singh, Swapan Kr. Datta, Bidyut Roy, Professor-in-Charge (Convener).

Social Sciences Division

Sankar K. Pal, Director (Chairman), Sugata Marjit, Rajni Palriwala, Surendra Munshi, Subrata Lahiri, Narendra Sharma, Krishna Bhattacharya, Abhirup Sarkar, Professor-in-Charge (Convener).

Statistical Quality Control and Operations Research Division

Sankar K. Pal, Director (Chairman), Sujit Basu, S.P. Mukherjee, S.K. Pillai, Bhaskar B. Idage, Kalyan K. Chowdhury, Head, SQC & OR Division (Convener).

Library, Documentation and Information Sciences Division

Sankar K. Pal, Director (Chairman), K.K. Banerjee, S. Ravindran, S. Mondal, Arup Roy Choudhury, Chief Librarian (Convener).

INDIAN STATISTICAL INSTITUTE

SEVENTY SEVENTH ANNUAL REPORT 2008 – 2009

Statement of Accounts and Auditor's Report for the year 2008-2009

CONTENTS

AUDITOR'S REPORT
TO
INDIAN STATISTICAL INSTITUTE

1. We have audited the attached Balance Sheet as at 31st March, 2009 of the **INDIAN STATISTICAL INSTITUTE** (the Institute), an Institute of National Importance, registered under the Societies Registration Act, 1860 and established under the Indian Statistical Institute Act,1959 and also the Income and Expenditure Account of the Institute for the year ended on that date annexed thereto. These financial statements are the responsibility of the management of the Institute. Our responsibility is to express an opinion on these financial statement based on our Audit.

   We conducted our audit in accordance with the auditing standards generally accepted in India. Those Standards require that we plan an perform the audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

2. We report that :

2.1 The Institute has not yet got the tax exemption u/s 10 of the Income tax Act, 1961 for its income for the financial year 2008-09 and as such we are unable to comment on Institute's Income Tax liability, if any for the year under audit(refer note No. 8.3,Schedule-25)

2.2 The Institute falls within the definition of "Employer" as prescribed u/s 115W of the Income Tax Act, 1961 and as such liable to pay Fringe Benefit Tax u/s 115WA of the said act. No payment or provision for such tax is made in the accounts (amount of liability including arrear liability is not ascertained by the management).

2.3 No depreciation for the financial year 1986-87 and onwards has been provided in the accounts on the fixed assets acquired up to the financial year 1985-86(refer note no 1.1., Schedule –25)

2.4 Allocation of grant between capital and revenue out of plan grant and allocation of revenue expenditure between plan and non plan grant are made by the Institute.(refer note no. 9.2,Schedule-24)

2.5 Indian Statistical Institute, New Delhi Center has not followed the General Financial Rules, 2005 with regard to construction/renovation of its building.

2.6 The Institute has not updated fixed assets register and also no physical verification carried out during the year. And as such amount of discrepancies between the book balance and physical balance could not be ascertained.

2.7 Sales proceeds of fixed assets amounting to Rs. 1086306/= have been kept under current liabilities (refer note no. 1.7,Schedule-25)

2.8 No provision has been made in respect of doubtful debts of Rs. 113583.00(refer note no. 2.1,Schedule-25)

2.9 Loans to staff under motor car, house building and vehicles amounting to Rs. 13897627/- could not be verified in the absence of necessary documents.

2.10. No provision has been made in respect of old/doubtful advances lying under various sub heads, amounts not ascertain (refer note no. 2.2 to 2.7,Schedule-25)

2.11 Prepaid Expenses (other than library journals) are charged off in the Accounts (refer note no. 1.2(d),Schedule-24)

2.12 Stores and Spares, medicine and stationeries are charged off to accounts in the year of purchase(refer note no.10,Schedule-24)

2.13 Certain Income and Expenditure including retirement benefit to the employees are accounted on cash basis(refer note no.1.2 and 4,Schedule-24)

2.14 No adjustment/appropriate accounting has been made in respect of old liabilities of Rs. 4365532/- (refer note no.7,Schedule-25)

The comments under the above have consequential effect on the year's surplus of income over expenditure and the year –end net assets position, total amount not ascertainable.

3. ***Subject to our comments in para-2 above***

   (i) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;

   (ii) In our opinion, proper books of account as required by law have been kept by the Institute so far as appears from our examination of those books;

4. The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account.

5. In our opinion and to the best of our information and according to the explanations given to us the financial statements read together with the notes thereon and **subject to our comments in Para 2 above give a true and fair view** in conformity with the accounting principles generally accepted in India:

   (i) in the case of the Balance Sheet, of the state of affairs of the Institute as at 31st March'2009;and

   (ii) in the case of the Income and Expenditure Account, of the excess of Income over Expenditure for the year ended on that date.

For L.B. Jha & Co.
Chartered Accountants

(B.N. Jha)
Partner
Membership No. 51508

The 24th September 2009

INDIAN STATISTICAL INSTITUTE
BALANCE SHEET AS AT 31/03/2009

(Amount in Rupees)

PARTICULARS	SCHEDULE	CURRENT YEAR	PREVIOUS YEAR
LIABILITIES			
CORPUS/CAPITAL FUND	1	640506895	501848103
EARMARKED/ENDOWMENT FUNDS	3	350538351	308886754
CURRENT LIABILITIES AND PROVISIONS	7	110382180	103074369
LIABILITIES FOR FIXED ASSETS OF EXT. AIDED FUND		86648372	74441927
LIABILITIES FOR FIXED ASSETS OF ISEC FUND		250890	0
TOTAL		1188326688	988251153
ASSETS			
FIXED ASSETS	8	449038541	376031025
INVESTMENTS/ ASSETS-FROM EARMARKED/ ENDOWMENT FUNDS	9	208300814	206618635
CURRENT ASSETS, LOANS, ADVANCES ETC	11	444088071	331159566
FIXED ASSETS OF EXT. AIDED FUND (CONTRA)		86648372	74441927
FIXED ASSETS OF ISEC FUND(CONTRA)		250890	0
TOTAL		1188326688	988251153
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

(S. K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Balance Sheet referred to our report of even date.
GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700001

For L B Jha & Co.
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31/03/2009 (Amount in Rupees)

PARTICULARS	SCHEDULE	CURRENT YEAR		PREVIOUS YEAR	
		PLAN	NONPLAN	PLAN	NONPLAN
INCOME					
Internal Receipts	12		3,52,67,268		3,48,33,229
Grant-in-Aid From Govt. of India	13	11,51,00,142	78,90,21,399	12,25,47,000	53,95,47,000
TOTAL (A)		11,51,00,142	82,42,88,667	12,25,47,000	57,43,80,229
EXPENDITURE					
Establishment Expenses	20	1,73,47,699	60,85,96,403	1,29,88,739	46,13,96,987
Other Administrative Expenses etc	21	8,45,75,988	6,26,81,554	8,22,46,119	5,22,08,843
TOTAL (B)		10,19,23,687	67,12,77,957	9,52,34,858	51,36,05,830
BALANCE BEING SURPLUS /(DEFICIT) (A - B) CARRIED TO CORPLUS/CAPITAL		1,31,76,455	15,30,10,710	2,73,12,142	6,07,74,399
SIGNIFICANT ACCOUNTING POLICIES	24				
CONTINGENT LIABILITIES AND NOTES ON	25				

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S.K. Iyer)
(Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Income and Expenditure account referred to our report of even date.
GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 1 FORMING PART OF THE BALANCE SHEET AS AT 31 MARCH 2009

PARTICULARS	CURRENT YEAR		PREVIOUS YEAR	
OPENING BALANCE		501848103		359223351
LESS: RECOVERED DURING THE YEAR ON ACCOUNT OF EXCESS OF RECEIPT OVER EXPENDITURE FOR THE YEAR 2008-09				
NON PLAN REVENUE	60774399		27947183	
PLAN REVENUE	27312142	88086541	18714605	46661788
ADD: CONTRIBUTION TOWARDS CAPITAL FUND RECEIVED DURING THE YEAR 2008-09	137994056		152364000	
LESS: RECOVERED DURING THE YEAR	38232056	99762000	3820788	148543212
ADD: TRANSFER OF ASSETS OF DEVELOPMENT FUND		4433412		
ADD: 95% COST OF BOOKS AND JOURNALS ACQUIRED DURING THE YEAR OUT OF PLAN REVENUE BUDGET		53965857		41181380
LESS: DEPRECIATION ON ASSETS DURING THE YEAR SCH 8A	96274993		88441029	
DEPRECIATION ON ASSETS ACQUIRED OUT OF DEV.FUND SHCL 8B	1327627		83082	
		97602620		88524111
LESS: AMOUNT WRITTEN OFF ON FIXED ASSETS DURING THE YEAR SCH 8		481		481
ADD: EXCESS OF RECEIPT OVER EXPENDITURE ON NON PLAN GRANT A/C	153010710		60774399	
ADD: EXCESS OF RECEIPT OVER EXPENDITURE ON PLAN REVENUE GRANT A/C	13176455		27312142	
		166187165		88086541
		640506895		501848103

S.K. Chakraborty
Dy.Chief Executive (F)

S.K.Iyer
Chief Executive (A & F)

Sankar K. Pal
Director

GF-I Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B JHA & CO.
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	DEV ONLINE H/W RECOGNITION PROJECT 201 I I S,B'LORE		HAPLO TYPE DIVR OF ANGIOTENSIN PROJECT 202 DST,GOI		DNA SEQUENCE VARIATION PROJECT 203 DEP.BIO-TECH	
a) Opening Balance of The Funds		26,592		9,110		13,65,294
b) Additions To The Funds :						
1. Donation / Grants	5,00,000		5,27,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		5,00,000		5,27,000		
TOTAL (a+b)		5,26,592		5,36,110		13,65,294
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	99,478					
- Books & Journal						
- Other						
TOTAL		99,478				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	3,84,703		2,40,000		88,500	
- Travelling & Conveyance	48,135		11,072			
- Admn. expenses/Consumables	23,515		1,77,108		6,22,942	
- Tax Deducted at Source						
- Contingencies	72,823		12,008		24,374	
- Share Of Overhead	63,750		88,000		1,00,000	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		5,92,926		5,28,188		8,35,816
d) Refund of Unspent Balance						
TOTAL (c)		6,92,404		5,28,188		8,35,816
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-1,65,812		7,922		5,29,478

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	INFLUENCE OF BD FORMS ON TUB. PROJECT 204 CHAR.A		HP LAB INDIA - CVPR PROJECT 205 HP LAB RESE		MESOZIC GONDWAA VERTEBRATES PROJECT 206 D.S.T, G.O.I.	
a) Opening Balance of The Funds						28,735
b) Additions To The Funds :						
1. Donation / Grants	19,00,000		2,66,010			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		19,00,000		2,66,010		
TOTAL (a+b)		19,00,000		2,66,010		28,735
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	14,07,360					
- Books & Journal						
- Other						
TOTAL		14,07,360				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	61,897		1,92,974			
- Travelling & Conveyance			10,500		18,990	
- Admn. expenses/Consumables			8,348		7,393	
- Tax Deducted at Source						
- Contingencies	8,068		6,717		1,211	
- Share Of Overhead	3,37,000		34,688			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		4,06,965		2,53,227		27,594
d) Refund of Unspent Balance						
TOTAL (c)		18,14,325		2,53,227		27,594
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		85,675		12,783		1,141

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	VISITING PROFE SSORSHIP B V RO PROJECT 207 NBHM		GENOMIC DIVERSITY,WASIA PROJECT 208 DST, G O I		DESIGNING AND STUDYING MODE PROJECT 209 OF ACTI	
a) Opening Balance of The Funds				1,93,491		
b) Additions To The Funds :						
1. Donation / Grants	3,12,000				95,91,500	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		3,12,000				95,91,500
TOTAL (a+b)		3,12,000		1,93,491		95,91,500
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal			872			
- Other						
TOTAL				872		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	3,12,000		2,60,000			
- Travelling & Conveyance					5,990	
- Admn. expenses/Consumables					4,55,006	
- Tax Deducted at Source						
- Contingencies			909		65,696	
- Share Of Overhead					1,07,560	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		3,12,000		2,60,909		6,34,252
d) Refund of Unspent Balance						
TOTAL (c)		3,12,000		2,61,781		6,34,252
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)				-68,290		89,57,248

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM LIB. GRANT BANGALORE PROJECT 212 NBHM,DEP.ATOM		INTERACTING PART. SYSTEM-S. PROJECT 216 ATHREYA SCIR		FINANCIAL RESER SWARNJAYTI FELL PROJECT 217 DST,G.O.I.	
a) Opening Balance of The Funds		37,313		3,32,333		2,81,398
b) Additions To The Funds :						
1. Donation / Grants	12,62,687					
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		12,62,687				
TOTAL (a+b)		13,00,000		3,32,333		2,81,398
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			34,000			
- Books & Journal	10,33,102				61,284	
- Other						
TOTAL		10,33,102		34,000		61,284
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			32,000		50,000	
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			47,425		6,709	
- Share Of Overhead			49,850		18,291	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				1,29,275		75,000
d) Refund of Unspent Balance						
TOTAL (c)		10,33,102		1,63,275		1,36,284
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,66,898		1,69,058		1,45,114

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	SOCIO ECON. CONDITIONS PROJECT 220 WB MINO.COMM		STUDIES OF ENVN ECOLOGICAL ASPT PROJECT 221 C H & PLANT SC.		INT. PASSENGER SURVEY-ASU DEPT PROJECT 222 OF TOURISM	
a) Opening Balance of The Funds		75,775		4,84,369		
b) Additions To The Funds :						
1. Donation / Grants	2,64,000				80,28,150	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		2,64,000				80,28,150
TOTAL (a+b)		3,39,775		4,84,369		80,28,150
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables	9,736		950			
- Tax Deducted at Source						
- Contingencies	10,831		1,000			
- Share Of Overhead	23,998				10,46,870	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		44,565		1,950		10,46,870
d) Refund of Unspent Balance						
TOTAL (c)		44,565		1,950		10,46,870
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,95,210		4,82,419		69,81,280

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM BOOKGRANT PROJECT 223 NBHM,DAE G.O.I.		DEV.OF BIO INFO RMATIC TOOLS PROJECT 224 MIN.SC. & TECH		IMPACT OF ECO REFORM TRIBAL PROJECT 225 NABARD	
a) Opening Balance of The Funds		49,562		62,394		
b) Additions To The Funds :						
1. Donation / Grants	27,50,438				2,02,875	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		27,50,438				2,02,875
TOTAL (a+b)		28,00,000		62,394		2,02,875
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal	28,74,796					
- Other						
TOTAL		28,74,796				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			13,000			
- Travelling & Conveyance					6,013	
- Admn. expenses/Consumables					8,860	
- Tax Deducted at Source						
- Contingencies			6,503		2,189	
- Share Of Overhead					18,442	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				19,503		35,504
d) Refund of Unspent Balance						
TOTAL (c)		28,74,796		19,503		35,504
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-74,796		42,891		1,67,371

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	IMPROVEMENT IN MGMT.ENTRANCE PROJECT 226 - IIM		PHYSICAL GROWTH BODY COMP. PROJECT 227 N.H.F. NETHERLA		UNIVERSITY ONE WAY HASH FAMILY PROJECT 228 MIN.OF DEFENCE	
a) Opening Balance of The Funds		23,436		12,04,687		7,49,597
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		23,436		12,04,687		7,49,597
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			3,33,053		50,000	
- Travelling & Conveyance			93,076		67,892	
- Admn. expenses/Consumables			5,103		24,588	
- Tax Deducted at Source						
- Contingencies			1,25,057		85,289	
- Share Of Overhead					1,15,250	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				5,56,289		3,43,019
d) Refund of Unspent Balance						
TOTAL (c)				5,56,289		3,43,019
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		23,436		6,48,398		4,06,578

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ATIYAH SINGER INDEX THEOREM PROJECT 229 GEUGE DST-GOI		DEVELOPMENT OF VER.PORT,SOFT. PROJECT 230 C.S.I.R ,NMITLI		NBHM TRAVEL GRA - ATHREYA PROJECT 231 NBHM	
a) Opening Balance of The Funds				7,455		
b) Additions To The Funds :						
1. Donation / Grants	2,00,000		6,00,000		1,42,400	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		2,00,000		6,00,000		1,42,400
TOTAL (a+b)		2,00,000		6,07,455		1,42,400
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	34,000					
- Books & Journal						
- Other						
TOTAL		34,000				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	64,667		4,000			
- Travelling & Conveyance			17,236		1,37,732	
- Admn. expenses/Consumables	8,018					
- Tax Deducted at Source						
- Contingencies			20,640			
- Share Of Overhead	33,400					
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		1,06,085		41,876		1,37,732
d) Refund of Unspent Balance				7,455		
TOTAL (c)		1,40,085		49,331		1,37,732
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		59,915		5,58,124		4,668

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM NURTURE CONTRACT PROGM. PROJECT 232 DEPT ATOMIC ENG		NBHM TRAVEL GRT DR.ARUP PAL PROJECT 233 NBHM		LONG TERM EFFET HTV/AIDS IN PROJECT 234 WORLD BANK	
a) Opening Balance of The Funds		22,458		1,694		
b) Additions To The Funds :						
1. Donation / Grants	8,00,000				2,41,667	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		8,00,000				2,41,667
TOTAL (a+b)		8,22,458		1,694		2,41,667
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	16,325					
- Books & Journal						
- Other						
TOTAL		16,325				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	60,000				2,00,000	
- Travelling & Conveyance						
- Admn. expenses/Consumables	475					
- Tax Deducted at Source						
- Contingencies	1,40,249				41,618	
- Share Of Overhead	60,000					
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		2,60,724				2,41,618
d) Refund of Unspent Balance				1,694		
TOTAL (c)		2,77,049		1,694		2,41,618
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		5,45,409				49

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	REFRESHER COUR INDIAN ACADEMY PROJECT 235		J.C. BOSE FELL PROF. R. BHATIA PROJECT 236 DST		SPATIAL STOCH ARTIS PROCESS PROJECT 237 D S T, G.O.I.	
a) Opening Balance of The Funds		2,823		2,57,057		
b) Additions To The Funds :						
1. Donation / Grants	3,05,423		6,50,000		3,70,130	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		3,05,423		6,50,000		3,70,130
TOTAL (a+b)		3,08,246		9,07,057		3,70,130
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			44,756			
- Books & Journal						
- Other						
TOTAL				44,756		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,70,000		2,40,000			
- Travelling & Conveyance					1,97,443	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	31,298		82,740		565	
- Share Of Overhead			60,000			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		3,01,298		3,82,740		1,98,008
d) Refund of Unspent Balance						
TOTAL (c)		3,01,298		4,27,496		1,98,008
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		6,948		4,79,561		1,72,122

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	WRITTEN TEST AWARD OF NBHM PROJECT 238 D.ATOMIC ENERGY		SWARNAJAYANTI FELLOW. AWARD PROJECT 240		EMERITUS SCITS R K ROYCHOUDHUY PROJECT 241 C S I R	
a) Opening Balance of The Funds		594				10,895
b) Additions To The Funds :						
1. Donation / Grants	8,000		29,98,600		2,79,105	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		8,000		29,98,600		2,79,105
TOTAL (a+b)		8,594		29,98,600		2,90,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	7,500		1,35,622		2,40,000	
- Travelling & Conveyance			650			
- Admn. expenses/Consumables			918		33,400	
- Tax Deducted at Source						
- Contingencies	409		19,268		14,105	
- Share Of Overhead			70,000			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		7,909		2,26,458		2,87,505
d) Refund of Unspent Balance		594				
TOTAL (c)		8,503		2,26,458		2,87,505
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		91		27,72,142		2,495

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	PROCESS PROTIEN ASSISTED SILIKA PROJECT 242 D S T , G O I		NBHM NURTURE PROGRAMME PROJECT 243 (2006-2007)		DEV. OF INF. OF AGRICULTURAL PROJECT 244 DST- GOI	
a) Opening Balance of The Funds		1,79,000		10,000		
b) Additions To The Funds :						
1. Donation / Grants					26,30,800	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						26,30,800
TOTAL (a+b)		1,79,000		10,000		26,30,800
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets					6,42,240	
- Books & Journal						
- Other						
TOTAL						6,42,240
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,35,452				1,56,844	
- Travelling & Conveyance					10,948	
- Admn. expenses/Consumables					8,068	
- Tax Deducted at Source						
- Contingencies					1,48,346	
- Share Of Overhead	23,340				3,43,200	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		1,58,792				6,67,406
d) Refund of Unspent Balance						
TOTAL (c)		1,58,792				13,09,646
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		20,208		10,000		13,21,154

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	GOOGLY RESEARCH AWARD-DR MAN PROJECT 245 GOOGLY INC.MOT		HANDWRITING ANALYSIS FOR PROJECT 246 INSA GOI		IBM- FACULTY AWARD - 2007 PROJECT 247 IBM NEW YORK	
a) Opening Balance of The Funds		2,90,528		18,959		2,09,430
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		2,90,528		18,959		2,09,430
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets					79,100	
- Books & Journal						
- Other						
TOTAL						79,100
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance	18,991					
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			1,366			
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		18,991		1,366		
d) Refund of Unspent Balance						
TOTAL (c)		18,991		1,366		79,100
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,71,537		17,593		1,30,330

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SCHEDULE-3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	FARM HOUSEHOLD SURVEY PROJECT 248		CENTRE FOR SOFT COMPUT RESEARCH PROJECT 249		NEW TECHNIQUES OF FAST IMAGE PROJECT 250	
FUNDING AGENCY	E.W.CENTER HOUS		D.S.T., G.O.I.		INTEL CORP,USA	
a) Opening Balance of The Funds		8,052		33,35,071		3,69,074
b) Additions To The Funds :						
1. Donation / Grants	39,060					
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		39,060				
TOTAL (a+b)		47,112		33,35,071		3,69,074
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	18,850					
- Books & Journal			69,013			
- Other			8,00,000			
TOTAL		18,850		8,69,013		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			16,40,300			
- Travelling & Conveyance	1,365		1,50,988			
- Admn. expenses/Consumables	1,218		64,858			
- Tax Deducted at Source						
- Contingencies	14,191		2,80,315		63	
- Share Of Overhead					94,978	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		16,774		21,36,461		95,041
d) Refund of Unspent Balance						
TOTAL (c)		35,624		30,05,474		95,041
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		11,488		3,29,597		2,74,033

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	INVEST.OF MEANS TO ASSESS ERROR PROJECT 251 C S I R		CRONIC EXPOSURE TO ENVIRN.TOXIS PROJECT 252 MIN.OF ENV.FORS		DELAY FAULT MODELING & TEST PROJECT 253 INTEL.CORP.USA	
a) Opening Balance of The Funds		70,833		11		6,54,991
b) Additions To The Funds :						
1. Donation / Grants			2,45,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				2,45,000		
TOTAL (a+b)		70,833		2,45,011		6,54,991
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			50,000			
- Books & Journal						
- Other						
TOTAL				50,000		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances					1,68,000	
- Travelling & Conveyance			2,240		71,018	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			6,270			
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				8,510		2,39,018
d) Refund of Unspent Balance						
TOTAL (c)				58,510		2,39,018
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		70,833		1,86,501		4,15,973

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	RELBLTY. ASSMNT .OF A SOLID R/M PROJECT 254 DEPT.OF SPACE		DIGITAL IMAGING FOR INVESTIGATN PROJECT 255 D S T.MIN SC &		WATER WAVE DIFF BY FLO.& SU PROJECT 256 C.S.I.R.	
a) Opening Balance of The Funds		1,69,376				17,995
b) Additions To The Funds :						
1. Donation / Grants			9,00,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				9,00,000		
TOTAL (a+b)		1,69,376		9,00,000		17,995
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			4,20,056			
- Books & Journal						
- Other						
TOTAL				4,20,056		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			1,37,333			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead			1,10,000			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				2,47,333		
d) Refund of Unspent Balance						
TOTAL (c)				6,67,389		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,69,376		2,32,611		17,995

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	STUDIES ON PLAK TONIC DIVERSIY PROJECT 257 DST		PROCESSING AND ANALYSIS AIRCRT PROJECT 258 US ARMY		INSEAD RESEARCH GRANT(FOREIGN) PROJECT 259 CEDEX, FRANCE	
a) Openirig Balance of The Funds		99,615		0		2,56,983
b) Additions To The Funds :						
1. Donation / Grants			19,20,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				19,20,000		
TOTAL (a+b)		99,615		19,20,000		2,56,983
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables			510			
- Tax Deducted at Source						
- Contingencies			9,288			
- Share Of Overhead			2,50,370			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				2,60,168		
d) Refund of Unspent Balance						
TOTAL (c)				2,60,168		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		99,615		16,59,832		2,56,983

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ANALYSIS OF CRYP. ALGORITHM PROJECT 260 DST,GOI		R&D CRYPTOGRAPY PROJECT 261 DIT GOI		EVALUATION OF RELBLTY. FLIGHT PROJECT 262 DEPT.OF SPACE	
a) Opening Balance of The Funds				15,76,283		1,30,109
b) Additions To The Funds :						
1. Donation / Grants	7,70,000					
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		7,70,000				
TOTAL (a+b)		7,70,000		15,76,283		1,30,109
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			12,65,770			
- Travelling & Conveyance			4,70,818			
- Admn. expenses/Consumables			33,499			
- Tax Deducted at Source						
- Contingencies			1,64,528			
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				19,34,615		
d) Refund of Unspent Balance						
TOTAL (c)				19,34,615		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		7,70,000		-3,58,332		1,30,109

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	DEV OF AGRO CON NANOPARTICLES PROJECT 263		J C BOSE FELLOS ARUP BOSE PROJECT 264		DATA BASED FOR DE.CENTRA.PLAN PROJECT 265	
FUNDING AGENCY	DBT		D S T, G O I		HWH ZILLA PARI.	
a) Opening Balance of The Funds		68,41,074				16,737
b) Additions To The Funds :						
1. Donation / Grants			8,00,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				8,00,000		
TOTAL (a+b)		68,41,074		8,00,000		16,737
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	54,43,793					
- Books & Journal						
- Other						
TOTAL		54,43,793				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,77,094		60,000			
- Travelling & Conveyance	80,640					
- Admn. expenses/Consumables	4,89,380		1,282		6,080	
- Tax Deducted at Source						
- Contingencies	3,62,410		8,322		344	
- Share Of Overhead	1,00,000		60,000			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		13,09,524		1,29,604		6,424
d) Refund of Unspent Balance						
TOTAL (c)		67,53,317		1,29,604		6,424
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		87,757		6,70,396		10,313

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SCHEDULE 3 FORMING PART OF BALANCE.SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	IMAGE PROCESS TECH.PARTICLE PROJECT 266		STAT. METHODS FOR MAPN.MULTIV PROJECT 267		DEV.OF ROBUST ANALY AND RECOG PROJECT 268	
FUNDING AGENCY	C S I R		N I H.U S A		MIN. OF COM.TEC	
a) Opening Balance of The Funds		28,515		84,02,386		16,73,155
b) Additions To The Funds :						
1. Donation / Grants	85,480				15,07,200	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		85,480				15,07,200
TOTAL (a+b)		1,13,995		84,02,386		31,80,355
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets					4,54,598	
- Books & Journal					1,314	
- Other						
TOTAL						4,55,912
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,11,662		1,69,277		7,45,796	
- Travelling & Conveyance	13,467		28,643		1,20,882	
- Admn. expenses/Consumables			31,577		22,814	
- Tax Deducted at Source						
- Contingencies	1,108		20,658		49,346	
- Share Of Overhead	7,192				1,92,168	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		1,33,429		2,50,155		11,31,006
d) Refund of Unspent Balance						
TOTAL (c)		1,33,429		2,50,155		15,86,918
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-19,434		81,52,231		15,93,437

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	COMPUTATIONAL INTELL. REMOTE PROJECT 269		NBHM LIBRARY CO MMITTEE(NORTHER PROJECT 273		RANDOM GEOMET GRAPHS (R.ROY) PROJECT 274	
FUNDING AGENCY	D.A.E, GOI,MUMB		DEP.ATOMIC ENG		D S T N DELHI	
a) Opening Balance of The Funds		4,72,809		10,187		78,185
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		4,72,809		10,187		78,185
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,88,827					
- Travelling & Conveyance	27,722				27,368	
- Admn. expenses/Consumables	869					
- Tax Deducted at Source						
- Contingencies	89,324					
- Share Of Overhead	30,000				5,474	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		4,36,742				32,842
d) Refund of Unspent Balance				10,187		
TOTAL (c)		4,36,742		10,187		32,842
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		36,067				45,343

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM RESEARCH AWARD-L.SAHU(DL PROJECT 276 DEPT.ATOMIC ENG		CENTRAL SECTOR SCHOLORSHIP - PROJECT 277 SC STUDENT		NBHM BOOK GRANT (DELHI) PROJECT 278 DEPT ATOMIC EGY	
a) Opening Balance of The Funds		5,225				18,446
b) Additions To The Funds :						
1. Donation / Grants			66,900		27,81,554	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				66,900		27,81,554
TOTAL (a+b)		5,225		66,900		28,00,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			45,000			
- Books & Journal					24,59,710	
- Other						
TOTAL				45,000		24,59,710
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			14,175			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				14,175		
d) Refund of Unspent Balance						
TOTAL (c)				59,175		24,59,710
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		5,225		7,725		3,40,290

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	EMERITUS.SCNT. DR. A.CHOUDHURY PROJECT 280 CSIR		POLYMORPHISM IN CYPIAL CYP2I PROJECT 281 DST		VALUATION OF ECOLOGICAL SERV PROJECT 282 ME & FOREST	
a) Opening Balance of The Funds		5,184		5,31,338		-5,741
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		5,184		5,31,338		-5,741
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			1,82,416			
- Books & Journal						
- Other						
TOTAL				1,82,416		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance			21,846			
- Admn. expenses/Consumables			1,79,365			
- Tax Deducted at Source						
- Contingencies			24,249			
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				2,25,460		
d) Refund of Unspent Balance						
TOTAL (c)				4,07,876		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		5,184		1,23,462		-5,741

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	SURVEY OF PRENT STATUS OF EVALT PROJECT 283 SAIL,DURGAPUR		SOFTWARE DEV. FOR TIGER PUG PROJECT 284 D.O.F, GOV.W.B		NASI SR.SCIENTS P. JUBILEE PROJECT 285 MASI	
a) Opening Balance of The Funds				14,916		
b) Additions To The Funds :						
1. Donation / Grants	2,95,000				2,90,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		2,95,000				2,90,000
TOTAL (a+b)		2,95,000		14,916		2,90,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	87,705				48,387	
- Travelling & Conveyance	26,847				7,623	
- Admn. expenses/Consumables					8,112	
- Tax Deducted at Source						
- Contingencies	29,766				830	
- Share Of Overhead	77,000					
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		2,21,318				64,952
d) Refund of Unspent Balance						
TOTAL (c)		2,21,318				64,952
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		73,682		14,916		2,25,048

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	STRATIGRAPHIC CANALYS OF CHAT PROJECT 286 DST,GOI		BOYSCAT FELLOWS SS DAS GSU PROJECT 287 DST - GOI		SAMPLE BASED PROJ OF ELEPHAN PROJECT 288 MIN.ENV & FORST	
a) Opening Balance of The Funds		12,92,743		73,047		67,021
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		12,92,743		73,047		67,021
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	11,22,399					
- Books & Journal						
- Other						
TOTAL		11,22,399				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,24,800					
- Travelling & Conveyance	1,17,929					
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	1,16,071					
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		3,58,800				
d) Refund of Unspent Balance						
TOTAL (c)		14,81,199				
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-1,88,456		73,047		67,021

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	UNDERSTANDING ROLE OF SYM.IN PROJECT 289 D S T. G O I		HOST VIRUS INT AT GENETIC PROJECT 290 D S T		CROSS LINGUAL INF.ACCESS DEP. PROJECT 291 COMMU.INF, DIT	
a) Opening Balance of The Funds		71,562				-71,069
b) Additions To The Funds :						
1. Donation / Grants			20,99,000		13,56,609	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				20,99,000		13,56,609
TOTAL (a+b)		71,562		20,99,000		12,85,540
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			13,65,522		22,239	
- Books & Journal					11,891	
- Other						
TOTAL				13,65,522		34,130
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,581		42,800		11,83,819	
- Travelling & Conveyance	6,728		44,281		53,245	
- Admn. expenses/Consumables			4,26,445		81,376	
- Tax Deducted at Source						
- Contingencies			17,324		46,447	
- Share Of Overhead			96,000		1,76,902	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		9,309		6,26,850		15,41,789
d) Refund of Unspent Balance						
TOTAL (c)		9,309		19,92,372		15,75,919
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		62,253		1,06,628		-2,90,379

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ADV.TECH.FOR REMOTE SENSING PROJECT 292 D S T G.O.I.		DEV.OF AN ANN BASED PREDICTIO PROJECT 293 I J I R A		SOME FEATURE EXTRA & INDEXIN PROJECT 294 DST.G.O.I.	
a) Opening Balance of The Funds				2,07,462		-1,316
b) Additions To The Funds :						
1. Donation / Grants	16,00,000					
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		16,00,000				
TOTAL (a+b)		16,00,000		2,07,462		-1,316
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,47,305					
- Travelling & Conveyance	60,000					
- Admn. expenses/Consumables	24,397					
- Tax Deducted at Source						
- Contingencies	13,873					
- Share Of Overhead	2,00,000					
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		5,45,575				
d) Refund of Unspent Balance						
TOTAL (c)		5,45,575				
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		10,54,425		2,07,462		-1,316

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	DEV.OF EXP.PARA DIGMS VISUAL C PROJECT 295		CAMCS SINP ISI COLLABORATV PROJECT 296		SPL. HONORARIUM SSB-AWARDED PROJECT 297	
FUNDING AGENCY	DRDO		SAHA INST.KOL		CSI - GOI	
a) Opening Balance of The Funds		7,18,561				
b) Additions To The Funds :						
1. Donation / Grants			10,00,000		9,00,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				10,00,000		9,00,000
TOTAL (a+b)		7,18,561		10,00,000		9,00,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			2,34,502			
- Books & Journal						
- Other						
TOTAL				2,34,502		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	22,240				2,070	
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		22,240				2,070
d) Refund of Unspent Balance						
TOTAL (c)		22,240		2,34,502		2,070
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		6,96,321		7,65,498		8,97,930

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	BAYESION AUTOMATED RECOG PROJECT 298 DEPT.OF SPACE		CONSTRUC. ANALY REGIONAL VARIAT PROJECT 299 MIN.OF STATISTC		J.C.BOSE FELLOW DR S. K. PAL PROJECT 340 DST - GOI	
a) Opening Balance of The Funds		73,886		-5,81,598		-19,289
b) Additions To The Funds :						
1. Donation / Grants			6,50,000		10,60,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				6,50,000		10,60,000
TOTAL (a+b)		73,886		68,402		10,40,711
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal			1,517			
- Other						
TOTAL				1,517		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			1,45,200		2,40,000	
- Travelling & Conveyance			1,11,081		5,03,138	
- Admn. expenses/Consumables			14,103			
- Tax Deducted at Source						
- Contingencies			2,07,418		82,682	
- Share Of Overhead			65,000		60,000	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				5,42,802		8,85,820
d) Refund of Unspent Balance						
TOTAL (c)				5,44,319		8,85,820
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		73,886		-4,75,917		1,54,891

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	STUDY ON ASSESG THE IMPACT JUTE PROJECT 341 CHEM & PET. ASO		NON COMMUTATIV GEOMETRY &QUANT PROJECT 342 I N S A		PREDICT THE METEOROLOGICAL PROJECT 343 DEPT. OF SPACE	
a) Opening Balance of The Funds		1,19,150				
b) Additions To The Funds :						
1. Donation / Grants			50,000		6,15,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				50,000		6,15,000
TOTAL (a+b)		1,19,150		50,000		6,15,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal			16,971			
- Other						
TOTAL				16,971		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances					12,581	
- Travelling & Conveyance					14,425	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			400		2,460	
- Share Of Overhead					90,000	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				400		1,19,466
d) Refund of Unspent Balance						
TOTAL (c)				17,371		1,19,466
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,19,150		32,629		4,95,534

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	MODELLING & PREDICT PRESSUE PROJECT 344 V.S.S.C		CHEMICALS WEAP CONVENTION SELE PROJECT 345		ROBUST IMPLEMEN TATIONS OF I PROJECT 346 MINISTRY OF DEF	
a) Opening Balance of The Funds		2,53,592		75,017		3,85,243
b) Additions To The Funds :						
1. Donation / Grants			1,20,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				1,20,000		
TOTAL (a+b)		2,53,592		1,95,017		3,85,243
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance					1,12,062	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			290		7,240	
- Share Of Overhead			20,040			
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				20,330		1,19,302
d) Refund of Unspent Balance						
TOTAL (c)				20,330		1,19,302
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,53,592		1,74,687		2,65,941

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	STATISTIC IN GENETIC MEDICIN PROJECT 347		ESTMATING PROVR DISTRICT LEVEL PROJECT 348		DEV.METHODGY TOWARDS MEASRE PROJECT 349	
FUNDING AGENCY	ICMR		UNDP .		MIN OF STATISTS	
a) Opening Balance of The Funds		1,08,180		16,72,449		60,186
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		1,08,180		16,72,449		60,186
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			4,89,811			
- Books & Journal						
- Other						
TOTAL				4,89,811		
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,08,000					
- Travelling & Conveyance			85,061		48,326	
- Admn. expenses/Consumables			48,616		790	
- Tax Deducted at Source						
- Contingencies	175		9,189		30	
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		1,08,175		1,42,866		49,146
d) Refund of Unspent Balance						
TOTAL (c)		1,08,175		6,32,677		49,146
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		5		10,39,772		11,040

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	FLOOD ADVANCE PROJECT 802		CONVEYANCE ADVANCE PROJECT 804		GENOMIC DIVERSI INDIA POPULATIN PROJECT C244 MST/BBT GOI	
a) Opening Balance of The Funds		7,20,000		47,50,000		12,859
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		7,20,000		47,50,000		12,859
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		7,20,000		47,50,000		12,859

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	DEV OF DESIGN AID/TOOL FOR PROJECT O204 POLY		EVALUATION WORK SRC PATNA PROJECT O205		ALGEBRAIC ANALY OF MODEL ETC PROJECT O206 D.S.T., G.O.I.	
a) Opening Balance of The Funds		1,14,450		1,26,663		307
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		1,14,450		1,26,663		307
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,14,450		1,26,663		307

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	DESIGN AID TOOS FOR CLECTION PROJECT O207 CAIR		DEV.OF INDIGENO BLOCK ETC ISRO PROJECT O209 DEPT.OF SPACE		BYASIAN NON-PAR AMETIC INFEREN. PROJECT O215 CSIR	
a) Opening Balance of The Funds		10,144		1,22,833		5,877
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		10,144		1,22,833		5,877
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		10,144		1,22,833		5,877

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	EVALUATION OF TLC KAMRUP ZSS PROJECT O221 KAMRUP, GUAHATI		DEV OF ENCRIPTN ALGORITHIM PROJECT O222		STATUS OF WOMAN IN W.BENGAL PROJECT O226 GOVT.OF W.B	
a) Opening Balance of The Funds		10,359		2,293		1,001
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		10,359		2,293		1,001
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt			2,293			
TOTAL				2,293		
d) Refund of Unspent Balance						
TOTAL (c)				2,293		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		10,359				1,001

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	CSIR-SENIOR RESEARCH ASSOC PROJECT O227		EFFECT OF ALU INSECTION PROJECT O229		ICSSR FELLOWSHP C.JYAL PROJECT O232	
FUNDING AGENCY	C.S.I.R.		I C M R		ICSSR-DELHI	
a) Opening Balance of The Funds		3,692		47,192		930
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		3,692		47,192		930
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		3,692		47,192		930

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	IMPROVED GENOME ANNOTATION PROJECT O240		INSA SENIOR SC. FELLOWSHIP-CHN PROJECT O244		FAST ALGOROTHM FOR DNA PROJECT O245	
FUNDING AGENCY	CSIR				DST GOI	
a) Opening Balance of The Funds		3,94,981		-37,334		66,747
b) Additions To The Funds :						
1. Donation / Grants			37,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				37,000		
TOTAL (a+b)		3,94,981		-334		66,747
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance		3,94,981				
TOTAL (c)		3,94,981				
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)				-334		66,747

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	MOLECULAR GENET STUDIES PROJECT O255		PATTERN INSTAB. INTERFACE WAVS PROJECT O257		REPORT ON STATE DEVELOPMENT PROJECT O258 GOVT.W.B	
a) Opening Balance of The Funds		8,129		43,232		-16,285
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		8,129		43,232		-16,285
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		8,129		43,232		-16,285

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	MAFIC CRUSTAL XENOLITHS IN PROJECT O260		DEV ALGORITHMS ROBUST SPEAKER PROJECT O264		FOREST AND THE RESOR FOR POOR PROJECT O266	
FUNDING AGENCY	E. GH		MIT,GOI		UNIV.READING UK	
a) Opening Balance of The Funds		-73,613		51,921		20,232
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		-73,613		51,921		20,232
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance				51,921		
TOTAL (c)				51,921		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-73,613		0		20,232

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	RES.ASSOCIATES DR.S.SENGUPTA PROJECT O280 C.S.I.R.		ESTIM.OF AGE OF CURRENCY NOTES PROJECT O282 R.B.I., G.O.I.		SOFT COMPUTING CHEMOGENOMIC PROJECT O283 SILYCOGNE INFOR	
a) Opening Balance of The Funds		1,834		1,56,602		28,190
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		1,834		1,56,602		28,190
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,834		1,56,602		28,190

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	MOLECULAR GENET IC STUDIES OF S PROJECT O284 DEPT BIO-TECH		STUDY ON DEV METHOD FOR INDX PROJECT O285 SE.RLY		PREDICTION GROD VIBRATION USING PROJECT O287 CMRI NAGPUR	
a) Opening Balance of The Funds		40,473		96,861		85,000
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		40,473		96,861		85,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		40,473		96,861		85,000

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	UTERINE CANCER PREVENTION PROJECT O289 D.S.T. & NES WB		OBC STDY OF SOE PROJECT O291 WBC BACKWARD		ADVANCE TECHNIQ REMOTE SENSING PROJECT O292 D S T , G O I	
a) Opening Balance of The Funds		34,999		27,133		2,43,097
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		34,999		27,133		2,43,097
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						2,43,097
TOTAL (c)						2,43,097
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		34,999		27,133		

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ACCOUNTBILITY SOME TRADITIONL PROJECT O297 NI.FOUNDATION		UGC REFRESHER COURSE PROJECT O299 U.G.C.		NON COMMUTATIV MARKOV PROCS PROJECT O340 D S T	
a) Opening Balance of The Funds		2,193		24,193		4,442
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		2,193		24,193		4,442
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,193		24,193		4,442

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	EMPRIAL STUDY LABOUR PROBLEM PROJECT O342 LABOU DPT. W.B		SINGLE NUCLEOTI POLY MORPHISM PROJECT O343 DST		DEV DESIGN AID TOOLS PROJECT O344 CAIR(B'LORE)	
a) Opening Balance of The Funds		6,872		10,949		13,509
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		6,872		10,949		13,509
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		6,872		10,949		13,509

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	CRYPTOGRAPHY LUND UNIVERSITY PROJECT 0345 DEP.I.T.USENIX		TECHTONIC SETIG OF ALKLINE PROJECT 0347 CSIR (GOI)		WEAPONS & ELECT RONIC SYSTEM EN PROJECT 235A W.E.S.E.E.	
a) Opening Balance of The Funds		-7,699		5,919		2,71,298
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		-7,699		5,919		2,71,298
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-7,699		5,919		2,71,298

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM TEST FOR SELECT MA/MSC PROJECT 238A NBHM		NBHM-MSC. SCHOLAR 2004-05 PROJECT 238B NBHM		NBHM TEST RESH AWARD PROJECT 238C NBHM. D A E	
a) Opening Balance of The Funds		1,265		10,166		12,941
b) Additions To The Funds :						
1. Donation / Grants	8,000		14,000		20,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		8,000		14,000		20,000
TOTAL (a+b)		9,265		24,166		32,941
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	6,500		6,000		8,000	
- Travelling & Conveyance			4,681		5,761	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	1,333		654		939	
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		7,833		11,335		14,700
d) Refund of Unspent Balance		1,265		10,166		12,941
TOTAL (c)		9,098		21,501		27,641
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		167		2,665		5,300

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	NBHM WORLD MATH R.BHATIA PROJECT 275A		CSIR FELLOWSHIP SRF/JRF PROJECT 5301		NBHM FELLOWSHIP A.MUJUMDER PROJECT 5302	
FUNDING AGENCY	NBHM,DAE		CSIR		NBHM	
a) Opening Balance of The Funds		8,955		21,33,506		5,000
b) Additions To The Funds :						
1. Donation / Grants			34,85,339			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				34,85,339		
TOTAL (a+b)		8,955		56,18,845		5,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			40,65,663			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			1,11,634			
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				41,77,297		
d) Refund of Unspent Balance						
TOTAL (c)				41,77,297		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		8,955		14,41,548		5,000

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FELLOWSHIP DR.B BEHERA PROJECT 5303 NBHM		NBHM FELLOWSHIP S.CHATTERJEE PROJECT 5304 NBHM		NBHM FELLOWSHIP PROSENJIT DAS PROJECT 5305	
a) Opening Balance of The Funds		27,152		68,668		69,913
b) Additions To The Funds :						
I. Donation / Grants					2,99,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						2,99,000
TOTAL (a+b)		27,152		68,668		3,68,913
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			28,516		70,000	
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				28,516		70,000
d) Refund of Unspent Balance						
TOTAL (c)				28,516		70,000
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		27,152		40,152		2,98,913

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FELLOWSHIP ABHIJIT PAL PROJECT 5306		NBHM FELLOWSHIP MAHABIR PD.JHAN PROJECT 5307		ICMR FELLOWSHIP -SUJATA KAR PROJECT 5308	
a) Opening Balance of The Funds		70,000		92,066		25,625
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		70,000		92,066		25,625
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	70,000		84,100			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		70,000		84,100		
d) Refund of Unspent Balance						
TOTAL (c)		70,000		84,100		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)				7,966		25,625

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	G E FOUNDAYION SCHOLARSHIPS PROJECT 5309 SHIBDAS BONDYO		G E FOUNDATION SCHOLARSHI PROJECT 5310 ARNAB DAS		NBHM GRANT MS R. GAYEN CHU PROJECT 5311 NBHM	
a) Opening Balance of The Funds		44,293		21,370		50,661
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		44,293		21,370		50,661
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		44,293		21,370		50,661

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FELLOWSHI OF SM.A MAITRA PROJECT 5312 NBHM		NBHM FELLOWSHIP PABITRA BARIK PROJECT 5313 NBHM		GE FOUND SCHOL GOURAB DE PROJECT 5314 NBHM	
a) Opening Balance of The Funds		41,600				37,136
b) Additions To The Funds :						
1. Donation / Grants			1,59,000			
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				1,59,000		
TOTAL (a+b)		41,600		1,59,000		37,136
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	41,600		84,000			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		41,600		84,000		
d) Refund of Unspent Balance						
TOTAL (c)		41,600		84,000		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)				75,000		37,136

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FELLOWHIP JYOTISHMAN BHOW PROJECT 5315 NBHM		NBHM FELLOWSHIP SOUMEN SARKAR PROJECT 5316 NBHM		NAT SC AWARD S. SENGUPTA PROJECT 5317	
a) Opening Balance of The Funds		33,093		60,042		24,000
b) Additions To The Funds :						
1. Donation / Grants	2,57,000		2,55,000		6,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		2,57,000		2,55,000		6,000
TOTAL (a+b)		2,90,093		3,15,042		30,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	46,845		60,000			
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		46,845		60,000		
d) Refund of Unspent Balance						
TOTAL (c)		46,845		60,000		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,43,248		2,55,042		30,000

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	DBT POST DOC FELLOW- S.MITRA PROJECT 5318		POST DOC FELLOW NBHM PROJECT 5319 SANJAY PARUI		NBHM MA/MSC SCHOLARSHIP PROJECT 5320	
FUNDING AGENCY	DBT GOI		NBHM/DAE			
a) Opening Balance of The Funds		1,05,222		1,70,000		1,37,660
b) Additions To The Funds :						
1. Donation / Grants	1,17,700					
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		1,17,700				
TOTAL (a+b)		2,22,922		1,70,000		1,37,660
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,01,562		48,000		60,000	
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	19,288					
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		1,20,850		48,000		60,000
d) Refund of Unspent Balance						
TOTAL (c)		1,20,850		48,000		60,000
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,02,072		1,22,000		77,660

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED ENDOWMENT FUNDS FUNDING AGENCY	AWARD & TRAVEL GRANT MICROSOFT PROJECT 5321 NBHM,DAE		NBHM POST DOCT FELLOW PROJECT 5322 RABEYA BASU		NBHM-POST DOC. FELLOWSHIP-DR PROJECT 5331 J. SINGH	
a) Opening Balance of The Funds		4,90,000		73,610		
b) Additions To The Funds						
1. Donation / Grants	5,10,000		78,000		2,07,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext Proj.						
TOTAL		5,10,000		78,000		2,0
TOTAL (a+b)		10,00,000		1,51,610		2,0
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets	76,744					
- Books & Journal						
- Other						
TOTAL		76,744				
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	2,00,000				1,12,000	
- Travelling & Conveyance	1,11,721					
- Admn. expenses Consumables	2,930					
- Tax Deducted at Source	41,500					
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund Int Receipt		3,56,151				
TOTAL						1
d) Refund of Unspent Balance		4,32,895				
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-d-e)		5,67,105		1,51,610		

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	NBHM TRAVEL GRT MITHUN MUKHERJE PROJECT 5332		ISS PROB. TRAINING PROG. PROJECT 5333 -CSO-DELHI		CSIR FELLOWSHIP -TEJAS (BL) PROJECT 5334	
FUNDING AGENCY	NBHM DAE				C.S.I.R.	
a) Opening Balance of The Funds		1,373				85,171
b) Additions To The Funds :						
1. Donation / Grants			2,96,850		2.29,999	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				2,96,850		2,29,999
TOTAL (a+b)		1,373		2,96,850		3,15,170
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			46,000		2,16,000	
- Travelling & Conveyance			20,404			
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies			2,03,546		82,183	
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				2,69,950		2,98,183
d) Refund of Unspent Balance						
TOTAL (c)				2,69,950		2,98,183
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,373		26,900		16,987

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	IFIM RESEARCH		NBHM TRAVEL GRT S.S ROY		NBHM TRAVEL GRT S. ATHREYA	
	PROJECT 5335		PROJECT 5339		PROJECT 5340	
FUNDING AGENCY	D.A.E.MUMBAI		NBHM		D.A.E, MUMBAI	
a) Opening Balance of The Funds						
b) Additions To The Funds :						
1. Donation / Grants	17,250		50,000		1,44,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		17,250		50,000		1,44,000
TOTAL (a+b)		17,250		50,000		1,44,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	15,000					
- Travelling & Conveyance					1,31,056	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead	2,250					
- Trnf.To Dev.Fund/Int.Receipt						1,31,056
TOTAL		17,250		50,000		
d) Refund of Unspent Balance						
TOTAL (c)		17,250		50,000		1,31,056
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)						12,944

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SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	WORKSHOP REINFORCED RND. PROJECT 5341 WORKS-TIFR		NBHM TRAVEL GRT R.SCHOTT PROJECT 5342 D.A.E, MUMBAI		NBHM GRANT LINGARAJ SAHU PROJECT 5343 D.A.E, MUMBAI	
a) Opening Balance of The Funds						16,500
b) Additions To The Funds :						
1. Donation / Grants	3,50,000		96,417		1,83,600	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		3,50,000		96,417		1,83,600
TOTAL (a+b)		3,50,000		96,417		2,00,100
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances					84,581	
- Travelling & Conveyance	98,025		86,022			
- Admn. expenses/Consumables	7,688					
- Tax Deducted at Source						
- Contingencies	2,11,449				25,374	
- Share Of Overhead	52,500					
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		3,69,662		86,022		1,09,955
d) Refund of Unspent Balance						90,145
TOTAL (c)		3,69,662		86,022		2,00,100
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-19,662		10,395		

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FIN ASSISTANCE PROJECT 5344 SCHOOL WORKSHOP		NBHM FIN ASSISTANCE PROJECT 5345 ANNUAL FOUND		NBHM WORKSHOP PROBABILITY PROJECT 5346 D.A.E, MUMBAI	
a) Opening Balance of The Funds		28,583		1,15,212		22,380
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		28,583		1,15,212		22,380
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						22,380
TOTAL (c)						22,380
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		28,583		1,15,212		

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	CONF.ON PRESPECTIVES IN MATHEM PROJECT 5347 SCIENCE		NBHMSCHOLARSHIM/MATH PROJECT 5349 D.A.E, MUMBAI		NBHM FELLOWSHIP TSS RK RAO PROJECT 5350 D.A.E, MUMBAI	
a) Opening Balance of The Funds		63,359		41,805		
b) Additions To The Funds :						
1. Donation / Grants			2,16,000		3,96,450	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL				2,16,000		3,96,450
TOTAL (a+b)		63,359		2,57,805		3,96,450
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			1,95,096		23,600	
- Travelling & Conveyance					90,652	
- Admn. expenses/Consumables					1,581	
- Tax Deducted at Source						
- Contingencies					2,41,636	
- Share Of Overhead					38,981	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL				1,95,096		3,96,450
d) Refund of Unspent Balance						
TOTAL (c)				1,95,096		3,96,450
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		63,359		62,709		

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	NBHM FELLOWSHIP LINGARAJ SHAHU PROJECT 5351 NBHM		CSIR FELLOWSHP PRITHA REKHI PROJECT 5352 CSIR		RMO INMO EXAM. PROF. B. V. R. PROJECT 5353 BHATT-NBHM	
a) Opening Balance of The Funds		2,000		13,330		
b) Additions To The Funds :						
1. Donation / Grants	34,150		3,11,000		3,83,125	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		34,150		3,11,000		3,83,125
TOTAL (a+b)		36,150		3,24,330		3,83,125
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	6,500		1,250		1,09,463	
- Travelling & Conveyance	28,150		1,05,710		7,139	
- Admn. expenses/Consumables			9,194		9,362	
- Tax Deducted at Source						
- Contingencies			1,86,648		36,981	
- Share Of Overhead			8,198		2,828	
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		34,650		3,11,000		1,65,773
d) Refund of Unspent Balance				13,330		
TOTAL (c)		34,650		3,24,330		1,65,773
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,500				2,17,352

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ISSR PROJECT A SANJAY GUHA PROJECT 5354 ISSR		CSIR FELLOWSHIP K.P.SINGH PROJECT 5355 CSIR		FELOWSHIP S. K. KATTUMANI PROJECT 5356 NBHM	
a) Opening Balance of The Funds		37,517		83,580		
b) Additions To The Funds :						
1. Donation / Grants	1,96,000				2,64,600	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		1,96,000				2,64,600
TOTAL (a+b)		2,33,517		83,580		2,64,600
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	1,39,167				1,26,154	
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies	79,534					
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		2,18,701				1,26,154
d) Refund of Unspent Balance				83,580		
TOTAL (c)		2,18,701		83,580		1,26,154
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		14,816				1,38,446

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	IMPLE. OF SIX SIGMA- MUMBAI PROJECT 9442 HUBER CHEMICAL		SPC TRG & GUID CROMP & GREAVES PROJECT 9444 CROMP & GREAVES		SIX SIGMA IMP. R.I.L.(PUNE) PROJECT 9445 R.I.L.(PUNE)	
a) Opening Balance of The Funds				1,45,086		15,71,384
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)				1,45,086		15,71,384
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work	0					
- Remuneration & Allowances	18,782		30,831		40,503	
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		18,782		30,831		40,503
d) Refund of Unspent Balance						
TOTAL (c)		18,782		30,831		40,503
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		-18,782		1,14,255		15,30,881

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	QALITY IMPV. PROJECT--HYDERB PROJECT 9446 I.T.C.LTD.		IMPLEMENT SPC AT CRIT. PROSS PROJECT 9447 FOSCO, MUMBAI		GRANDING SYS FOR CBSE(DELHI) PROJECT 9449 CBSE	
a) Opening Balance of The Funds		1,60,811		88,153		1,00,000
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		1,60,811		88,153		1,00,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,60,811		88,153		1,00,000

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	CONVERSION OF MATH CORE ETC. PROJECT 9450		STAT. TRGN. PRG VSNAL PROJECT 9451 VSANL,KOLKATA		L&T FARIDABAD (MUMBAI) PROJECT 9452 L&T	
a) Opening Balance of The Funds		1,50,000		6,70,165		3,73,663
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						
TOTAL (a+b)		1,50,000		6,70,165		3,73,663
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,50,000		6,70,165		3,73,663

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS	ITC BHADRACHALM HYDERABAD PROJECT 9453		TQM & ISO9000 WIMCO PROJECT 9454		M/S SAGRIK PROCESS ANA. PROJECT 9455	
FUNDING AGENCY	ITC		WIMCO ,KOLKATA		PVT LTD DELHI	
a) Opening Balance of The Funds		2,61,094		1,58,478		
b) Additions To The Funds :						
1. Donation / Grants					1,00,000	
2. Income From Investment made on account of Funds						
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL						1,00,000
TOTAL (a+b)		2,61,094		1,58,478		1,00,000
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance					8,777	
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						8,777
d) Refund of Unspent Balance						
TOTAL (c)						8,777
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		2,61,094		1,58,478		91,223

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	CONT.OF SILICON % SIRF.OF FGIPG PROJECT 9463 TATA METALICS		IMP.OF SIX SIGM SQC PROJECT PROJECT 9474 L&T MUMBAI		DEVELOPEMENT FUND	
a) Opening Balance of The Funds		78,000		1,88,757		21,44,60,685
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds					1,90,93,446	
3. Serv. Charg/SQCOR Receipt					1,87,89,257	
4. Sh/Adj of Ovhd on Ext. Proj.					20,22,297	
TOTAL						3,99,05,000
TOTAL (a+b)		78,000		1,88,757		25,43,65,685
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset					24,22,994	
- Bills Receivable						24,22,994
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			22,440			
- Travelling & Conveyance					33,930	
- Admn. expenses/Consumables					23,79,131	
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead					46,97,314	
- Trnf.To Dev.Fund/Int.Receipt				22,440		71,10,375
TOTAL						95,33,368
d) Refund of Unspent Balance				22,440		44,33,412
TOTAL (c)						24,03,98,905
e)Assets Trnf. to Corpus Fund				1,66,317		
NET BALANCE AS AT THE YEAR END (a+b-c-e)		78,000				

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	MAHALANOBIS INT SYMPOSIUM		STAFF BENEVOLENT FUND		ENDOWMENT FUND (LECT. IN ECON)	
a) Opening Balance of The Funds		1,27,521		1,11,024		64,150
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds	12,460		10,400		6,327	
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		12,460		10,400		6,327
TOTAL (a+b)		1,39,981		1,21,424		70,477
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables	9,263					
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		9,263				
d) Refund of Unspent Balance						
TOTAL (c)		9,263				
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,30,718		1,21,424		70,477

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ISI ALUMNI ASSO PRIZE FUND		HALDANE PRIZE FUND		MAHALANOBIS CHAIR/FELLOW FD	
a) Opening Balance of The Funds		55,402		1,82,239		14,54,712
b) Additions To The Funds :						
1. Donation / Grants	54,000					
2. Income From Investment made on account of Funds	5,418		18.004		1,47,289	
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		59,418		18,004		1,47,289
TOTAL (a+b)		1,14,820		2,00,243		16,02,001
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables	55,579					
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		55,579				
d) Refund of Unspent Balance						
TOTAL (c)		55,579				
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		59,241		2,00,243		16,02,001

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	RAJA RAO MEMORIAL FUND		M.N. MURTHY MEMORIAL FUND		A.S. GHOSH ENDOWMENT FUND	
a) Opening Balance of The Funds		1,54,971		2,30,322		6,57,524
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds	11,932		22,335		45,558	
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		11,932		22,335		45,558
TOTAL (a+b)		1,66,903		2,52,657		7,03,082
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables						
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						
d) Refund of Unspent Balance						
TOTAL (c)						
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,66,903		2,52,657		7,03,082

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ASIAN CONGRESS ON QUALITY		DR. P.K. MENON MEMORIAL FUND		ENDOWMENT FUND J.M. SENGUPTA	
a) Opening Balance of The Funds		7,87,158		75,954		265
b) Additions To The Funds :						
1. Donation / Grants					9,263	
2. Income From Investment made on account of Funds	77,623		6,176			
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		77,623		6,176		9,263
TOTAL (a+b)		8,64,781		82,130		9,528
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables					9,263	
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL						9,263
d) Refund of Unspent Balance						
TOTAL (c)						9,263
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		8,64,781		82,130		265

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ENDOWMENT FUND MS. SUNITI PAL		ENDOWMENT FUND - S. H.ARAVIND		HOUSE BUILDING ADVANCE	
a) Opening Balance of The Funds		1,04,494		1,09,734		3,08,97,319
b) Additions To The Funds :						
1. Donation / Grants						
2. Income From Investment made on account of Funds	12,823		13,078			
3. Serv. Charg/SQCOR Receipt						
4. Sh/Adj of Ovhd on Ext. Proj.						
TOTAL		12,823		13,078		
TOTAL (a+b)		1,17,317		1,22,812		3,08,97,319
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets						
- Books & Journal						
- Other						
TOTAL						
ii. Current Asset						
- Bills Receivable						
TOTAL						
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances						
- Travelling & Conveyance						
- Admn. expenses/Consumables	9,263		9,263			
- Tax Deducted at Source						
- Contingencies						
- Share Of Overhead						
- Trnf.To Dev.Fund/Int.Receipt						
TOTAL		9,263		9,263		
d) Refund of Unspent Balance						
TOTAL (c)		9,263		9,263		
e)Assets Trnf. to Corpus Fund						
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,08,054		1,13,549		3,08,97,319

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SCHEDULE 3 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

SCHEDULE 3- EARMARKED/ ENDOWMENT FUNDS FUNDING AGENCY	ISI GENERAL FUND		CURRENT YEAR TOTAL		PREVIOUS YEAR TOTAL	
a) Opening Balance of The Funds		1,20,22,352		31,24,19,260		27,39,98,558
b) Additions To The Funds :						
1. Donation / Grants			6,27,67,331		4,29,30,065	
2. Income From Investment made on account of Funds	11,01,749		2,05,84,618		1,81,16,366	
3. Serv. Charg/SQCOR Receipt			1,87,89,257		2,12,93,309	
4. Sh/Adj of Ovhd on Ext. Proj.			20,22,297		0	
TOTAL		11,01,749		10,41,63,503		8,33,77,226
TOTAL (a+b)		1,31,24,101		41,65,82,763		35,73,75,784
c) Utilisation / Expenditure						
i. Capital Expenditure						
- Fixed Assets			1,22,83,189		71,57,868	
- Books & Journal			65,30,470		52,16,641	
- Other			8,00,000			
TOTAL				1,96,13,659		1,23,74,509
ii. Current Asset						
- Bills Receivable			24,22,994		12,31,898	
TOTAL				24,22,994		12,31,898
iii. Revenue Expenditure						
- Site Prep. & allied work						
- Remuneration & Allowances			1,68,21,777		1,69,44,749	
- Travelling & Conveyance			35,50,509		29,67,766	
- Admn. expenses/Consumables			29,87,035		21,36,708	
- Tax Deducted at Source			23,79,131		19,71,596	
- Contingencies			38,09,033		14,89,819	
- Share Of Overhead			43,33,520		38,13,393	
- Trnf.To Dev.Fund/Int.Receipt			46,99,607		48,11,731	
TOTAL				3,85,80,612		3,41,35,762
d) Refund of Unspent Balance				9,93,736		7,46,861
TOTAL (c)				6,16,11,000		4,84,89,030
e)Assets Trnf. to Corpus Fund				44,33,412		
NET BALANCE AS AT THE YEAR END (a+b-c-e)		1,31,24,101		35,05,38,351		30,88,86,754

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 7 FORMING PART OF BALANCE SHEET AS AT 31 March, 2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
A. CURRENT LIABILITIES		
1. Acceptances		
2. Sundry Creditors:		
(a) For Goods		
(b) Others		
3. Advances Received		
4. Interest Accrued but not due on:		
(a) Secured Loans/Borrowings		
(b) Unsecured Loans/Borrowings		
5. Statutory Liabilities:		
(a) Overdue		
(b) Others - ST,IT, P.T.Ser.Tax etc	5,08,006	7,59,563
6 Other Current Liabilities	10,98,74,174	10,23,14,806
TOTAL	11,03,82,180	10,30,74,369

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SUB SCHEDULE OF SCHEDULE 7 FORMING PART OF BALANCE SHEET 31 March, 2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
SUB SCHEDULE OF SCHEDULE 7		
A. CURRENT LIABILITIES		
1. STATUTORY LIABILITIES		
(i) Income Tax		
(ii) Income Tax Contractor	2,13,443	1,55,229
(iii) P. Tax	2,05,282	1,67,116
(iv) Sales Tax outside party	61,406	70,824
(v) Service Tax	4,089	3,66,394
(vi) Cess on W.B. Cont. Worker Welfare	23,786	
Sub-Total (1)	5,08,006	7,59,563
2. Other Current Liabilities		
i) Library deposit	15,19,323	14,28,055
ii) Laboratory deposit	2,49,188	2,54,188
iii) Hostel caution money deposit	3,47,577	2,93,957
iv) Caution money of electric	19,165	19,165
v) Earnest money deposit	41,09,702	16,55,115
vi) Security deposit	74,64,408	55,64,829
vii) CTD & annuity deposit	55,455	36,400
viii) Provision For Outstanding Liabilities for Goods & Services	7,82,61,880	7,68,41,949
ix) ISI Co-operative credit society ltd.	3,70,025	1,83,776
x) ISEC ISI FUND	32,90,874	51,01,925
xi) Loan To/From Fund	8,01,734	
xii) Additional emoluments compulsary deposit	81,059	81,059
xiii) Group Insurance Exp Delhi & Giridih	25,457	39,544
xiv) Staff insurance premium & group insuran	1,17,835	1,82,454
xv) I.S.I.salary savings (lic)	3,36,320	3,26,492
xvi) Staff insurance prem. (Delhi & Giridi)	34,698	19,912
xvii) GLIC claim from insurance company	8,752	28,613
xviii) Disposal Of Asset	10,86,306	10,86,306
xix) Undisbursed Salary,Stipend,Pension etc	19,53,251	15,40,758
xx) Cimpa Unesco India School	2,50,307	2,50,307
xxi) ADM/entrance Test - PSRU		
xxii) DST - Meeting	70,506	5,15,206
xxiii) RC Bose Centinary Symposium	2,30,396	2,30,396
xxiv) DST Workshop in Network Analysis etc		
xxv) Joint International INDO-AMA Meeting		44,663
xxvi) International Conference ICAPR	1,26,856	1,26,856
xxvii) Conference Six Sigma SQC	51,914	51,914
xxviii) Int Conf on Theory of Op & it's Application	61,808	61,808
xxix) 6th Int Conf on distributed Computing	31,650	31,650
xxx) IEEE Transaction on Fuzzy System	2,42,260	21,537
xxxi) Workshop On Disciplinary Proceedings	3,463	3,463
xxxii) NBHM - Math Olympiad	95,505	1,12,805
xxxiii) DST Meeting -Center For Soft Computing	59,764	59,764

INDIAN STATISTICAL INSTITUTE

SUB SCHEDULE OF SCHEDULE 7 FORMING PART OF BALANCE SHEET 31 March, 2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
xxxiv) Training prog. on ISS Probetioners	4,59,825	3,53,087
xxxv) Workshop On Resourse Harvesting	8,560	8,560
xxxvi) Prof. Examination Of Actuarial Society	1,39,595	33,716
xxxvii) Lecture Series/Wrksh/Conf. On Past,Present,Future	4,87,194	3,42,325
xxxviii) Selection Of Research Awardees NBHM 2006-07		
xxxix) Prof. P C M Memorial Archieves		
xxxx) Conf. On Models & Methods In ECO	75,000	75,000
xxxxi) Int.Sympo.On Algo.& Application	20,431	20,431
xxxxii) Platinum Jubilee Grant Govt.Of W.B	21,14,685	21,75,000
xxxxiii) Int Conf.On Adv In Pattern Recognition	2,15,419	1,55,317
xxxxiv) Inst.Conf. On S .V. D	72,762	72,762
xxxxv) Int.Conf-Premi (MIU)	5,01,305	5,14,679
xxxxvi) Int.Conf on ICONQR-08	6,05,434	6,05,434
xxxxvii) Int.Nat.Conf on COM.VIS GRA/IMAPRO	34,323	34,323
xxxxviii) Int.Workshp on DIG.PRESERVATION	11,266	1,61,435
xxxxix) Visionary Lecture Series	70,000	70,000
xxxxx) Conf on Recent Adv. in Probability		24,373
xxxxxi) Trng. Prog. Six Sigma	2,71,211	2,76,283
xxxxxii) Int.Workshop on sedment Trans.	13,550	13,550
xxxxxiii) Trg. Prog. for SBI Officers	98,342	1,04,242
xxxxiv) Int.Conference on Geology	1,61,217	1,71,981
xxxxv) Amt Receivable from Govt. of India	6,84,835	2,85,164
xxxxvi) Conrt. to NPS Tier-1	22,60,382	6,22,278
xxxxvii) Stale Cheques	3,565	
xxxxviii) Workshop On Topology & Geometry of Poliations	1,01,315	
xxxxix) NBHM Travel Grant for ICIA M07-R. Barua	1,06,521	
Sub-Total (2)	10,98,74,174	10,23,14,806
GRAND TOTAL (1+2)	11,03,82,180	10,30,74,369

INDIAN STATISTICAL INSTITUTE

203, B.T. ROAD, KOL-108

SCHEDULES FORMING PART OF BALANCE SHEET AS AT March 31, 2009

SCHEDULE 8 - FIXED ASSETS	<---------- GROSS BLOCK ---------->				---------- DEPRECIATION ----------				<---------- NET BLOCK ---------->	
DESCRIPTION FIXED ASSETS :	Cost / Valuation as at beginning of the year(W.D.V. as on 31.03.86)	Additions during the year	Deductions during the year	Cost / Valuation at the year end	As at the beginning of the year	On Additions during the year	On Deductions during the year	Total upto the year-end	As at the Current yearend	As at the Previous year-end
	A	B	C	D=(A+B)-C	E	F	G	H=(E+F)-G	I=(D-H)	
A. LAND & LAND DEVELOPMENT	4,680,907.17	0.00		4,680,907.17	0.00	0.00	0.00	0.00	4,680,907.17	4,680,907.17
LAND : FREEHOLD	2568545.71	0.00	481.42	2,568,064.29	0.00	0.00	0.00	0.00	2,568,064.29	2,568,545.71
LAND : LEASE HOLD										
B.BUILDING	12,213,650.47	0.00		12,213,650.47	0.00	0.00	0.00	0.00	12,213,650.47	12,213,650.47
BUILDING : ON FREEHOLD LAND	8,458,563.82	0.00		8,458,563.82	0.00	0.00	0.00	0.00	8,458,563.82	8,458,563.82
BUILDING : ON LEASEHOLD LAND	908,495.59	0.00		908,495.59	0.00	0.00	0.00	0.00	908,495.59	908,495.59
SUPERSTRUCTURES ON LAND NOT BELONGING TO THE ENTRY								0.00		
	443,026.16	0.00		443,026.16	0.00	0.00	0.00	0.00	443,026.16	443,026.16
D. VEHICLES	3,506,756.92	0.00		3,506,756.92	0.00	0.00	0.00	0.00	3,506,756.92	3,506,756.92
E. FURNITURES, FIXTURES	1,974,134.19	0.00		1,974,134.19	0.00	0.00	0.00	0.00	1,974,134.19	1,974,134.19
F. OFFICE EQUIPMENT	965,312.58	0.00		965,312.58	0.00	0.00	0.00	0.00	965,312.58	965,312.58
G. COMPUTER & PERIPHERIALS	2,777,138.27	0.00		2,777,138.27	0.00	0.00	0.00	0.00	2,777,138.27	2,777,138.27
H. ELECTRIC INSTALLATIONS	16,861,803.75	0.00		16,861,803.75	0.00	0.00	0.00	0.00	16,861,803.75	16,861,803.75
I. LIBRARY BOOKS	437,890.40	0.00		437,890.40	0.00	0.00	0.00	0.00	437,890.40	437,890.40
J. TUBEWELLS & WATER SUPPLY SYSTEM	2,415,998.39	0.00		2,415,998.39	0.00	0.00	0.00	0.00	2,415,998.39	2,415,998.39
K. LABORATORY EQUIPMENT								0.00		
TOTAL OF CURRENT YEAR	58,212,223.42	0.00	481.42	58,211,742.00	0.00	0.00	0.00	0.00		
PREVIOUS YEAR	58,212,704.84	0.00	481.42	58,212,223.42					58,211,742.00	58,212,223.42
TOTAL : SCHL 8										

(S.K.Chakraborty)
Dy.Chief Executive (F)

(S.K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Balace Sheet referred to our report of even date .
GF-I Gillander House
8 , Netaji Subhas Road
Kolkata - 700001

For L B Jha & CO
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE
203, B.T. ROAD, KOL-108
SCHEDULES FORMING PART OF BALANCE SHEET AS AT March 31, 2009

	<---------- GROSS BLOCK ---------->				<---------- DEPRECIATION ---------->				<---------- NET BLOCK ---------->	
SCHEDULE 8A - FIXED ASSETS	Cost / Valuation as at beginning of the year	Additions during the year	Deductions during the year	Cost / Valuation at the year end	As at the beginning of the year	On Additions during the year	On Deductions during the year	Total upto the year-end	As at the Current year-end	As at the previous year end
DESCRIPTION										
FIXED ASSETS :										
	A	B	C	D=(A+B)-C	E	F	G	H=(E+F)-G	I=(D-H)	
A. LAND & LAND DEVELOPMENT										
LAND : FREEHOLD	22,666,445.20	3,448,239.00	0.00	26,114,684.20	0.00	0.00	0.00	0.00	26,114,684.20	22,666,445.20
LAND : LEASE HOLD	5,373,298.00	0.00	0.00	5,373,298.00	0.00	0.00	0.00	0.00	5,373,298.00	5,373,298.00
									0.00	
B.BUILDING									0.00	
BUILDING : ON FREEHOLD LAND	300,287,773.24	34,861,224.00	0.00	335,148,997.24	188,260,617.91	23,084,931.71	0.00	211,345,549.62	123,803,447.62	112,027,155.33
BUILDING : ON LEASEHOLD LAND	59,629,905.69	13,685,199.00	0.00	73,315,104.69	27,737,011.99	5,563,373.69	0.00	33,300,385.68	40,014,719.01	31,892,893.70
SUPERSTRUCTURES ON LAND NOT BELONGING TO THE ENTRY	5,385,634.92	0.00	0.00	5,385,634.92	2,621,323.76	445,476.86	0.00	3,066,800.62	2,318,834.30	2,764,311.16
								0.00		
D. VEHICLES	8,665,440.38	510,038.00	0.00	9,175,478.38	8,611,632.71	274,143.05	0.00	8,885,775.76	289,702.62	53,807.67
E. FURNITURES, FIXTURES	79,785,697.91	6,579,629.00	0.00	86,365,326.91	59,026,265.33	4,007,135.84	0.00	63,033,401.17	23,331,925.74	20,759,432.58
F. OFFICE EQUIPMENT	35,152,573.35	1,003,034.00	0.00	36,155,607.35	30,198,759.24	1,946,375.71	0.00	32,145,134.95	4,010,472.40	4,953,814.10
G. COMPUTER & PERIPHERIALS	218,561,398.94	11,365,101.00	0.00	229,926,499.94	210,079,426.53	12,293,500.00	0.00	222,372,926.53	7,553,573.41	8,481,972.41
H. ELECTRIC INSTALLATIONS	35,356,589.32	1,809,400.00	0.00	37,165,989.32	28,310,097.85	2,476,295.02	0.00	30,786,392.87	6,379,596.45	7,046,491.47
I. LIBRARY BOOKS	430,066,817.32	53,965,857.00	0.00	484,032,674.32	397,002,971.62	45,145,585.10	0.00	442,148,556.72	41,884,117.60	33,063,845.70
J. TUBEWELLS & WATER SUPPLY SYSTEM	8,292,948.06	8,295.00	0.00	8,301,243.06	7,712,647.64	144,763.28	0.00	7,857,410.92	443,832.15	580,300.42
K. LABORATORY EQUIPMENT	24,932,767.07	2,362,586.00	0.00	27,295,353.07	22,240,681.24	893,413.00	0.00	23,134,094.24	4,161,258.83	2,692,085.83
WORK IN PROGRESS	65,406,936.00	39,152,296.00	2,573,693.00	101,985,539.00	0.00	0.00	0.00	0.00	101,985,539.00	65,406,936.00
TOTAL OF CURRENT YEAR	1,299,564,225.40	168,750,898.00	2,573,693.00	1,465,741,430.40	981,801,435.82	96,274,993.26	0.00	1,078,076,429.08	387,665,001.32	317,762,789.57
PREVIOUS YEAR	1,144,250,901.40	155,313,324.00	0.00	1,299,564,225.40	893,360,406.00	88,441,029.00	0.00	981,801,436.00	317,762,789.57	
TOTAL : SCH-8A									387,665,001.32	317,762,789.57
TOTAL : SCH-8 + SCH-8A + SCH-8B									449,038,540.82	376,031,024.99

(S.K.Chakraborty)
Dy.Chief Executive (F)

(S.K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Balace Sheet referred to our report of even date .
GF-I Gillander House
8 , Netaji Subhas Road
Kolkata - 700001

For L B Jha & CO
Chartered Accountants

INDIAN STATISTICAL INSTITUTE

203, B.T. ROAD, KOL-108

SCHEDULES FORMING PART OF BALANCE SHEET AS AT March 31, 2009

	<---------- GROSS BLOCK ---------->				<---------- DEPRECIATION ---------->				<---------- NET BLOCK ---------->	
SCHEDULE 8B - FIXED ASSETS DESCRIPTION	Cost / Valuation as at beginning of the year	Additions during the year	Deductions during the year	Cost / Valuation at the year end	As at the beginning of the year	During the year	On Deductions during the year	Total upto the year-end	As at the Current year-end	As at the previous year end
FIXED ASSETS :	**A**	**B**	**C**	**D=(A+B)-C**	**E**	**F**	**G**	**H=(E+F)-G**	**I=(D-H)**	
A. LAND & LAND DEVELOPMENT										
LAND : LEASE HOLD	40,443.00	0.00	0.00	40,443.00	0.00	0.00	0.00	0.00	40,443.00	40443.00
B.BUILDING										
BUILDING : ON FREEHOLD LAND	28,870.00	0.00	0.00	28,870.00	21,652.50	721.75	0.00	22,374.25	6,495.75	7217.50
BUILDING : ON LEASEHOLD LAND	12,206,291.00	0.00	0.00	12,206,291.00	12,206,283.00	0.80	0.00	12,206,283.80	7.20	8.00
						0.00		0.00	0.00	
E. FURNITURES, FIXTURES	2,306,167.00	94,351.00	0.00	2,400,518.00	2,297,995.50	10,252.25	0.00	2,308,247.75	92,270.25	8171.50
F. OFFICE EQUIPMENT	1,121,371.00	0.00	0.00	1,121,371.00	1,121,336.00	5.25	0.00	1,121,341.25	29.75	35.00
G. COMPUTER & PERIPHERIALS	8,689,261.00	4,202,374.00	0.00	12,891,635.00	8,689,146.00	1,296,140.10	0.00	9,985,286.10	2,906,348.90	115.00
H. ELECTRIC INSTALLATIONS	125,974.00	0.00	0.00	125,974.00	125,971.00	0.45	0.00	125,971.45	2.55	3.00
K. LABORATORY EQUIPMENT	1,516,536.00	136,687.00	0.00	1,653,223.00	1,516,517.00	20,505.90	0.00	1,537,022.90	116,200.10	19.00
TOTAL OF CURRENT YEAR	26,034,913.00	4,433,412.00	0.00	30,468,325.00	25,978,901.00	1,327,626.50	0.00	27,306,527.50	3,161,797.50	56,012.00
PREVIOUS YEAR	26,034,913.00	0.00	0.00	26,034,913.00	25,895,819.00	83,082.00	0.00	25,978,901.00	56,012.00	
TOTAL : SCH-8B									3,161,797.50	56,012.00

(S.K.Chakraborty)
Dy.Chief Executive (F)

(S.K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Balace Sheet referred to our report of even date .
GF-I Gillander House
8 , Netaji Subhas Road
Kolkata - 700001

For L B Jha & CO
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 9 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
SCHEDULE - 9 INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
1. In Government Securities		
2. Other Approved Securities		
3. Shares		
4. Debentures and Bonds		
5. Subsidiaries and Joint Ventures		
6. Fixed Deposit with Banks	20,83,00,814	20,66,18,635
TOTAL	20,83,00,814	20,66,18,635

INDIAN STATISTICAL INSTITUTE

SUB-SCHEDULE OF SCHEDULE 9

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
SUB - SCHEDULE OF SCHEDULE 9		
DETAILS OF INVESTMENT IN FIXED DEPOSIT IN BANK		
1. ISI General Fund	1,12,82,000	1,12,75,000
2. ISI Developement Fund	19,12,23,000	19,12,23,000
3. Mahalonobis International Prize Fund	1,17,000	1,17,000
4. Endowment Fund For Lecture in Economics	56,000	56,000
5. Staff Benevolent Fund	1,00,000	1,00,000
6. ISI Alumni Association Prize Fund	50,000	50,000
7. Holdane Prize Fund	1,70,000	1,70,000
8. Raja Rao Prize Fund	1,25,000	1,25,000
9. P.C. Mahalonobis Fellowship Chair	13,45,000	13,45,000
10. M.N. Murthy Memorial Prize Fund	2,05,000	2,05,000
11. Ambar Nath & Santi Ghosh Endowment Fund	5,30,000	5,30,000
12. Asian Congress on Quality & Reliability Fund	7,00,000	7,00,000
13. P.K. Menon Memorial Fund	65,000	65,000
14. Suniti Pal Endowment Fund	1,00,000	1,00,000
15. S.Arvind Endowment Fund	1,02,000	1,02,000
16. Investment Of Tier-1 (NPS)	21,30,814	4,55,635
Total	20,83,00,814	20,66,18,635

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 11 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
SCHEDULE-11 CURRENT ASSETS.LOANS AND ADVANCES		
(A) CURRENT ASSETS		
1. INVENTORIES		
a(i) STORES AND SPARES		
a(ii) BUILDING MATERIALS		
b. LOOSE TOOLS		
c. STOCK IN TRADE		
FINISHED GOODS		
WORK IN PROGRESS		
2. SUNDRY DEBTORS	113583	113583
(a) DEBTS OUTSTANDING FOR A PERIOD EXCEEDING SIX MONTHS		

INDIAN STATISTICAL INSTITUTE

SCHEDULE 11 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
3. CASH BALANCES IN HAND (INCLUDING CHEQUES/DRAFTS)		
i. HEADQUARTERS-KOLKATA	196062	181503
ii. DELHI	8483	35383
iii. GIRIDIH	176085	127787
iv. BANGALORE	10757	8624
v. HYDERABAD	5244	7047
vi. COIMBATORE	25127	97538
vii. MUMBAI	22246	17671
viii. BARODA	3077	209
ix. CHENNAI	990	954
x. PUNE	341	6358
SUB TOTAL OF CASH	448412	483074

INDIAN STATISTICAL INSTITUTE

SCHEDULE 11 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
4. BANK BALANCES		
(a) WITH SCHEDULED BANKS		
ON CURRENT ACCOUNTS		
i. ALLAHABAD BANK-DÚNLOP BRIDGE BRANCH	193050144	173099759
ii. SBI SHYAMBAZAR BRANCH	1780666	2955288
iii. UBI-DUNLOP BRIDGE BRANCH	116867902	85404830
iv. INDIAN BANK-DELHI	5908334	6224759
v. UBI-GIRIDIH	208416	273621
vi. UCO BANK-GIRIDIH	3643	3718
vii. UCO BANK-BANGALORE	702833	1688764
viii. BANK OF BARODA-BANGALORE	468260	1956628
ix. SYNDICATE BANK-COIMBATORE	116298	444877
x. SBI-CHENNAI	589770	117072
xi. CANARA BANK-CHENNAI	93408	22658
xii. SBI-MUMBAI	528867	439469
xiii. BANK OF BARODA-BARODA	139442	92646
xiv. SYNDICATE BANK-HYDERABAD	17804	542573
xv. SBI-PUNE	357069	1002401
xvi. NATH BANK LTD-LIQUIDATION	3647	3647
xvii. RBI P/L/C	0	0
xviii. ALLAHABAD BANK-ISI EXTN COUNTER PPU	1117314	1095430
SUB TOTAL OF AMOUNT WITH BANK	321953817	275368140
TOTAL OF CASH AND BANK	322402229	275851214
5. ON DEPOSIT ACCOUNT-INCLUDING MARGIN MONEY	0	0
TOTAL (A)	322515812	275964797

INDIAN STATISTICAL INSTITUTE

SCHEDULE 11 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
B.LOANS,ADVANCES AND OTHER ASSETS		
1.LOANS		
(a) STAFF		
I. ADVANCES AGAINST T.A.	2858210	932355
ii. ADVANCES AGAINST LTC	530884	167354
iii. ADVANCES AGAINST PURCHASE OF CYCLE	61136	169986
iv. ADVANCE(STAFF AND OTHERS)	2824211	3210246
v. FESTIVAL ADVANCE	1583530	1665105
vi. ADVANCE AGAINST PURCHASE OF SCOOTER	804165	964479
vii. HOUSE BUILDING ADVANCE	12242282	14020041
viii. MOTOR CAR ADVANCE	851180	1185740
ix. GROUP INSURANCE EXCEPT DELHI AND GIRIDIH	0	0
x. UNPAID AMOUNT	1426	0
(b) (i) DEPTT.IMPREST	161750	55750
(ii) LOAN TO/FROM FUND	0	2518812

INDIAN STATISTICAL INSTITUTE

SCHEDULE 11 FORMING PART OF BALANCE SHEET AS AT 31/03/2009

PARTICULARS	CURRENT YEAR	PREVIOUS YEAR
2. ADVANCES AND OTHER AMOUNTS RECOVERABLE IN CASH OR IN KIND		
(a) CHARGES PREPAID	23277023	21720354
(b) OTHERS		
I. SECURITY DEPOSIT	51720	9720
ii. ADVANCE-PARTY	6205401	5212182
iii. INCOME TAX DEDUCTED-OTHER THAN FUND	623245	453703
iv. ADVANCE FOR LAND	30848	30848
v. ISEC-ISI FUND(COURSE FEE ETC)	23358	23358
vi INCOME TAX STAFF	31797	297471
3. INCOME ACCRUED		
(a) ON INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS	2721344	1946736
4. CLAIMS RECEIVABLE		
I. REGIONAL PROVIDENT FUND COMMISSIONER	68603	68603
5. CONFERENCE/SEMINAR		
I. WORKSHOP ON MULTIVARIATES STAT METHOD	18388	18388
ii. INTL.CONFERENCE ON MULTIVARIATES STAT METHOD	201819	201819
iii. TATA STEEL	60	60
iv. NBHM-RA SELECTION TEST	45597	6585
v. STAT.TOOLS FOR ISO 9000-02 ENT.26	0	14290
vi. ADM/ENTRANCE TEST-PSRU	18898	6683
vii. DST WORKSHOP IN NETWORK ANL.ETC	233059	208334
viii. IKONE BANGALORE 2007	85767	85767
ix. STUDYING VILLAGE ECONOMICS IN INDIA	158870	0
x. JOINT INTERNATIONAL INDO-AMA MEETING	42830	0
xi. CONFERENCE ON RECENT ADVANCES IN PROBABILITY	800	0
xii. SELECTION OF RESEARCH AWARDEES NBHM 2006-07	83466	0
xiii. PROF.P.C.MEMORIAL ARCHIEVES	53702	0
6. REMITTANCE IN TRANSIT	200000	0
7. ACCRUED INCOME-GRANT	65226000	0
8. ISEC ISI FUND-CAPITAL	250890	0
TOTAL (B)	121572259	55194769
TOTAL	444088071	331159566

(S. K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

This is the Balance Sheet referred to our report of even date.

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 12 FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD 31/03/2009

PARTICULARS	CURRENT YEAR		PREVIOUS YEAR	
	PLAN REVENUE	NONPLAN REVENUE	PLAN REVENUE	NONPLAN REVENUE
SCHEDULE - 12 MISC. RECEIPTS.				
1) Share of Income from S.Q.C.O.R Consultancy Services		46,97,314		47,42,236
2) Membership Fee		2,53,296		1,89,553
3) Fees for Training Course and Sale of Prospectus etc.		37,53,275		37,82,255
4) Receipt from Sale of Farm Products at Giridih				
5) Misc. Receipt, Examination Fees and Other Receipts		20,44,914		20,42,854
6) Interest on Short Term Deposit		1,72,36,359		1,74,25,901
7) Sale of Sankhya Publication		10,97,148		10,93,496
8) Hostel Seat Rent		5,15,003		4,92,802
9) Rent realised from Premises		7,57,000		7,64,339
10) Rent realised - Guest House		11,79,548		11,12,038
11) License Fees From Workers (Staff Qtr)		3,43,058		3,80,361
12) Interest on Scooter/Motor/Cycle Advance		2,70,923		3,293
13) Share of Overhead from Externally funded Project		19,23,920		14,14,394
14) Interest on Marginal Deposit				
15) Interest on House Bldg. Advance		11,95,510		13,89,707
TOTAL		3,52,67,268		3,48,33,229

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 13 FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD 31/03/2009

PARTICULARS	CURRENT YEAR		PREVIOUS YEAR	
	PLAN REVENUE	NONPLAN REVENUE	PLAN REVENUE	NONPLAN REVENUE
SCHEDULE - 13 GRANTS/SUBSIDIES				
A.1. Grant From Ministry of Statistics & Program implementation, Govt of India	11,51,00,142	78,90,21,399	12,25,47,000	53,95,47,000
2. State Government	NIL	NIL	NIL	NIL
3. Government Agencies	NIL	NIL	NIL	NIL
4. Institutions/Welfare Bodies	NIL	NIL	NIL	NIL
5. Others (Specify)	NIL	NIL	NIL	NIL
TOTAL	11,51,00,142	78,90,21,399	12,25,47,000	53,95,47,000

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 20 FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD 31/03/2009

PARTICULARS	CURRENT YEAR		PREVIOUS YEAR	
	PLAN REVENUE	NONPLAN REVENUE	PLAN REVENUE	NONPLAN REVENUE
SCHEDULE - 20 ESTABLISHMENT EXPENSES				
(a) Salary & Allowances (DA, HRA, CCA, Transport allowances, Bonus, Leave Salary, Extra Remuneration etc.,LTC, Medical Reimbursement and Medical Wel;fare Expenses. Visiting Scientist's remuneration etc.)	98,48,441	44,55,54,506	71,26,130	32,88,09,471
(b) Overtime Allowances	7,64,400	15,22,744	8,07,645	16,78,184
(c) Employer's Contribution to Provident Fund		59,22,355		46,19,124
(d) Expenses on Employee's Retirement and Terminal benefits (Gratuity, etc)		1,16,10,262		1,73,65,392
(e) Scholarship / Stipend & Other Assistances to Trainees	67,34,858	1,87,71,347	50,54,964	1,30,31,358
(f) Pension, Graded relief & Commuted value of Pension		12,52,15,189		9,58,93,458
TOTAL	1,73,47,699	60,85,96,403	1,29,88,739	46,13,96,987

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

SCHEDULE 21 FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD 31/03/2009

PARTICULARS	CURRENT YEAR		PREVIOUS YEAR	
	PLAN REVENUE	NONPLAN REVENUE	PLAN REVENUE	NONPLAN REVENUE
SCHEDULE - 21 OTHER ADMIN. EXPENSES				
(i) Purchase & Exp. on Giridih Agricultural Farm	17,400	96,133		53,280
(ii) Electricity charges	21,95,239	1,52,82,136	21,22,000	1,44,58,711
(iii) Repairs, Replacement and Maintenance of Office Equipment, Computers and accessories etc	1,35,49,772	34,01,888	1,32,56,166	27,53,477
(iv) Rent, Rates, Taxes and Water charges	24,53,114	70,85,317	25,91,495	44,52,767
(v) Transport Exp -Vehicles Running and Maintenance.	8,86,469	17,21,835	11,19,399	16,59,052
(vi) Postage, Telephone and Communication Charges	14,50,668	15,65,414	9,05,645	17,28,612
(vii) Stationeries, Liveries and Consumable stores for Electrical & Building	32,23,999	21,36,591	33,24,452	22,52,568
(viii) Travelling Expenses	52,83,394	71,02,256	77,41,507	44,87,785
(ix) Society type activities, Seminar and Conference	20,26,801	4,41,781	31,71,568	3,90,949
(x) Audit Fees & Expenses		1,52,360		2,08,980
(xi) Freight and Forwarding Expenses, Insurance, Advertisement, Examination	30,95,290	43,09,244	30,01,327	44,61,142
(xii) Books & Journals	4,13,22,348	1,54,83,817	3,53,57,915	1,19,32,429
(xiii) Printing & Publication	2,37,798	2,40,042	2,84,708	2,40,945
(xiv) Interest & Bank charges	1,329	2,85,777	565	3,25,391
(xv) Repairs, Maintenance of Building & Petty Constructions.	17,48,205	20,63,361	21,07,822	16,87,846
(xvi) Workers & Student's Walfare & Amenities (excluding Medical Expenses)	8,32,719	8,79,659	21,06,040	7,97,750
(xvii) Lab. & Reprography stores, Consumbles, Tools & Minor Accessories	62,51,443	4,33,944	51,55,510	3,17,159
TOTAL	8,45,75,988	6,26,81,554	8,22,46,119	5,22,08,843

(S.K. Chakraborty)
Dy. Chief Executive(F)

(S. K. Iyer)
Chief Executive (A & F)

(Sankar K. Pal)
Director

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8, Nctaji Subhas Road
Kolkata - 700 001

For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE
203, B.T. Road, Kolkata – 700 108

SCHEDULE FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDED 31ST MARCH 2009

Schedule 24 – Significant Accounting Policies

1. Accounting Convention

1.1. The Indian Statistical Institute is an Institute of National Importance by an Act of Parliament. It is fully funded by Govt. of India. The financial Statements are prepared on the basis of historical cost convention, and on the accrual method of accounting (unless otherwise stated).

1.2. All Income / Receipts and Expenditure are maintained on accrual basis excepting in following cases: -

(a) Receipts on Interest on HB Loan are accounted on recovery basis.

(b) Expenditure on Ad hoc Bonus and portion of D.A. to employees are accounted for on Cash basis.

(c) Expenditure on disbursement of Share of Faculty members in respect of income sharing externally funded SQCOR consultancy project is accounted for on Cash basis.

(d) Prepaid expenses are charged off in the year, they are incurred other than subscription of Journals.

1.3 In absence of prior period adjustment account, all transactions pertaining to the past year have been accounted for in the regular head of accounts.

2. Depreciation

2.1. Depreciation on assets acquired up to accounting year 1985 – 1986 have been charged up to 1985 – 1986 as per Income Tax Rules and thereafter no depreciation has been charged on those assets and the same have been kept in fixed assets Schedule-8 separately.

2.2. The system of charging depreciation has been reintroduced from the year 2003 – 2004 on assets acquired from 01.04.1986 as per rates specified in the Income Tax Rules 1962.

2.3. Depreciation on assets acquired after 30th September has been charged @50% of applicable rates. Assets which are fully depreciated have been retained at Re.1/-

2.4. No depreciation of fixed assets has been charged in the Income & Expenditure Account. However, the same amount has been deducted / reduced from the Capital Fund.

3. Fixed Assets

3.1. Fixed Assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition.

3.2. All assets which are put to use during the year are capitalized.

3.3. Sale or disposal of fixed assets are recognized on realization basis and credited to Miscellaneous Receipt as Income. The written down value of such asset are deducted from fixed assets as well as from Capital Fund.

4. Retirement Benefits

Provision for the accrued liability for Retirement Benefits, viz. Leave Encashment etc. are not made in the Accounts except unpaid liability of Retired employee because those expenses are paid out of grant received from Government. Accrued liability on Account of Gratuity has been disclosed in Notes on Accounts.

5. Earmarked / Endowment Fund

All externally / internally funded earmarked / endowment fund are accounted for under distinctive heads. Closing Balances of externally / internally funded earmarked / endowment fund are depicted in the Balance Sheet.

6. Foreign Currency Transaction

Transactions in foreign currencies are recorded at exchange rate at the time of settlement.

7. Investments

7.1. Investments against General Fund and other Funds stands in the name of Indian Statistical Institute the disclosure of such investment, in Schedule- 9 forming part of the Balance Sheet as at 31.03.2009 under different fund heads are based on internal records.

7.2. Interest received on Investment on General and other Fund are accounted for directly in the fund account itself.

8. Books and Journals

All the cost of books and journals have been charged to Income & Expenditure Account. However, 95% of such cost is capitalized by crediting the Capital/Corpus Fund.

9. Government Grant:

9.1. Plan Revenue Grant is specifically meant for Teaching, Training and Research activities of the Institute. Allocation of expenses between Plan and Non – Plan is made by the Institute according to its own convention.

9.2. Allocation between Capital and Revenue amount of Plan grant is made by the Institute as per its own convention.

10. Inventories:

In case of laboratory stores, minor accessories, stationary items including computer stationeries, medicine, are charged off to Income and Expenditure Account in the year of purchase.

(S.K.CHAKRABORTY) Dy. Chief Executive(F)	(S. K. IYER) Chief Executive (A & F)	(SANKAR K.PAL) Director

For L.B. Jha & Co.
Chartered Accountants

Partner

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Kolkata – 700 001

INDIAN STATISTICAL INSTITUTE
203, B.T. Road, Kolkata – 700 108

SCHEDULE FORMING PART OF THE ACCOUNTS
FOR THE YEAR ENDED 31ST MARCH 2009

Schedule - 25 : Notes on Accounts

1. Fixed Assets

1.1. Depreciation on fixed assets for the current year has been charged in the accounts on assets acquired on and after 01.04.1986 and depreciation on fixed assets acquired upto 31st March 1986 except Lease hold Land and Development could not be charged as the process of incorporation of data in the revised software is under progress.

Depreciation on Books including Annual Publications/ Journals has been calculated at effective flat rate of 62% as against 60% on other Books and 100% on Annual Publications as per I.T. Rules

1.2. Land and Land Development as per Schedule – 8 of this Accounts refers to "Takdah Planters Club, Darjeeling" acquired in 1964 - 1965 for 54 years. A sum of Rs.481.42 is being amortized every year.

1.3. Work-in-Progress in Schedule 8A represent Construction of Platinum Jubilee Academic Building and Platinum Jubilee International Statistical Education Centre Building.

1.4. The work on Physical verification of Fixed Assets had been entrusted to an outside Consultant in the year 2003-04. Their report is still awaited. Further to the above a Committee has been formed to look in to the matter and prepare a physical verification report.

1.5. Insurance Coverage of Fixed Assets excepting vehicle has not been taken in view of the communication received from Govt. that there is no provision under rule for insuring Government Building ,library books , equipment and computers etc.

1.6. Assets include (Schedule 8A) a computer system value of which is Rs. 7.00 Lakhs (Fixed approx) was stolen in 1992 – 1993 . The Council has resolved to write off the value of the computer system and the Government has been approached for necessary approval. Adjustment is awaited pending receipt of approval from Government of India.

1.7 Current Liabilities include Sale or disposal of assets amounting to Rs. 10,86,306.00 as on 31.03.2009. Detailed information about each item of assets deposed off during earlier years are being collected to give effect of such disposal in the Books of Account during the year 2009-2010. Necessary adjustment on account depreciation will be made while giving effect of disposal in Books of Account. The assets in question are very old and collection of data pertaining to these assets from the old records which were manually maintained, is in progress .

2. Current Assets , Loans & Advances

2.1 Current Assets under Schedule 11, includes Sundry Debtors of Rs/- 1,13,582,.82 which is considered doubtful. No provision for doubtful debts has been made in the accounts.

2.2.T.A. advance under Loans & Advances (Schedule – 11) for Rs.28.58.210.00 as on 31.03.2009 includes old balances . Some of the old advances are adjusted during the year under Audit. Action is being taken to identify and adjust remaining old Advances .

2.3. Loans & Advances include Rs. 3,647.00 relating to balance with Nath Bank Ltd., which is in liquidation. The Finance Committee of the Institute in its meeting held on 5th June 2007 has recommended to the Council for writing off the said amount. Approval from Government of India has been sought for. No adjustment has been made pending receipt of requisite approval.

2.4. Advance to party (Schedule -11), includes Rs. 29,09,388.58 paid to erstwhile Statistical Publishing Society as advance. Proposal for write off is initiated and adjustment will be made on approval. Rs.32213.56 paid to Bharat Overseas Pvt. Ltd.is also considered doubtful. In addition to these balances, there are old balances of Rs.4361678.15 (over 2 years). Action is being taken to adjust these balances after proper scrutiny.

2.5. Rs.30,848.34 on account of Advance for land (Schedule – 11) represents cost of contingent establishment and law charges for proposed acquisition of premises at 202 B.T. Road (in 1955) and at 123 Gopal Lal Thakur Road (in 1957). The Finance Committee of the Institute in its meeting held on 5th June 2007 has recommended the Council for writing off the said amount. Approval from Government of India has been sought for. No adjustment has been made pending receipt of requisite approval.

2.6. Advances (Staff & Others) under Loans & Advances, Schedule – 11 include some old and unreconciled debit/credit balances (Rs. 392315/- and Rs.253743/-) outstanding for more than two years. Action is being taken to identify and adjust these balances.

2.7.Advance of Staff / Workers of the Institute includes Rs.41,000.00 recoverable from some staff under suspension for which a court case is pending. One of the staff associated with this matter had since retired and the amount of Gratuity payable to this staff had been withheld and retained by the Institute.

2.8. The Net balance under the head of accounts Advance against T.A., L.T.C., Advance (Staff-Others) & Vendors has been shown in the schedules. Total debit balance Rs. 13989367/- and Credit balance is Rs.1570661/-.

2.9. Bills receivable from SQC consultancy amounting Rs. 24,22,994.00 represent value of professional services rendered during the year 2008 – 2009, payment against which are not received within the year under audit. Out of the above, Rs.1834419.00 has since been received till 31.08.2009.

3. Income and Expenditure Account:

3.1. Expenditures on account of Visiting Professor Remuneration and Expenditure on Medical Reimbursement & Medical Welfare, LTC have been included under the head of expenditure under Salary and allowances as recommended by Section 8(1) Committee of the Institute. Medical Reimbursement expenses includes Hospital Advances paid by the Institute.

3.2. Orders for payment of ad hoc bonus and a portion of D.A. for a particular financial year are issued by the Govt. after the end of a financial year. Accordingly such payment is booked in the year in which it is made.

3.3. Out of net receipts on Statistical Quality Control Services a sum of Rs.4699797/- being 25% of net receipts, is shown in the Income & Expenditure Account of the Institute and the balance amount (75%) has been retained with the Development Fund.

4 Development Fund:

4.1. In the absence of TDS Certificate, the Institute could not account for the Income tax deducted at source from SQC & OR bill for an amount of Rs.619737/- during the year under audit and consequently income from those SQC bills are netted. (Previous year- Rs.159995/-)

4.2. TDS are shown as Expenditure and the closing balance of fund is net off TDS.

4.3 Assets amounting to Rs.348901/= as on 31st March'2008 and Rs. 4084511/= during the year, acquired out of development fund have been taken into the asset Schedule 8B

5. Capital Commitments:

Contracts remaining to be executed on Capital Account amount to Rs.1034.67 lakhs. (Previous year Rs. 438.49 lakhs)

6. Gratuity liabilities:

The Gratuity Liability as per Payment of Gratuity Act, 1972 estimated as on 31.03.2009 estimated at Rs 149.10 Crores. (Previous year Rs. 49.70 crores)

7. Current Liabilities:

Other current liabilities include Rs.4365532/- being Earnest Money / Security Deposits which are outstanding since long. During the year Rs. 211882.89 on account of old earnest money deposit and Rs. 488525.48 on account of old Security Deposit has been adjusted Action is being taken to scrutinize and make appropriate adjustment in the accounts for remaining balances.

8. General:

8.1. As per decision of the Council, the Institute recovered overhead charges on fund received for externally funded project and credited 50% of the same to the Miscellaneous receipt account and balance to the Development Fund account.

8.2. Assets acquired out of fund of Externally Funded Projects, during the year under audit, have been shown in the Schedule 3 – Earmarked / Endowment Fund.

8.3. The Institute has been approved by the Central government for the purpose of clause(ii) of sub-section (1) of Section 35 of the Income Tax Act, 1961, read with Rule 6 of the Income Tax Rules, 1962 for the period 1st March 2001 to 31st march 2004. Applications of the Institute for the period from 1st April 2004 to 31st March 2007 and from 1st April 2007 to 31st March 2010 which are under consideration by the Ministry of Finance, Government of India.

8.4.Uniform format of Account recommended by the Govt. of India has been implemented to the extent, it is applicable and suitable to the Institute. Schedules of Accounts forming part of Balance sheet and Income & Expenditure are drawn which are relevant to the Institute. Schedules No. 2,4,5,6,10,14,15,16,18,19,22 & 23 are not applicable to the Institute.

8.5. Interests on House Building Advance (Schedule-11) is recovered after recovery of the principal amounts. On recovery, principal amount is credited to the House Building Advance Account and interest credited to the Income & Expenditure Account and gets funded creating House Building Advance Account.

8.6. Audit fee & expenses of Rs. 152360/-(Previous Year: Rs.112360/-) represents Statutory Audit fee (inclusive of Service Tax). Further, Rs. 20000/-(including Service Tax) paid for taxation matter is included under Freight Forwarding expenses etc.

8.7. Figures of previous year have been regrouped and rearranged wherever necessary

(S.K.CHAKRABORTY)	(S. K. IYER)	(SANKAR K.PAL)
Dy. Chief Executive(F)	Chief Executive (A & F)	Director

For L.B. Jha & Co.
Chartered Accountants

Partner

GF-1 Gillander House
8, Netaji Subhas Road
Kolkata – 700 001

AUDITOR'S REPORT
TO
INDIAN STATISTICAL INSTITUTE

1. We have audited the attached balance sheet as at 31st March, 2009 of Indian Statistical Institute, Plan and Policy Research Unit (Unit),set up by executing Memorandum of Understanding between Planning Commission and Indian Statistical Institute and also the Income & Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the management of the Unit. Our responsibility is to express and opinion on these financial statements based on our audit.

   We conducted our audit in accordance with auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimate made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

2. We report that

   a) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;

   b) In our opinion, proper books of account as required by law have been kept by the unit so far as appears from our examination of those books;

   c) The Balance Sheet and Income & Expenditure Account dealt with by this report are in agreement with the books of account;

d) In our opinion and to the best of our information and according to the explanations given to us the financial statements give a true and fair view in conformity with the accounting principles generally accepted in India.

i. in the case of the Balance Sheet, of the state of affairs of the Plan and Policy Research Fund as at 31st March 2009:

ii. in the case of the Income & Expenditure Account, of the excess of income over expenditure of the Fund for the year ended on that date.

For and behalf of
L.B. Jha & Co.
Chartered Accountants

(B.N.JHA)
PARTNER
Membership No. 51508

Dated : The 24th September 2009

INDIAN STATISTICAL INSTITUTE

PLAN AND POLICY RESEARCH FUND,FUNDED BY PLANNING COMMISSION

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 ST MARCH 2009

PARTICULARS	Rs. P.	
INCOME		
Interest on Investment	3,546,178.00	3,111,388.0
Interest on Saving Bank A/c	9,270.00	17,460.0
TOTAL (A)	3,555,448.00	3,128,848.0
EXPENDITURE		
Salary,Honorarium	996,069.00	860,873.0
Travelling,Conveyance etc.	257,338.00	162,151.0
Books & Journals	235,518.00	225,332.0
Repairs & Maintenance of Equipment & Computer and Contingencies	561,976.00	266,882.
Stores & Stationaries and General Charges	31,016.00	20,359.
Postage,Telephone & Electricity Charges	78,189.00	71,600.
Seminar & Conference	278,481.00	-
Overhead Charges to ISI	148,564.00	88,
TOTAL (B)	2,587,151.00	1,695,362.
Excess of Income Over Expenditure (A - B)	968,297.00	

S.K.CHAKRABORTY
Deputy Chief Executive(F)

S.K. IYER
Chief Executive(A&F)

SANKAR PAL
DIRECTOR

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For L B Jha & Co
Chartered Accountants

Partner

INDIAN STATISTICAL INSTITUTE

PLAN AND POLICY RESEARCH FUND,FUNDED BY PLANNING COMMISSION

BALANCE SHEET AS AT 31 ST MARCH 2009

PARTICULARS	CURRENT YEAR Rs. P.	PREVIOUS YEAR Rs. P.
ENDOWMENT FUND :		
As per Last Account	45,368,145.87	43,934,659.87
ADD : Excess of Income Over Expenditure	968,297.00	1,433,486.00
TOTAL	46,336,442.87	45,368,145.87
GENERAL FUND		
Amount Transferred from Endowment Fund		
ADD : 95 % of Cost of Books & Journals Purchased & TDS on Accured Interest	1,230,113.00	1,006,371.00
CURRENT LIABILITIES		
Outstanding Liabilities	260,708.00	88,165.00
LOAN AND ADVANCES		
Loan on FDR	200,000.00	-
TOTAL	94,363,706.74	46,462,681.87
ASSETS		
Fixed Assets	5,745,575.00	5,198,141.00
Investment	39,109,623.00	39,109,623.00
Tax Deducted at Source	979,311.00	614,037.00
Books & Journals	1,214,792.00	991,050.00
CURRENT ASSETS		
Interest accured but not due on Fixed Deposit	310,124.00	310,092.00
Advance & Prepaid Expenditure	165,543.00	70,334.00
Cash & Bank Balance With Indian Bank	502,295.87	169,404.87
(Cash in hand = 28981.00 , Previous Year = 28303.00)		
(Cash at Bank = 473314.87 , Previous Year = 141101.87)		
TOTAL	48,027,263.87	46,462,681.87

S.K.CHAKRABORTY
Deputy Chief Executive(F)

S.K. IYER
Chief Executive(A&F)

SANKAR PAL
DIRECTOR

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3,Netaji Subhas Road
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For L B Jha & Co
Chartered Accountants

Partner

COMMENTS OF AUDITORS FORMING PART OF THEIR REPORT ON THE ACCOUNTS OF THE INDIAN STATISTICAL INSTITUTE FOR THE YEAR ENDED 31ST MARCH 2009 AND REPLIES OF THE ADMINISTRATION IN ITALICS THEREIN PER SERIATIM BELOW.

2.1 The Institute has not yet got the tax exemption u/s 10 of the Income tax Act, 1961 for its income for the financial year 2008-09 and as such we are unable to comment on Institute's Income Tax liability, if any for the year under audit (refer note No. 8.3,Schedule-25)

Indian Statistical Institute has been approved by the Central Government for the purpose of clause (ii) of sub-section (1) of section 35 of the Income Tax Act, 1961, read with Rule 6 of the Income3 tax Rules, 1962 for the period from 01.04.2001 to 31.03.2004 under the category 'University, College or other Institution' partly engaged in research activities (and not as a scientific research association existing solely for research). The Institute has applied for grant of approval for exemption for the period from 01.04.2004 to 31.03.2007and from 01.04.2007 to 31.03.2010 before Director of Income Tax (Exemption). The Institute is yet to receive any reply. However, the Institute is making all efforts in this direction.

2.2 The Institute falls within the definition of "Employer" as prescribed u/s 115W of the Income Tax Act, 1961 and as such liable to pay Fringe Benefit Tax u/s 115WA of the said act. No payment or provision for such tax is made in the accounts (amount of liability including arrear liability is not ascertained by the management).

The Institute is an autonomous scientific and research Institute fully funded by Government of India. This is an Institute of National Importance recognized by an Act of Parliament, the Indian Statistical Institute Act, 1959, and as such the Institute should not fall under Fringe Benefit Tax. The matter has also been discussed with our Income Tax consultant and he has advised that Indian Statistical Institute is eligible for exemption under Section 12 A(a) of Income Tax Act 1961 and hence not liable for Fringe Benefit Tax. The Institute has already initiated necessary action for complying the necessary formalities in this regard.

2.3 No depreciation for the financial year 1986-87 and onwards has been provided in the accounts on the fixed assets acquired up to the financial year 1985-86(refer note no 1.1., Schedule –25)

Depreciation on fixed assets acquired upto 31st March 1986 for which depreciation already provided upto 1985-86, could not be charged in the accounts during the year 2008–2009 as a portion of data pertaining to such assets are in the process of incorporation through computer software. Necessary effects will be given in the accounts on completion of the process of incorporation of the data through computer software.

2.4 Allocation of grant between capital and revenue out of plan grant and allocation of revenue expenditure between plan and non plan grant are made by the Institute.(refer note no. 9.2,Schedule-24)

Allocation between Capital and Revenue amount of Plan grant is made by the Institute as disclosed under point 9.2 of Schedule-24 – Significant Accounting Policies forming part of Annual Accounts 2008 – 2009.

2.5 Indian Statistical Institute, New Delhi Center has not followed the General Financial Rules, 2005 with regard to construction/renovation of its building.

The Institute has been following the General Financial Rules scrupulously except one case in Delhi Centre where minimal procedural difference was there which had no Financial Implications. The suggestion has been noted and the Institute will ensure that it will be followed scrupulously.

2.6 The Institute has not updated fixed assets register and also no physical verification carried out during the year. And as such amount of discrepancies between the book balance and physical balance could not be ascertained.

The fixed assets Registers of the Institute are maintained in two sets, one for the set of assets acquired upto the year 1985-86 for which depreciation provided upto 31st March 1986 and another set of assets acquired from 01.04.1986 and onwards for which depreciation are provided till date. The assets register for the second set of assets are furnished to the Audit. The assets register pertain to first set of assets are in the process of compilation out of manually maintained old assets registers. The physical verification of assets have been partly completed by the external agency appointed by the Institute for this purpose. The reconciliation between ground stock and book stock of assets are yet to be carried out. A Committee has been formed to look into the matter and prepare a Physical Verification Report.

2.7 Sales proceeds of fixed assets amounting to Rs. 1086306/= have been kept under current liabilities (refer note no. 1.7,Schedule-25)

Sale proceeds of fixed assets are accounted for after ascertaining the cost (book value), date of purchase, depreciation if any etc. from the unit / division / centre where such assets belong to. The relevant data as to the cost (book value), date of purchase, depreciation if any etc are in the process of compilation

2.8 No provision has been made in respect of doubtful debts of Rs. 113583.00(refer note no. 2.1,Schedule-25)

The debts referred above are very old and are carried forward since past several years. The Institute is contemplating to write off such old debts from time to time with the approval of the competent authority.

2.9 Loans to staff under motor car, house building and vehicles amounting to Rs. 13897627/- could not be verified in the absence of necessary documents.

The necessary documents pertaining to loans to staff under motor car, house building and vehicles i.e. Schedules of Motorcar, Vehicles Advances and House Building Advances have since been completed and produced before the Statutory Auditors for his perusal.

2.10 No provision has been made in respect of old/doubtful advances lying under various sub heads, amounts not ascertain (refer note no. 2.2 to 2.7,Schedule-25)

The Institute is taking necessary action for adjustment of old / doubtful advances lying under various sub heads. No adjustment is done pending receipt of requisite approval. Point-wise detailed replies of the Institute are given in the Schedule-25 (Notes on Accounts) at note no. 2.2 to 2.7.

2.11 Prepaid Expenses (other than library journals) are charged off in the Accounts (refer note no. 1.2(d),Schedule-24)

Prepaid expenses are carried forward in respect of Library Journals only as disclosed under Point 1.2.(d) of Schedule-24 – Notes on Accounts, forming part of Annual Accounts 2008 – 2009.

2.12 Stores and Spares, medicine and stationeries are charged off to accounts in the year of purchase(refer note no.10,Schedule-24)

In case of laboratory stores, minor accessories, stationary items including computer stationeries, medicine, are charged off to Income and Expenditure Account in the year of purchase as disclosed under point 10 of Schedule-24 – Significant Accounting Policies. forming part of Annual Accounts 2008 – 2009.

2.13 Certain Income and Expenditure including retirement benefit to the employees are accounted on cash basis(refer note no.1.2 and 4,Schedule-24)

Certain Income and Expenditure including retirement benefit to the employees are accounted on cash basis and this has been disclosed under point no. 1.2 and 4 of Schedule – 24- Significant Accounting Policies forming part of Annual Accounts 2008 – 2009.

2.14 No adjustment/appropriate accounting has been made in respect of old liabilities of Rs. 4365532/- (refer note no.7,Schedule-25)

During the year review of old Earnest Money Deposit and Security Deposit was taken up and Rs.211882.89 on account of earnest money deposit and Rs. 488525.48 on account of Security Deposit was adjusted. Action is being taken to scrutinize the remaining balances for appropriate adjustment / payment

(S.K. Chakraborty)	(S.K. Iyer)	(Sankar K. Pal)
Dy. Chief Executive (F)	Chief Executive (A & F)	Director

AUDITORS' REPORT

1. We have audited the attached Balance Sheet of **INDIAN STATISTICAL INSTITUTES' CONTRIBUTORY PROVIDENT FUND AND GENERAL PROVIDENT FUND AS AT** 31ST March 2009 and also the respective Income & Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the Board of Trustees, ISICPF and Board of Management, ISIGPF. Our responsibility is to express on opinion on these financial statements based on our audit.

   We conducted our audit in accordance with auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

2. Attention is invited to our following comments :

   2.1 **Non maintenance of separate books of Account by CPF and GPF (Refer Note No.1);**

   2.2 **Investment of Funds are made from a common pool of CPF & GPF and resulted in consequential inter Fund outstanding balances (Refer Note No.7);**

   2.3 **No interest from the date of deposit upto the end of the current year has been credited to the members as envisaged in the respective Rules of the Funds. The interest has been credited during the year to the Member's Account till the year ended 31st March, 2008.**

3. We report that :
   (a) We have obtained all the information and explanations, which to the best of our knowledge an belief were necessary for the purposes of our audit.

   (b) **Subject to Para 2.1 and 2.3 above,** in our opinion, proper books of account as required by la have been kept by the Fund so far as appears from our examination of those books.

   (c) The above referred Balance Sheets and Income & Expenditure Accounts dealt with by this repo are in agreement with the books of account.

   (d) In our opinion and to the best of our information and according to the explanations given to us th financial statements read together with the notes thereon and **subject to our comments in Para – above give a true and fair view** in conformity with the accounting principles generally accepted India.

      i) in the case of the Balance Sheet, of CPF and GPF of the state of affairs of the fund as 31st March 2009;

      ii) in the case of the Income & Expenditure Account, of CPF and GPF of the excess income over expenditure of the Fund for the year ended on that date.

For and behalf of
L. B. Jha & Co.
Chartered Accountants

(B. N. Jha)
Partner
Membership No. 51508

Dated : 24 September 2009

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Fund and Liabilities	Rs. P.	As at 31st March 2009 Rs. P.
	Members' Own Subscription :		
	As per last account	33,315,959.42	
	Add:Transfer from external sources	79,005.00	
	Add: Contribution during the year	4,434,945.00	
	Less:Refunded during the year	1,852,548.38	
959.42	Less:Withdrawal during the year	77,000.00	35,900,361.04
	Contribution :		
	As per last account	35,181,550.23	
	Add:Transfer from external sources	82,165.00	
	Add: Contribution during the year	4,434,945.00	
	Less: Refunded during the year	1,847,187.68	37,851,472.55
	' Additional Subscription		
	As per last account	20,071,765.51	
	Add: During the year	4,104,462.00	
	Less:Refunded during the year	1,349,052.00	
	Less:Withdrawal during the year	250,000.00	22,577,175.51
	' Deposit :		
	pening Balance	36,612.46	
	.ess: Paid during the year	4,412.99	32,199.47
	DA to CPF :		
	Opening Balance	2,292,606.90	
	Less:Paid during the year	166,852.38	2,125,754.52
	nterest :		
	Members' Own Subscription		
	per last account	26,424,161.59	
	dd:Transfer from external sources	4,481.00	
	dd: During the year	4,297,659.66	
	ess: Paid during the year	2,320,951.25	
	ess: Withdrawal during the year	480,000.00	27,925,351.00
			126,412,314.09

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Property & Assets	Rs. P.	As at 31st March 2009 Rs. P.
	Investment at costs :		
41,077,000.00	(a) 5 Yrs. Postal Time Deposit	32,263,000.00	
27,902,000.00	(b) Fixed Deposit with Allahabad Bank, Dunlop Bridge Branch	42,479,000.00	
108,409,700.00	(c) Fixed Deposit with United Bank of India, Dunlop Bridge Branch	108,706,700.00	
155,500.00	(d) RBI Stock certificates	155,500.00	
---	(e) Fixed Deposit with Union Bank of India, Ashok Garh Branch	2,330,000.00	
---	(f) Fixed Deposit with State Bank of India, Bonhooghly Estate Br.	10,055,851.00	195,990,051.00
	Loan to Members		
	Opening Balance	4,374,808.00	
	Add : Loan paid during the year	3,623,500.00	
4,374,808.00	Less: Loan realised during the year	2,416,894.00	5,581,414.00
	Current Assets :		
	Interest Accrued		
1,490,501.00	(a) 5 Yrs. Postal Time Deposit	1,294,626.00	
11,375,625.91	(b) On United bank of India Fixed Deposit	23,692,563.54	
2,907,814.00	(c) On Allahabad Bank Fixed Deposit	6,107,835.00	
0.00	(d) Union Bank of India Fixex Deposit	65,693.00	
0.00	(e) State Bank of India Fixed Deposit	451,880.00	
6,381.00	(d) RBI Stock certificates	6,381.00	31,618,978.54
197,699,329.91			233,190,443.54

Contd (2)

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Fund and Liabilities	Rs. P.	As at 31st March 2009 Rs. P.
117,322,656.11	**Brought Forward :**		126,412,314.09
	Interest :		
	(b)On Employers' Contribution		
	As per last account	25,372,582.55	
	Add:Transfer from external sources	4,481.00	
	Add: During the year	4,520,620.66	
25,372,582.55	Less: Paid during the year	2,057,132.32	27,840,551.89
	(c)On Members' Additional Subs.		
	As per last account	9,147,684.83	
	Add: During the year	2,223,511.00	
9,147,684.83	Less:Paid during the year	565,738.00	10,805,457.83
2,518,812.31	**Amount due to ISI**		-------
------	**Amount due to GPF**		3,252,300.76
56,906,754.06	**Undistributed Income as per Income and Expenditure A/c.**		65,695,531.87
211,268,489.86			**234,006,156.44**

(S. K. Joardar)
Manager/Secretary

(Swapan Kumar Parui)
Member

(Ranjan Gupta)
Member

Date : 24 September 2009

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Property & Assets	Rs. P.	As at 31st March 2009 Rs. P.
197,699,329.91	Brought Forward :		233,190,443.54
	Cash and Bank Balances		
239,816.45	(i)Postal Savings bank A/c.	9,079.45	
724.92	(ii)With Allahabad Bank Savings A/c.	538.42	
1,497.06	(iii)With Union Bank of India Savings A/c.	2,051.06	
1,600.00	(iv) With Bank of India Savings A/c	1,600.00	
133.28	(v) With United bank of India Dunlop Bridge branch Savings A/c.	710.28	13,979.21
13,325,388.24	**Amount due from GPF**		--------
-------	**Amount due from ISI**		801,733.69
211,268,489.86			**234,006,156.44**

In terms of our separate report of even date.

For and on behalf of
L. B. Jha & Co.
Chartered Accountants
(B. N. Jha)
Partner
Membership No.51508

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Income and Expenditure A/c for the year ended 31st March 2009

Year ended 31st March 2008 Rs. P.	Expenditure	Rs. P.	Year ended 31st March 2009 Rs. P.
17,968,988.13	**To excess of Income over expenditure carried down**		19,830,569.13
17,968,988.13			19,830,569.13
	To Interest on :		
	(i) CPF Members' Own Subs.	4,297,659.66	
	(ii) CPF Additional Subscription	2,223,511.00	
10,439,999.16	(iii)CPF Employers' Contribution	4,520,620.66	11,041,791.32
56,906,754.06	**To Balance carried over to Balance Sheet**		65,695,531.87
67,346,753.22			**76,737,323.19**

(S. K. Joardar)
Manager/Secretary

(Swapan Kumar Parui)
Member

(Ranjan Gupta)
Member

Date : 24 September 2009

INDIAN STATISTICAL INSTITUTE
CONTRIBUTORY PROVIDENT FUND

Income and Expenditure A/c for the year ended 31st March 2009

Year ended 31st March 2008 Rs. P.	Income	Rs. P
	By Interest on :	
	(a) 5 Yrs. Postal Time Deposit	
	(b) Post Office Savings Bank A/c	
	(c) Allahabad Bank Savings Bank A/c.	1,8
	(d) Allahabad Bank Fixed Deposit A/c.	
	(e) On United bank of India Fixed Deposit A/c.	
	(f) On United Bank of India Savings Bank A/c.	
	(g) On Union Bank of India Savings Bank A/c.	5
	(h) On Union Bank of India Fixed Deposit A/c.	65,693.
	(i) S. B. I. Fixed Deposit A/c	504,731.(
17,968,988.13	(j) R.B.I. Stock certificates	17,108.5
17,968,988.13		
	By amount brought forward from last account	56,906,754.0(
49,377,765.09	Add : During the year	0.0(
	By excess of Income over	
17,968,988.13	expenditure brought down	
67,346,753.22		

In terms of our separate report of even date.

For and on behalf of
L. B. Jha & Co.
Chartered Accountants
(B. N. Jha)
Partner
Membership No.51508

INDIAN STATISTICAL INSTITUTE
GENERAL PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Fund and Liabilties	Rs. P.	As at 31st March 2009 Rs. P.
	Members' Own Subscription		
	As per last account	201,550,439.58	
	Add:Transfer from external sources	636,897.00	
	Add: Contribution during the year	42,343,987.00	
	Less:Refunded during the year	14,248,226.70	
201,550,439.58	Less:Withdrawal during the year	7,057,500.00	223,225,596.88
	Other Deposit :		
	Opening Balance	172,473.26	
172,473.26	Less: Paid during the year	12,932.16	159,541.10
	DA to GPF :		
	Opening Balance	2,186,253.14	
2,186,253.14	Less:Paid during the year	178,754.00	2,007,499.14
	Interest :		
	On Members' Own Subscription		
	As per last account	101,127,936.19	
	Add:Transfer from external sources	3,807.00	
	Add: During the year	20,336,468.96	
	Less: Paid during the year	8,417,139.14	
101,127,936.19	Less: Withdrawal during the year	808,000.00	112,243,073.01
245,684,073.75	**Undistributed Income transferred from Income and Expenditure A/c.**		282,138,757.67
13,325,388.24	**Amount due to CPF**		-----
564,046,564.16			619,774,467.80

. K. Joardar)
anager/Secretary

(Subrata Kumar Roy)
Member

(Prabir Chattoraj)
Member

ıte : 24 September 2009

INDIAN STATISTICAL INSTITUTE
GENERAL PROVIDENT FUND

Balance Sheet as at 31st March 2009

As at 31st March 2008 Rs. P.	Property & Assets	Rs. P.	As at 31st March 2009 Rs. P.
	Investments at costs :		
7,028,000.00	(a) 5 Yrs. Postal Time Deposit	0.00	
1,903,000.00	(b) Fixed Deposit with Allahabad Bank, Dunlop Bridge Branch	1,903,000.00	
387,069,375.00	(c) Fixed Deposit with United bank of India, Dunlop Bridge Branch	390,960,375.00	
14,521,164.00	(d) Fixed Deposit with Bank of Maharashtra, Shyambazar Branch	38,981,292.00	
18,957,000.00	(e) Fixed Deposit with Union Bank, Ashokgarh Branch	18,957,000.00	450,801,667
	Loan to Members :		
	Opening Balance	42,866,645.22	
	Add : Loan paid during the year	20,477,800.00	
42,866,645.22	Less: Loan realised during the year	20,110,360.00	43,234,085
	Interest accrued		
407,457.00	(a) 5 Yrs. Postal Time Deposit	0.00	
98,974.00	(b) On Allahabad Bank Fixed Deposit	287,377.00	
42,034,023.50	(c) On United Bank of India Fixed Deposit	87,481,730.38	
21,114,292.00	(d) On Bank of Maharashtra, Fixed Deposit	1,073,862.00	
27,998,314.00	(e) On Union Bank of India, Fixed Deposit	33,635,540.00	122,478,509
	Cash and Bank Balances :		
25,828.32	(i) With Allahabad Bank, Savings A/c	823.32	
4,489.52	(ii) With United Bank of India,Savings A/c	648.52	
1,957.00	(iii)With Union Bank of India,Savings A/c	2,026.00	
1,241.00	(iv) With Bank of India, Savings A/c	1,241.00	
14,803.60	(v)With Postal Savings Bank A/c	3,166.60	7,90
------	**Amount due from CPF**		3,252,30
564,046,564.16			**619,774,46**

In terms of our separate report of even date.

For and on behalf of
L. B. Jha & Co.
Chartered Accountants
(B. N. Jha)
Partner
Membership No.51508

INDIAN STATISTICAL INSTITUTE
GENERAL PROVIDENT FUND

Income and Expenditure A/c for the year ended 31st March 2009

Year ended 31st March 2008 Rs. P.	Expenditure	Rs. P.	Year ended 31st March 2009 Rs. P.
51,873,089.57	**To excess of Income over Expenditure carried down**		0.00
51,873,089.57			0.00
	To Interest on :		
19,596,434.79	GPF Members' Own Subscription		20,336,468.96
	To Balance carried to		
245,684,073.75	Balance Sheet		282,138,757.67
265,280,508.54			**302,475,226.63**

(S. K. Joardar)
Manager/Secretary

(Subrata Kumar Roy)
Member

(Prabir Chattoraj)
Member

Date : 24 September 2009

INDIAN STATISTICAL INSTITUTE
GENERAL PROVIDENT FUND

Income and Expenditure A/c for the year ended 31st March 2009

Year ended 31st March 2008 Rs. P.	Income	Rs. P.	Year ended 31st March 2009 Rs. P.
	By Interest on :		
	(a)5 Yrs. Post Office Time Deposit	177,906.00	
	(b) Post Office Savings Bank A/c	0.00	
	(c)Allahabad Bank Savings Bank A/c	6,121.00	
	(d)Allahabad Bank Fixed Deposit	188,403.00	
	(e)United Bank of India Fixed Deposit A/c.	46,361,570.88	
	(f)United Bank of India Savings Bank A/c.	159.00	
	(g) Bank of Maharastra Fixed Deposit A/c.	4,419,698.00	
	(h)Union Bank of India Savings Bank A/c.	69.00	
	(i) Union Bank of India Fixed Deposit A/c.	5,637,226.00	
51,873,089.57	(j) Bank of India Fixed Deposit A/c	0.00	56,791,152.8
51,873,089.57			56,791,152.8
213,407,418.97	**To Amount brought forward from last account**		245,684,073.7
51,873,089.57	By excess of Income over expenditure brought down		56,791,152.8
265,280,508.54			**302,475,226.6**

In terms of our separate report of even date.

For and on behalf of
L. B. Jha & Co.
Chartered Accountants
(B. N. Jha)
Partner
Membership No.51508

INDIAN STATISTICAL INSTITUTE PROVIDENT FUND

Notes on Accounts of Indian Statistical Institute

Contributory Provident Fund and General Provident Fund

1. Although no separate books of account are maintained by GPF & CPF, however personal ledger for each member of ISICPF & ISIGPF as well as P.F. investment ledger (both of CPF & GPF) are regularly maintained by P.F. Unit. Hence payment of P.F. loan, withdrawals and final settlements of P.F. balances are made to member-subscriber as per personal ledger of the members.

2. Interest credited to the members on their CPF and GPF balances pertains to the previous financial year i.e. 2007-2008 and booked in the Income & Expenditure Account for the year 2008-2009.

3. Interest accrued on investment on P.O.T.D. has been accounted for on average basis as per past practice, i.e. for investment upto 15th of a month, interest for the full month has been computed; whereas for investment beyond 15th, interest for the remaining period of the month has been ignored.

4. On the amount of Loan paid to members of both ISICPF and ISIGPF, interest is not realized. However, interest is credited to the account of member-subscriber of CPF/GPF after deducting any sums withdrawn (including loan) during the current year.

5. D.A to P.F. and other Deposit both of ISIGPF and ISICPF are related to Members' Subscription.

6. Balances in Members' ledger accounts (Employers' Contribution & Employees' Contribution) includes Rs.32,12,597.97 in CPF and Rs.4,29,255.87 in GPF represents employees retired/left the services and their old balances brought forward since long (previous year Rs.32,12,597.97 in CPF and Rs.4,29,255.87 in GPF). No interest is paid on such balances.

7. Amount due from CPF of Rs.32,52,300.76 as shown in the books of GPF and the corresponding amount in the books of CPF as amount due to GPF arises out of transaction (for investment of funds) made by CPF with a view to avail the higher rate of interest on Investment.

. K. Joardar) . cretary	(Swapan Kumar Parui) Member	(Ranjan Gupta) Member
		For and on behalf of L.B. Jha & Co. Chartered Accountants
Kumar Roy) Member	(Prabir Chattoraj) Member	
: 24 September 2009		(B.N. Jha) Partner.

EDITORIAL BOARD