Annual Report 2018-19

Indian Statistical Institute

87TH ANNUAL REPORT 2018 - 19

INDIAN STATISTICAL INSTITUTE

203, Barrackpore Trunk Road, Kolkata – 700108
Website: http://www.isical.ac.in/

From the Director's Desk

I am delighted to present the Annual Report of the Indian Statistical Institute for the year 2018-19. This Institute that started its journey in December 1931 in Kolkata has today grown into a unique institution of higher learning spread over several cities of India. The Institute, founded by the visionary PC Mahalanobis, continues its glorious tradition of disseminating knowledge in Statistics, Mathematics, Computer Science, Quantitative Economics and related subjects. The year 2018-19 saw the formation of the new Council of the Institute. I am delighted to welcome Shri Bibek Debroy as the President of the Institute. It is also a privilege that Professor Goverdhan Mehta continues to guide the Institute as the Chairman of the Council.

The Institute conducted its 53rd Convocation in January 2019. The Institute was happy to have Lord Meghnad Jagdishchandra Desai, Padma Bhushan, Emeritus Professor, London School of Economics, as the Chief Guest. During the year, the Institute observed the closing ceremony of the 125th Birth Anniversary Celebrations of P.C. Mahalanobis in Kolkata and the different Centres. The year-long celebrations were marked by a series of academic activities, culminating with the closing ceremony that was graced by the Hon'ble Vice-President of India, Shri M. Venkaiah Naidu and Shri D.V. Sadananda Gowda, the then Hon'ble Minister of Statistics & Programme Implementation on June 29, 2018. A commemorative coin, a photo album and a music album were released by the Hon'ble Vice-President of India. Google launched a Google doodle to commemorate the day. Google Arts and Culture paid tribute to the visionary leader by organizing an online exhibition of his life and works (https://artsandculture.google.com/entity/prasanta-chandra-mahalanobis/m01_b18?categoryid=historical-figure). Special issues of journals Sankhya and Cryptography &Communications were planned. One may recall that on June 29, 2017, the then Hon'ble President of India, Shri Pranab Mukherjee, had inaugurated the 125th Birth Anniversary Celebrations of Mahalanobis.

It is always a delight to inform that once again the Institute faculty members have been recognized both nationally and internationally with a large number of honors and awards. I mention some of these here. In 2018, Arunava Sen was conferred the TWAS-Siwei Cheng Prize in Economics and Sanghamitra Bandyopadhyay was conferred the TWAS Prize Engineering Sciences in Trieste, Italy. Arup Bose was selected as J.C. Bose Fellow for 2019-2023 after having completed one term of this fellowship from 2014 to 2018. Nikhil Ranjan Pal was appointed President, IEEE Computational Intelligence Society. Sushmita Mitra became Fellow of the Indian National Science Academy and received the Flex Award given by the Fulbright-Nehru Academic and Professional Excellence Fellowship for 2019-2020. Pradipta Maji was elected Fellow of the National Academy of Science. Parthanil Roy received the Swarna Jayanti Fellowship, 2017-2018. He wasappointed as the Bernoulli Society Youth Representative for 2017-2020. Amartya K. Dutta was awarded the Satish C. Bhatnagar Award for Best Publication in the field ofHistory of Mathematics. Malay Bhattacharyya was awarded INAE Young Engineer Award in Computer Science and also selected as INAE Young Associate for 2018. Abhik Ghosh has won IEEE-GRSS Regional Leader Award in 2019. A more detailed list is provided in the report. A large number of faculty members continue taking up editorial assignments in the respective fields. The Institute faculty published more than 730 papers and received more than 5200 citations in 2018. The Institute is proud of their achievements and wishes them further success in the future.

An academic institution I s incomplete without a vibrant set of visitors bringing with them fresh inputs and ideas. We were privileged to welcome a large number of eminent visitors from around the world in various disciplines to the Institute. These are mentioned in the Annual Report. During this period several conferences and workshops were organized by the various units of the Institute. Some of these were the International Conference on Probability held in January 2018, the International Conference on India Biodiversity Meetorganized by the Agriculture & Ecological Research Unit during February 14-16, 2019, 4th International Workshop on Pattern Analysis and Applications organized by the Computer Vision & Pattern Recognition Unit, Kolkata during February 26-28, 2019 and the International Conference on Future of Libraries organized by the Library and Reprography & Photography Division, in collaboration with IIM, Bangalore, held at Bangalore Centre during January 26-28, 2019. On December 18th, 2018, the Foundation Day of the Institute was celebrated with a lecture by Professor Parthasarathi Chakraborti, Director, Indian Institute of Engineering Science and Technology, Shibpur.

The regular academic degree programs of the Institute are going strong as usual. The post graduate diploma in statistical methods and applications conducted in the North-East Centre of the Institute in Tezpur was opened up for students from across the country, with half of the seats being reserved for those domiciled in the North East. This course is also planned to be initiated in the Chennai Centre of the Instiute. The two-year Post Graduate Diploma in Business Analytics course, conducted jointly with the Indian Institute of Management Calcutta and Indian Institute of Technology, Kharagpur, although comparatively new continued to be rated very high internationally. The Statistical Training Diploma offered by the International Statistical Education Centre, serving officials and students from different countries, is running successfully with the current batch having trainees from eleven countries.

The Institute receives grants-in-aid from the Ministry of Statistics and Program Implementation, Government of India. The faculty members also conduct a large number of research and training projects throughout the year. The major government agencies like DBT, DST, MeITy, DAE, NITI Aayog, RBI, Government of West Bengal, Government of Jharkhand fund several research projects. Memorandum of Understandings (MOUs) have been signed/ extended between ISI and several other organizations including University of Technology, Sydney, Universita Degli Studi Di Trieste, Italy, Technical University of Košice, Slovakia, Basque Centre for Applied Mathematics (BCAM), Spain, University of the Aegean, Greece, London School of Economics and Political Science (LSE), University of Campinas, Brazil, University of Gothenburg, Sweden, University of Porto, Portugal, Cancer Research Malaysia, Dauphine Université Paris, Geological Survey of India, Airports Authority of India, National Highway Authority of India, Ministry of Mines, Tata Consultancy Services, Credit – Suisse, R S Software India Limited, Cognizant Technology Solutions India Pvt. Ltd., Price water house Coopers, TATA Steel and many more. Apart from these, the Institute is working very closely with the Government of India and various state governments for solving problems of social importance and for improvement of services being offered by the government, in addition to conducting a large number of training programs for government officials.

Construction activities are going on in the different campuses of the Institute. The academic and administrative buildings of the campus of ISI North East in Tezpur and the campus of the RC Bose Centre for Cryptology and Security are nearing completion. New construction in Bangalore campus and repair works in the Kolkata campus are ongoing. A Centre for Artificial Intelligence and Machine Learning was set up in ISI Kolkata to cater to the growing demand in this area. The Institute needs significant additional funding for further expansion and improvement of the existing infrastructure in its multiple campuses. The Institute also needs the support of the government to enhance the number of faculty posts, especially in the new centers in Tezpur and Chennai, to enable initiation of substantial academic programs there. While the Institute needs to overcome several constraints to maintain the high standards it has set for itself, it is blessed with full cooperation from the administrative ministry. I am thankful to the Secretary, Ministry of Statistics and Programme Implementation and all other officials of the Ministry of Statistics and Programme Implementation, Government of India as also the Additional Secretary and Financial Adviser for their active support. Approaching the completion of the fourth year as Director, I want to express my deep gratitude to the President of the Institute and the Chairman of the Council for their able guidance and support. I thank all the experts who serve the Institute in different capacities. Finally, I thank all the scientific and non-scientific workers, students and well-wishers of the Institute for extending their cooperation for the all-round development of the Institute.

March 31, 2019

Sanghamitra Bandyopadhyay

Preface

This Annual Report gives you a glimpse into the research and teaching activities of the Indian Statistical Institute during April 2018 to March 2019 in a completely new and revised format. Apart from the general layout, the note worthy changes include addition of new content, which comprise activities that have always been an integral part of ISI, like placement for students, national & international activities etc. In addition to teaching, research activities and publications, MoUs facilitating exchange of faculty/ students, industry-academia/ government-academia interactions and the employability and productivity of graduates have also been highlighted in this report.

These inclusions would not have been possible without the active help and cooperation extended by our faculty and staff members whose timely contribution of additional source information greatly helped us improvise this issue. We are also grateful to everyone whose tireless efforts went into the editing and formulation of a proper lay-out for the materials at hand. A special word of thanks to Monali Paladhi, *Deputy Librarian* and Debabrata Karmakar, *Public Relations Unit* who helped us in accessing and organizing content for this issue. The members of the editorial board have put in a lot of effort to make this volume a source of information about the multi-faceted activities of this institute. We sincerely regret any errors or omissions that might have crept in despite our best efforts.

The Editorial Board

CONTENTS

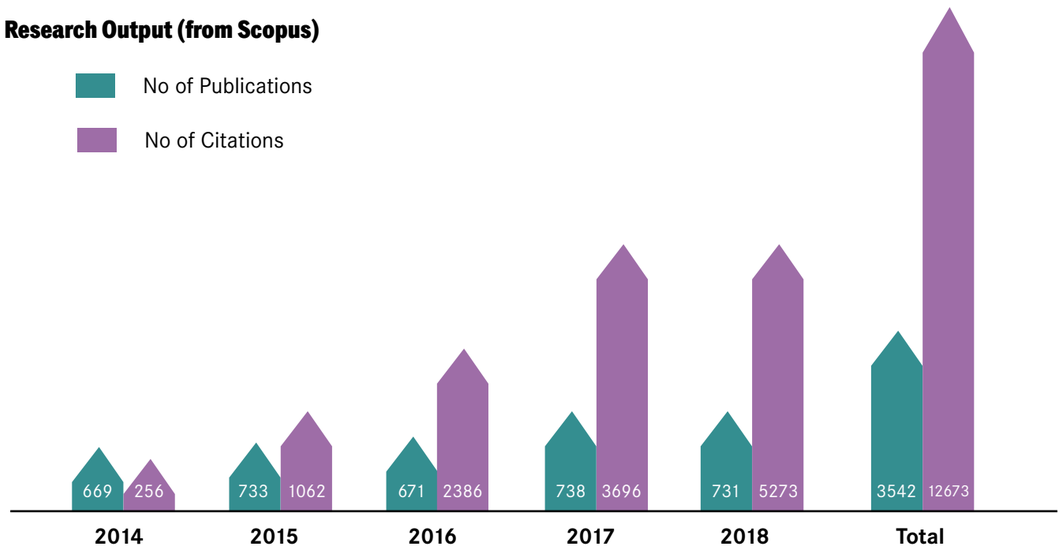
CONTENTS

THE INSTITUTE

ISI AT A GLANCE

Research Highlights

Research Output (from Scopus)



Books published : 20

Prestigious Awards and Honours

Number of Fellowship : 17	Number of Awards : 13	Number of Membership : 11
Number of Recognitions by the Academic Bodies : 9	Editorial Assignments : 88	

New MoUs signed : 16

Projects

Externally funded projects	**172**
Projects done for Govt.	**29**

Conferences, Workshops and Training Programs organized : 392

International Statistical Education Centre (ISEC)

- Founded : 1950
- Commencement date of 72nd Term : 01 August, 2018
- Number of Trainees : 14
- Countries participated : Fiji, Malawi, Tajikistan, Liberia, Ethiopia, Tunisia, Sri Lanka, Tanzania, Kenya, D.R. Congo and Niger.

JOURNEY OF ISI

Thinking ahead of times

1961	B. Stat and M. Stat programme in Statistics
1981	M.Tech programme in Computer Science
1989	M.Tech programme in Quality, Reliability and Operations Research - QROR
1996	M.S. programme in Quantitative Economics - MSQE
2000	Bachelor of Mathematics - B. Math
2003	Master of Mathematics - M. Math
2014	M.S. in Quality Management Science – MSQMS
2015	Post Graduate diploma in Buisness Analytics –PGDBA *(with IIM Kolkata & IIT Kharagpur)*
2018	M. Tech. in Cryptology and Security

Time line of some specialized programmes introduced in ISI over the years

1931-1960:

- PC Mahalanobis establishes ISI
- First international journal of Statistics in India, Sankhya, Foreword by Rabindranath Tagore
- Path breaking discoveries by ISI scientists:
  - Mahalanobis distance, large scale sample survey method -PC Mahalanobis
  - Cramer-Rao Bound, Rao-Blackwell Theorem - CR Rao
  - BCH Error correcting codes - RC Bose
  - Theory of large deviations - SRS Varadhan
  - Bahadur Efficiency and Basu's Theorem in Statistics
- National Sample Survey conceived in ISI
- UNESCO empowered ISI to train statisticians of developing countries –International Statistical Education Centre (ISEC)
- Second Five-Year Plan drafted
- ISI designs the first analog computer in India
- First digital computer in India, HEC-2M, installed in ISI
- Dinosaur fossil, Barapasaurus tagorei, discovered by ISI geologists

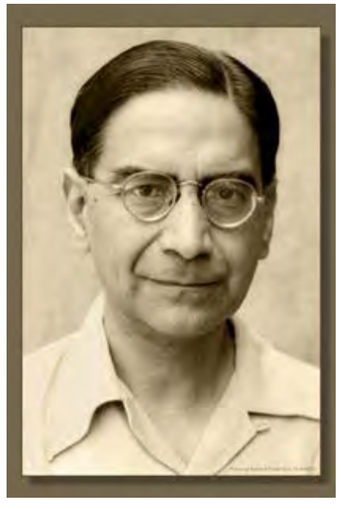
1961-2010

- First digital computer (ISIJU-1) built
- Knowledge-based computing systems
- Precursor to modern Artificial Intelligence and Data Analytics research in India
- Genomic Study, Bio informatics, Image Processing, Machine Learning
- Outreach program: North-East and Jharkhand
- Centre for Soft Computing Research
- Pioneering work in Artificial Intelligence and Machine Learning, Bioinformatics, Computational Genetics, Cryptology, Indian Language Technologies, Population Genomics, Soft Computing Technology

2011 - till date

- Centre in the North-East of India established for development of the region
- Teaching and training in Official Statistics & Policy Research
- Seminal contributions in Game theory, Algebraic Geometry, Poverty and Inequality measures, Disease Genetics
- Discovery of Shringasaurus
- Centre for (i) Cryptology and Security (ii) Climate, Food, Energy and Environment
- Computational and experimental biology research; cancer, auto-immune and neuro-degenerative diseases

BRIEF HISTORY OF THE INSTITUTE



Founder
Professor Prasanta Chandra Mahalanobis

The Indian Statistical Institute, a premier and internationally acclaimed research, teaching and training institute, is recognized as an institute of national importance.

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.

1931, Dec 17: The Indian Statistical Institute (ISI) was formally established in a meeting presided by Sir R.N. Mukherjee, the first President of the Institute and Prasanta Chandra Mahalanobis was appointed as the Honorary Secretary.

1932, April 28: The Indian Statistical Institute was registered 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, as amended in 1964.

Objectives:

- 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;
- To undertake research in various fields of natural and social sciences with a view to the mutual development of Statistics and these sciences;
- 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.
- 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 then Presidency College (now Presidency University) with enduring support from a number of distinguished personalities and devoted scholars in Calcutta. 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 the 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 Statistics in the country came into being in 1933.

ISI and Nation Building:

When India became independent, the Institute held a pivotal role in the task of nation building through the brilliant choice of the area of surveys, which were socially and nationally relevant. The patronage and invaluable contribution of Sir Ronald A. Fisher played an important role. 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. **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 Professor Mahalanobis and the planning models formulated by him and his colleagues have since been regarded as major contributions to economic planning in India. The formal recognition came in **December 1959**, when the then Prime Minister, Pandit Jawaharlal Nehru piloted the enactment of **the Indian Statistical Institute Act of 1959 in the Parliament**. This Act designated ISI as an **'Institution of National Importance'**. The activities of ISI 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 established at Kolkata and the Documentation Research and Training Centre began functioning in Bangalore. Other developments in infrastructure also began.

The 1950s saw the Institute establishing

- a full-fledged research and training school in Statistics and Probability, with applications in natural and social sciences,
- a planning wing entrusted with the formulation of the Second Five-Year Plan of India,
- the National Sample Survey wing engaged in comprehensive socio-economic data collection for the nation,
- a string of Statistical Quality Control units for promoting the quality movement at various industrial centres of the country,
- a collaboration with the International Statistical Institute to train Government statisticians from Asia and Africa, and
- an Electronic Computer Laboratory that was responsible for developing the first mechanical hand computing machine, the first Analog computer, the first Punched Card storing machine and the first Solid State Computer in India.

In 1961, 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, was visited by many 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, Genichi Taguchi and George Akerlof. Incidentally, George Akerlof was the 2001 Nobel prize winner in economics and a visiting professor of ISI during 1967-68. During recent times, the visit of Amartya K. Sen, Robert Aumann, Lotfi A. Zadeh, Joseph E. Stiglitz, Sir James A. Mirrlees, Eric Maskin, Ei-ichi Negishi, Ada Yonath, David Jonathan Gross and S.R.S. Varadhan (the 2007 Abel Prize winner for his contributions to probability theory and an alumnus of the institute) may be specially mentioned. The Institute is proud to have C.R. Rao, who is among the world leaders in statistical science and is presently 98 years of age, in its list of illustrious alumni.

Post Mahalanobis period :

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 problems, 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 organizational 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.

Over the decades diversity in research thrusts began to grow manifold, with emphasis on Computer Science and application of Statistics in new areas of research in natural and social sciences. Other Centres, with full-fledged research and teaching programmes, were gradually created.

The **Delhi Centre**, initially housed within the Planning Commission premises, was started in 1974, and was shifted to its present campus in 1975.

The **Bangalore Centre** was conceived by Professor P.C. Mahalanobis during 1960s. With the Statistical Quality Control unit functioning in Bangalore from 1956, and Documentation Research and training Centre from 1962, Professor Mahalanobis had thought of starting a centre of ISI around the mid-sixties. However, the activities of the Bangalore Centre started in September 1978 in a rented building under the Directorship of Professor G. Kallianpur. The various units moved to the present campus in May 1985 and in September 1996, the Bangalore Centre was formally declared as a Centre of ISI.

The **Chennai centre** came into being on 26th July, 2008 and has to its credit several theoretical and applied research work in Statistics and Mathematics.

A **North-East Centre** has been established **at Tezpur, Assam** on 23rd July, 2011. The Post-Graduate Diploma in Statistical Methods and Analytics (PGDSMA) course has been running successfully at the N-E Centre, Tezpur.

The Institute offers a one-year Postgraduate Diploma in Computer Applications (PGDCA) since the year 2014-15 at its Giridih Branch while a two-year full time diploma programme named, Post Graduate Diploma in Business Analytics (PGDBA) is being jointly offered by ISI Kolkata, IIT Kharagpur and IIM Calcutta since 2015.

The present structure of seven divisions has been arrived at through some further changes. Re-organization of the Divisions has also been attempted. Systems Science and Informatics Unit (SSIU) was started as a part of the Computer and Communication Sciences Division (CCSD) at ISI Bangalore centre in August 2009. The Documentation Research and Training Centre (DRTC) has been made a part of CCSD. Cryptology and Security Research Unit (CSRU) also became a part of CCSD in April, 2014. The CSRU is an integral component of R.C. Bose Centre for Cryptology and Security, Kolkata. It is worth mentioning that the R.C. Bose Centre for Cryptology and Security is a national hub for cryptographic requirements. 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.

Funding:

The Ministry of Statistics & Programme Implementation, Government of India provides full funding to the Institute. Their support and constant encouragement are among the major factors which helps the Institute to sustain its academic growth and excellence. Funds are provided for –

- Plan & Non-Plan budget as per the recommendations of a committee set up for the purpose under Section 8(1) of the "Indian Statistical Institute Act. 1959, No. 57 of 1959" based on the programme of research, teaching, training and various academic activities.
- Grants-in-aid which include the funds required for construction of buildings, hostels, guest house, purchase of equipment, hiring manpower etc.
- Expansion of research and training activities of the Institute by way of opening new Centres in various parts of the country e.g., the Ministry of Statistics & Programme Implementation, Government of India approved establishment of R.C. Bose Centre for Cryptology and Security, as a separate Centre of the Institute, in July 2012.

Distinguished scientists and statesmen who have served the Institute since inception

Presidents

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	1944-63
7	Shri Y.B. Chavan	1964-66
8	Professor Satyendra Nath Bose	1967-75
9	Shri Subimal Dutt	1976-89
10	Professor M.G.K. Menon	1990-2012
11	Dr. C. Rangarajan	2012-16
12	Dr. Vijay Kelkar	2016-18
13	Shri Bibek Debroy	2018-till date

Chairmen

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	2004-12
10	Shri A.K. Antony	2012-14
11	Dr. Arun Shourie	2014-16
12	Professor Goverdhan Mehta	2016- till date

Directors

1	Professor P.C. Mahalanobis	Dec	1931	-	June	1972
2	Professor C.R. Rao	July	1972	-	June	1976
3	Professor G. Kallianpur	July	1976	-	Sept	1978
4	Professor B.P. Adhikari	Aug	1979	-	Oct	1983
5	Professor Ashok Maitra	April	1984	-	Jan	1987
6	Professor J.K. Ghosh	Jan	1987	-	Jan	1992
7	Professor B.L.S. Prakasa Rao	Jun	1992	-	Feb	1995
8	Professor S.B. Rao	July	1995	-	July	2000
9	Professor K.B. Sinha	Aug	2000	-	July	2005
10	Professor S.K. Pal	Aug	2005	-	July	2010
11	Professor Bimal K. Roy	Aug	2010	-	July	2015
12	Professor Sanghamitra Bandyopadhyay	Aug	2015	-	till date	

D.Sc. (Honoris Causa) awardees

February 1962	Professor Satyendra Nath Bose, Professor Ronald A. Fisher, Pandit Jawaharlal Nehru, Dr. Walter A. Shewhart
April 1962	Professor A.N. Kolmogorov
May 1965	Dr. Chintaman Dwarkanath Deshmukh
December 1974	Professor Raj Chandra Bose, Dr. M.V. Keldysh, Professor Jerzy Neyman
February 1977	Professor Harald Cramer
February 1978	Shri Morarji Desai, Professor L.V. Kantorovich
December 1989	Professor C.R. Rao
January 2001	Professor Gopinath Kallianpur
February 2004	Professor S.R. Srinivasa Varadhan
March 2006	Professor L.A. Zadeh
December 2006	Dr. Manmohan Singh
February 2011	Dr. Subhas Mukherjee (Posthumously)
January 2013	Prof. K.R. Parthasarathy, Prof. Jayanta Kr. Ghosh, Prof. Pranab Bardhan

ORGANIZATIONAL CHART

Theoretical Statistics and Mathematics Division
- Theoretical Statistics and Mathematics Unit (SMU), Bangalore
- Theoretical Statistics and Mathematics Unit (SMU), Delhi
- Theoretical Statistics and Mathematics Unit (SMU), Kolkata
- Theoretical Statistics and Mathematics Unit (SMU), Chennai

Applied Statistics Division
- Applied Statistics Unit (ASU), Kolkata
- Applied Statistics Unit (ASU),Chennai
- Interdisciplinary Statistical Research Unit (ISRU), Kolkata
- Applied and Official Statistics Unit (AOSU), North-East Centre, Tezpur

Computer and Communication Sciences Division
- Advanced Computing and Microelectronics Unit (ACMU),Kolkata
- Computer Vision and Pattern Recognition Unit (CVPRU), Kolkata
- Cryptology and Security Research Unit (CSRU), Kolkata
- Documentation Research and Training Centre (DRTC), Bangalore
- Electronics and Communication Sciences Unit (ECSU), Kolkata
- Machine Intelligence Unit (MIU), Kolkata
- Systems Science & Informatics Unit (SSIU), Bangalore
- Computer Science Unit (CSU), Chennai

Physics and Earth Sciences Division
- Geological Studies Unit (GSU), Kolkata
- Physics and Applied Mathematics Unit (PAMU), Kolkata
- Theoretical and Applied Science Unit (TASU), North-East Centre, Tezpur

Biological Sciences Division
- Agricultural and Ecological Research Unit (AERU), Kolkata & Giridih
- Biological Anthropology Unit (BAU), Kolkata
- Human Genetics Unit (HGU), Kolkata

Social Sciences Division
- Economic Analysis Unit (EAU), Bangalore
- Economic Research Unit (ERU), Kolkata
- Linguistic Research Unit (LRU), Kolkata
- Sampling and Official Statistics Unit (SOSU), Kolkata
- Socio-Economic Research Unit(SERU), North-East Centre, Tezpur
- Economics and Planning Unit (EPU), Delhi
- Population Studies Unit (PSU), Kolkata
- Psychology Research Unit (PRU), Kolkata
- Sociological Research Unit (SRU), Kolkata & Giridih

Statistical Quality Control and Operations Research (SQC & OR) Division
- SQC & OR Unit, Bangalore
- SQC & OR Unit, Chennai
- SQC & OR Unit, Coimbatore
- SQC & OR Unit, Delhi
- SQC & OR Unit, Hyderabad
- SQC & OR Unit, Kolkata
- SQC & OR Unit, Mumbai
- SQC & OR Unit, Pune

Library, Documentation and Information Sciences Division
- Library, Kolkata
- Library North-East Centre, Tezpur
- Library, Delhi
- Library, Bangalore
- Library, Chennai

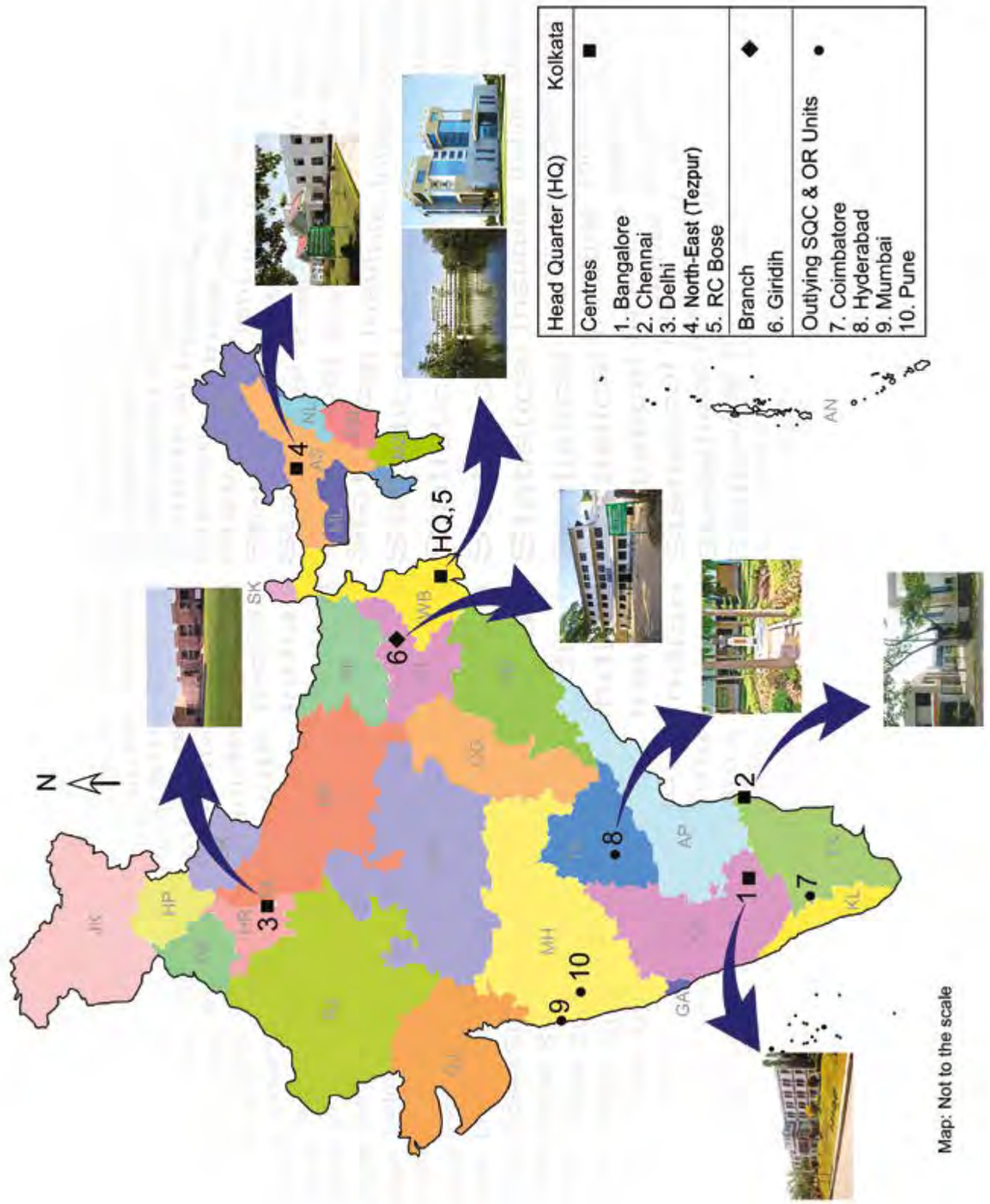
Teaching and Training Division
- Dean's Office
- Placement Cell

Computer and Statistical Services Centre

Associate Institutions
- Center for Soft Computing Research: A National Facility, Kolkata
- International Statistical Education Centre (ISEC), Kolkata

Administrative Services Division
- Accounts Section
- Audio Visual Unit
- Canteen
- Cash Unit
- Chief Executive (Administrative & Finance)'s Office
- Despatch Unit
- Central Stores
- Council Section
- Director's Office
- Electrical Maintenance Unit
- Engineering Unit
- Estate Office
- Guest House
- Hostels
- House Building Advance Cell
- Import & Travel Cell
- Internal Audit Cell
- Legal Cell
- Medical Expenses Reimbursement Unit
- Medical Welfare Unit
- Personnel Unit
- Provident Fund Unit
- Public Relations Unit
- Publication and Printing Unit
- Official Language Cell
- Retirement Benefit Cell
- Security Unit
- Telephone Unit
- Transport Unit

LOCATIONS



Head Quarter (HQ)	Kolkata
Centres	■
1. Bangalore	
2. Chennai	
3. Delhi	
4. North-East (Tezpur)	
5. RC Bose	
Branch	◆
6. Giridih	
Outlying SQC & OR Units	●
7. Coimbatore	
8. Hyderabad	
9. Mumbai	
10. Pune	

Map: Not to the scale

THE COUNCIL & KEY COMMITTEES

Council

President: Shri Bibek Debroy,

Chairman: Professor Goverdhan Mehta, FNA, FRS, Dr. Kallam Anji Reddy Chair School of Chemistry, University of Hyderabad, Hyderabad - 500 046, Telangana.

Director: Professor Sanghamitra Bandyopadhyay.

Representatives of the Government of India

Shri Ali R Rizvi, Additional Secretary and Financial Advisor, Government of India, Ministry of Statistics and Programme Implementation, New Delhi.
Shri Jyotirmoy Poddar, DG (ES), Government of India, Ministry of Statistics and Programme Implementation, New Delhi.
Shri Pramod Kumar Das, Additional Secretary, Government of India, Ministry of Finance, Department of Expenditure, New Delhi.
Dr. Praveer Asthana, Adviser/Scientist-G, Head (AI and Mega Science Divisions), Government of India, Ministry of Science and Technology, New Delhi.
Dr. Rajiv Ranjan, Adviser and Officer-in-Charge, Department of Economic and Policy Research, Reserve Bank of India, Mumbai.
Shri Madan Mohan, Deputy Director General (HE), Government of India, Ministry of Human Resource Development, New Delhi.

Representative of the ICSSR

Professor V.K. Malhotra, Member-Secretary, Indian Council of Social Science Research, New Delhi.

Representatives of the INSA

Dr. Manindra Agrawal, N Rama Rao Chair Professor, Department of Computer Science, Indian Institute of Technology, Kanpur.
Professor B.L.S. Prakasa Rao, Ph. D, FNA, FASc, FNASc., FAPAS, Former Director ISI, INSA Senior Scientist, CR Rao Advance Institute of Mathematics, Statistics and Computer Science, Hyderabad.
Dr. Madhu Dikshit, THSTI National Chair, Haryana.
Professor Yadati Narahari, Department of Computer Science and Automation, Indian Institute of Science, Bangalore.

Representative of the University Grants Commission

Professor Umesh Singh, Department of Statistics, Institute of Science, Banaras Hindu University, Varanasi.

Scientists co-opted by the Council

Professor Rohini M. Godbole, FNA, Centre for High Energy Physics, Indian Institute of Science, Bangalore.
Dr. Ravi P. Singh, Secretary General of Quality Council of India, An independent organization under Department of Industrial Policy and Promotion, Government of India

Elected representatives of the Institute members not employed in the Institute

Professor Shibdas Bandyopadhyay, Kolkata.
Dr. Aditya Bagchi, Kolkata.
Dr. I.K. Ravichandra Rao, Bangalore.

Elected representatives of the employees of the Institute

Dr. Partha Pratim Mohanta, Representative of the Scientific Workers.
Shri Gouri Sankar Acharya, Representative of the Non-Scientific Workers.

Officers of the Institute

Professor B.V. Rajarama Bhat, Professor-in-Charge, Theoretical Statistics and Mathematics Division.
Professor Sumitra Purkayastha, Professor-in-Charge, Applied Statistics Division.
Professor E. Somanathan, Professor-in-Charge, Social Sciences Division.
Professor Parthasarathi Ghosh, Professor-in-Charge, Physics and Earth Sciences Division.
Professor Susmita Mukhopadhyay, Professor-in-Charge, Biological Sciences Division.
Professor Bhabatosh Chanda, Professor-in-Charge, Computer and Communication Sciences Division.
Dr. Ashis Kr. Chakraborty, Head, SQC & OR Division.
Professor Abhay G. Bhatt, Head, Delhi Centre.
Professor C.R.E. Raja, Head, Bangalore Centre.
Dr. D. Sampangi Raman, Acting Head, Chennai Centre.
Professor Goutam Mukherjee, Dean of Studies.

Non-Member Secretary

Brigadier Jagdish Narayan Pandey (Retd), Chief Executive (Administration & Finance).

Academic Council

Sanghamitra Bandyopadhyay, Director (Chairperson)
Goutam Mukherjee, Dean of Studies (Convener)

Theoretical Statistics and Mathematics Division

B.V. Rajarama Bhat, Mohana Delampady, Sunanda Bagchi, B. Rajeev, B. Sury, V.R. Padmawar, Siva Athreya, C. Robinson Edward Raja, Probal Chaudhuri, Alok Goswami, Arup Bose, Goutam Mukherjee, Gopal Krishna Basak, Pradipta Bandyopadhyay, Amartya Kumar Dutta, Debashish Goswami, Rudra Pada Sarkar, Mahuya Datta, Rahul Roy, R.B. Bapat, Abhay Gopal Bhatt, Arup Kumar Pal, Isha (Bagai) Dewan, Anish Sarkar, Swagato Kumar Ray, Ritabrata Munshi, Anil Kumar Ghosh, Mrinal Kanti Das, Partha Sarathi Chakraborty, Jaydeb Sarkar.

Applied Statistics Division

Sushama M. Bendre, Bimal Kr. Roy, Debasis Sengupta, Anup Dewanji, Mausumi Bose, Palash Sarkar, Debapriya Sengupta, Tapas Samanta, Atanu Biswas, Subhamoy Maitra, Pabitra Pal Choudhury, Subir Kumar Bhandari, Smarajit Bose, Rita Saha Ray, Sumitra Purkayastha, Ayanendranath Basu.

Social Sciences Division

Madhura Swaminathan, Satya Ranjan Chakravarty, Amita Majumder, Abhirup Sarkar, Nityananda Sarkar, Manash Ranjan Gupta, Tarun Kabiraj, Manipushpak Mitra, Indraneel Dasgupta, Arunava Sen, E. Somanathan, Prabal Roy Chowdhury, Tridip Ray, Chetan Ghate. Abhiroop Mukhopadhyay, Debasis Mishra, Samarjit Das.

Biological Sciences Division

Joydev Chattopadhyay, Anjana Dewanji, Arunava Goswami, Barun Mukhopadhyay, Subrata Kr. Roy, Bidyut Roy, Saurabh Ghosh, Pabitra Banik, Susmita Mukhopadhyay.

Physics and Earth Sciences Division

Dilip Saha, Chandan Chakraborty, Dhurjati Prasad Sengupta, Saswati Bandyopadhyay, Subir Ghosh, Barnana Roy, Banasri Basu, Guruprasad Kar, Parthasarathi Ghosh, Preeti Parashar.

Computer and Communication Sciences Division

Subhas Chandra Nandy, Nabanita Das, Susmita Sur-Kolay, Sandip Das, Umapada Pal, Bhabatosh Chanda, Nikhil Ranjan Pal, Krishnendu Mukhopadhyaya, Kumar Sankar Roy, Dipti Prasad Mukherjee, Srimanta Pal, Sushmita Mitra, Ashish Ghosh, Sanghamitra Bandyopadhyay, Rajat Kumar De, Devika P. Madalli, B.S. Daya Sagar, Utpal Garain, Pradipta Maji, A.R.D. Prasad, Kausik Kumar Majumdar.

Statistical Quality Control and Operations Research Division

Kalyan Kumar Chowdhury, P.K. Perumallu, Ashim Roy Chowdhury, U. Haridas Acharya, Surajit Pal, A. Rajagopal, Samir Kr. Neogy, G.S.R. Murthy, A.L.N. Murthy, Amitava Bandyopadhyay, Dipak Kr. Manna, Arup Kumar Das, Ranjan Sett, Arup Ranjan Mukhopadhyay, Abhijit Gupta, Prasun Das, Ashis Kr. Chakraborty, Nandini Das, Susanta Kr. Gauri, Md. Zafar Anis, Ashok Sarkar, Sanjit Ray, E. V. Gijo

Library, Documentation and Information Sciences Division

Kishor Chandra Satpathy

Computer and Statistical Service Centre (CSSC)

Amitava Datta, Debashis Roy,

Member-Secretary, ISEC

Ayanendranath Basu

Finance Committee

Director (Chairperson), Government Representative (MOS & PI), Government Representative (Ministry of Finance), Professor Abhirup Sarkar, ISI, Kolkata, Professor Dilip Saha, ISI, Kolkata, Professor Nikhil R. Pal, ISI, Kolkata, Professor Pabitra Banik, ISI, Kolkata, Professor Chetan Ghate, ISI, Delhi, Dr. Prasun Das, ISI, Kolkata, Head, Delhi Centre, Head, Bangalore Centre, Head, Chennai Centre, Dr. Partha P. Mohanta, Shri Samar Ray (Former PS, Finance Dept., Government of WB; Former Dy. Comptroller and Auditor General, Government of India) (External Expert), Chief Executive (A&F), Shri Sudip K. Chakraborty (Convener)

Works Advisory Committees

Kolkata

Professor Anandapran Gupta (Chairperson), Professor Rajat K. De (Vice-Chairperson), Professor Rajkumar Roychowdhury , Professor Smarajit Bose, Professor Indranil Dasgupta, Dr. Ashis K. Chakraborty, Dr. Bhaskar Sengupta [Expert (Civil)], Professor Siddhartha Datta [Expert (Architecture)], Shri Asim Sinha [Expert (Electrical)], Chief Executive (A&F), Dr. Partha P. Mohanta, Shri Amitava Mukherjee, In-Charge, EMU, In-Charge, Engg. Unit (Convener)

Delhi

Professor B. Bhattacharjee, Civil Engineering department, IIT Delhi (Chairman) Head ISI Delhi, Mr. G. K.Taneja, Institute Engineer, IIT Delhi– Expert (Electrical), Mr. R. Upadhyay, Executive Engineer (Civil), Shri Lal Bahadur Sanskrit Vidyapeeth - Expert (Civil), Mr. Madhav Naik (Architect), Professor Anish Sarkar, ISI Delhi, Prof S. K. Neogy, ISI Delhi, Professor Moni Shankar Bishnu , ISI Delhi, Mr. Parama Gogoi, ISI Delhi, Mr. Pratyush Banerjee, DCE (A), ISI Delhi (Convener)

Bangalore

Professor K.S. Nanjunda Rao (Chairperson), Dr. B.K. Keshavan, External expert (Electrical Engineering), Dr. S. V. Venkatesh, External expert (Civil Engineering), Head, ISI, Bangalore Centre, Head, Stat-Math Unit, ISI, Bangalore or his/her nominee), Head, DRTC, ISI, Bangalore or his/her nominee, Head, SQC & OR Unit, ISI, Bangalore or his/her nominee, Head, E.A.U., ISI, Bangalore or his/her nominee, Head, SSIU, ISI, Bangalore or his/her nominee, Ms. N. Sarvamangala, Accounts Officer, Bangalore Centre, Sr. Administrative Officer, ISI, Bangalore (Convener)

Ph.D. / D.Sc. Committees

Statistics

Director or his/her nominee (Chairperson), Dean of Studies or his/her nominee, Mausumi Bose, Gopal K. Basak, Mohan Delampady, V. Padmawar, Isha Dewan, Abhay G. Bhatt, Ayanendranath Basu, Tapas Samanta, Anil K. Ghosh, Atanu Biswas (Convener)

Mathematics

Director or his/her nominee (Chairperson), Dean of Studies or his/her nominee, B. Sury, Siva Athreya, Swagato K. Ray, Mrinal Kanti Das, Banasri Basu, Debashish Goswami, Parthasarathi Chakraborty, Arup K. Pal (Convener)

Computer Science

Director or his/her nominee (Chairperson), Dean of Studies or his/her nominee, Subhas C. Nandy, Susmita Sur-Kolay, Mandar Mitra, Bhabatosh Chanda, Nikhil R. Pal, Sushmita Mitra, Subhamoy Maitra, Pradipta Maji, Utpal Garain (Convener)

Quantitative Economics

Director or his/her nominee (Chairperson), Dean of Studies or his/her nominee, Indraneel Dasgupta, Manipushpak Mitra, Prabal Roy Chowdhury, Madhura Swaminathan, Debasis Mishra, Abhiroop Mukhopadhyay, Tarun Kabiraj (Convener)

SQC & OR

Director or his/her nominee (Chairperson), Dean of Studies or his/her nominee, Mohan Delampady, Subir Bhandari, Utpal Garain, Smarajit Bose, Ashis K. Chakraborty, E.V. Gijo, Samir K. Neogy, Arup K. Das (Convener)

Policy Planning and Evaluation Committee (PPEC)

Chairman of ISI Council (Chairperson), Director (Vice-Chairperson), Director General, CSO, Financial Advisor, MOS & PI, Professor Kalyan B. Sinha, Professor B.L.S. Prakasa Rao Professor Partha P. Majumder, Professor Partha P. Chakraborty, Director, IIT Kharagpur, Professor Ahay G. Bhatt, ISI, Delhi, Professor Mohan Delampady, ISI Bangalore, Professor Dhrubojyoti Chattopadhyay, Former Pro-VC (Acad.) Calcutta University, VC Amity University, Professor Dipti P. Mukherjee, ISI (Convener)

Technical Advisory Committees (TAC)

Theoretical Statistics and Mathematics Division

Director, ISI (Chairperson), Professor V. Balaji, Professor Indranil Biswas, Professor Tathagata Bandyopadhyay, Professor B.L.S. Prakasa Rao, Professor V.S. Borkar, Professor-in-Charge, Statistics & Mathematics Division (Convener)

Applied Statistics Division

Director, ISI (Chairperson), Professor S. P. Mukherjee, Professor Rahul Mukherjee, Professor Debasis Kundu Professor Kalyan Das, Professor-in-Charge, Applied Statistics Division (Convener).

Computer and Communication Sciences Division

Director, ISI (Chairperson), Professor P. Nagabhushan, Professor Santanu Chaudhury, Professor Partha P. Chakraborty, Dr. Pijushkanti Panigraphi, Professor Pallab Dasgupta, Professor Naveen Garg, Professor Chiranjib Bhattacharyya, Professor-in-Charge, Computer & Communication Sciences Division (Convener)

Physics and Earth Sciences Division

Director, ISI (Chairperson), Professor Ashok Sahni, Professor Narayan Banerjee, Professor Suman Chakraborty, Professor Santanu Banerjee, Professor N.V. Chalpati Rao, Professor-in-Charge, Physics & Earth Sciences Division (Convener)

Biological Sciences Division

Director, (ISI) (Chairperson), Professor Nitai P. Bhattacharyya, Professor Himanshu Pathak, Professor Giriraj Chandak, Professor A. R. Sharma, Professor Gautam Kshatriya, Professor Aditya Chatterjee, Professor-in-Charge, Biological Sciences Division (Convener)

Social Sciences Division

Director, ISI (Chairperson), Prof Saikat Roy, Prof Anindya Sen, Prof Arvind Pandey, Prof K. S. James, Prof Tista Bagchi, Prof Rajni Palriwala, Prof Achla Raina, Professor-in-Charge, Social Sciences Division (Convener)

Statistical Quality Control and Operations Research Division

Director, ISI (Chairperson), Professor Ramanuj Majumdar, Professor Debasis Kundu, Professor Manoj Tiwari, Dr. O.P. Mall, Head, SQC & OR Division (Convener)

Library, Documentation and Information Sciences Division

Director, ISI (Chairperson), Dr. G. Mahesh, Dr. P.R. Goswami, Professor Sachindra Nath Bhattacharya, Dr. M. Paul Pandian, Chief Librarian, Library (Convener).

TEACHING AND TRAINING

Dean of Studies: Professor Goutam Mukherjee, SMU Kolkata
Office of the Dean of Studies: 5th floor, S.N. Bose Bhawan, ISI, Kolkata-700 108

ISI Placement Committee
Chairperson: Dr. Ashis Kumar Chakraborty, SQCOR Kolkata
Convener: Dr. Debapriyo Majumdar, CVPR Kolkata
Kolkata Office: 5th floor, S.N. Bose Bhawan, ISI, Kolkata-700 108

International Statistical Education Center (ISEC)
Member-Secretary, ISEC: Professor Ayanendranath Basu, ISRU Kolkata
ISEC Location: C.D. Deshmukh Bhawan, ISI, Kolkata-700 108

ISI is one of the premier institutes of India and is renowned worldwide for its first holistic degree programmes in Statistics (both UG and PG), introduced by its founder, Professor P.C. Mahalanobis.

PROGRAMMES OFFERED

The following academic programmes were offered during the academic session 2018-2019:

UG DEGREE PROGRAMMES (Three years)	Offered at
Bachelor of Statistics - B. Stat. (Hons.)	Kolkata
Bachelor of Mathematics - B. Math. (Hons.)	Bangalore
PG DEGREE PROGRAMMES (Two years)	
Master of Statistics - M. Stat.	Delhi & Kolkata
Master of Mathematics - M. Math.	Bangalore/Kolkata, every alternate year
Master of Science (M.S.) in Quantitative Economics - MSQE	Delhi & Kolkata
Master of Science (M.S.) in Quality Management Science - MSQMS	Bangalore
Master of Science (M.S.) in Library and Information Science - MSLIS	Bangalore
M. Tech. in Computer Science	Kolkata
M. Tech. in Cryptology and Security (New course in 2018)	Kolkata
M. Tech. in Quality, Reliability and Operations Research	Kolkata
PG DIPLOMA PROGRAMMES (One year)	
Post Graduate Diploma in Statistical Methods and Analytics	Tezpur, North-East Centre
Post Graduate Diploma in Computer Applications	Giridih
PG DIPLOMA PROGRAMME (Two years)	
Post Graduate Diploma in Business Analytics (PGDBA)	Jointly offered at IIM Kolkata IIT Kharagpur and ISI Kolkata
DOCTORAL PROGRAMMES	Bangalore, Chennai, Delhi, Giridih, Hyderabad & Kolkata

A. Research Fellowships and degrees awarded by ISI in Statistics, Mathematics, Quantitative Economics, Computer Science, Quality, Reliability and Operations Research

B. Research Fellowships awarded by ISI and degrees awarded by other academic bodies in areas including Biological Sciences, Geology, Library & Information Science and Physics.

C. Research Fellowships awarded by government bodies (e.g. CSIR, DST, INSPIRE, NBHM, UGC) and degrees awarded by ISI/other academic bodies.

The Institute also confers D.Sc. (Honoris Causa)

TRAINING PROGRAMMES

A. Short term training programmes (duration: ranging from 4 weeks to 6 months): This training is provided to UG/PG students from other reputed Universities/Institutions as part of their curriculum requirements/ for enhancement of knowledge and application skills, under the guidance of faculty members of the Institute.

B. International Training Programme (duration: 10 months)**:**

This training is imparted by the **International Statistical Education Center (ISEC)**, founded in 1950 at the initiative of Professor P.C. Mahalanobis, through an agreement between the International Statistical Institute and the Indian Statistical Institute (ISI). Presently, the Centre is run by ISI under the auspices of the Government of India and functions under a Joint Board of Directors.

This training programme leads to a diploma in Statistical Theory and Applications and is offered to selected overseas participants from countries of the Middle East, South-East Asia, Far-East and the Commonwealth countries of Africa. Participants are trained in theoretical and applied aspects of statistics at various levels and special courses on different topics of varying duration are also organized, as deemed necessary.

ADMISSIONS

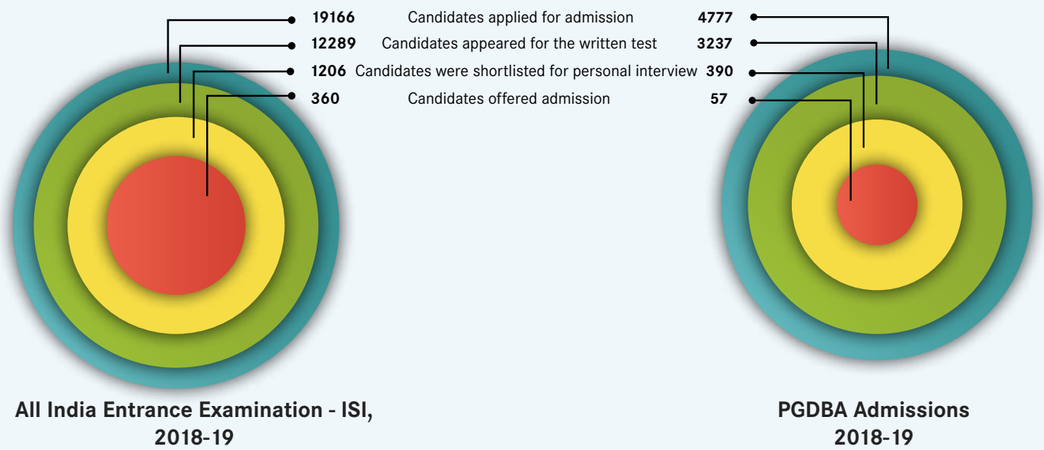
DEGREE, DIPLOMA AND Ph.D. PROGRAMMES

The office of the Dean of Studies takes care of all academic matters related to the courses and training programmes, from admissions to the award of final degrees. The Faculty members of the Institute, in addition to their regular teaching duties under various academic programmes, also offer research courses in consultation with the Research Fellow Advisory Committee (RFAC) of the respective divisions to the Research Fellows of the Institute.

The **All India Entrance examination for all programmes** excepting PGDBA, is conducted by the Admissions Committee of ISI. The tests for the Academic session 2018-19 were conducted on Sunday, May 13, 2018 in 47 centres across the country.

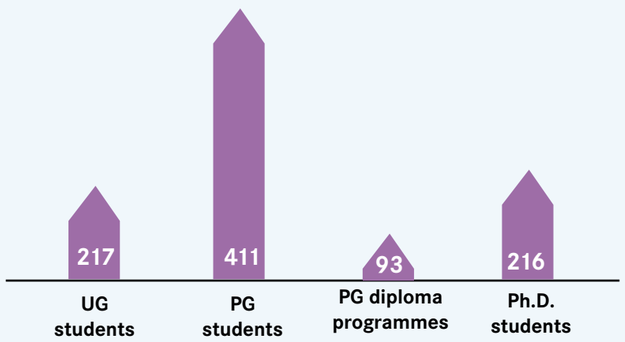
Selection for the **Post Graduate Diploma in Business Analytics** (PGDBA) programme is jointly framed and conducted on a rotation basis byeither IIM Kolkata, IIT Kharagpur or ISI Kolkata. ISI Kolkata last conducted the admission tests in 2017 and will do so again in 2020. Admission tests for the 2018-19 session was held at IIM, Kolkata. Classes for the 1st semester are held in ISI every year.

The Selection Process



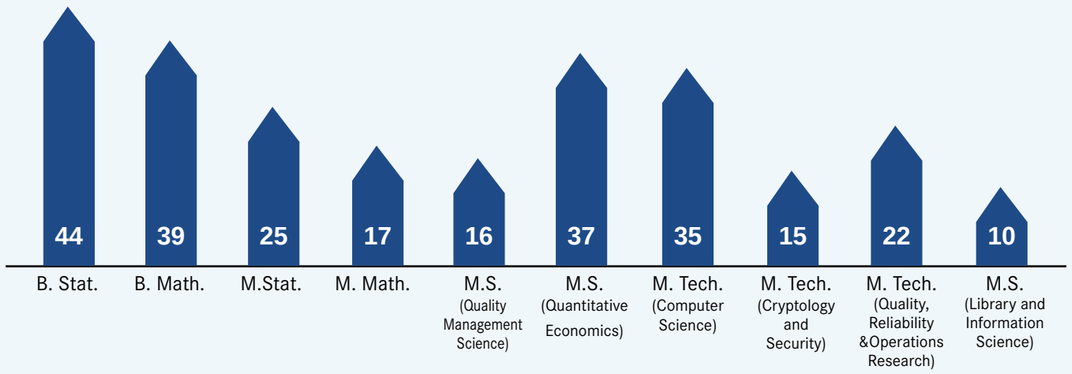
STUDENT ENROLLMENT

Distribution of total students (2018-19)

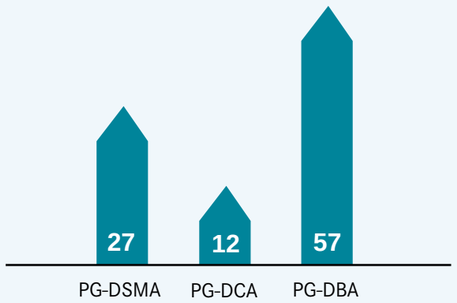


2018-19 Intake

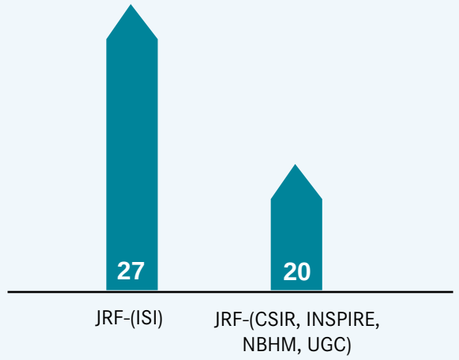
Distribution across UG/PG degree programmes



Distribution across PG diploma programmes



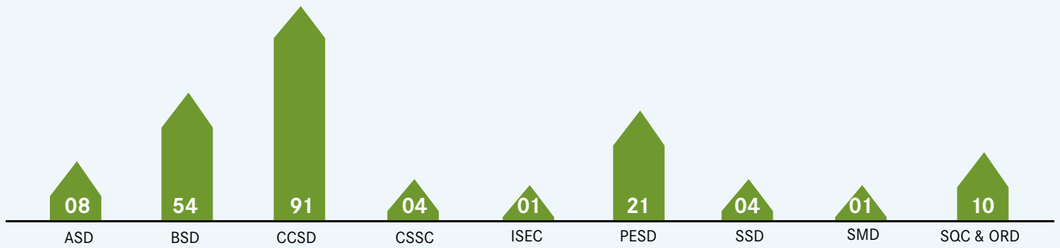
Distribution across PhD programme



TRAINING PROGRAMMES

A) Short term training programmes

During 2018-19, **194 students** from different Institutes/Universities in India received training under the guidance of faculty members from different Divisions of the Institute



INTERNATIONAL STATISTICAL EDUCATION CENTER (ISEC)

(Batch of 2018-19)

The 72nd term of the ISEC Regular Course (2018-2019) commenced on August 01, 2018. This batch consists of 14 trainees of which 13 were supported by fellowships under the Indian Technical Economic Coperation (ITEC)/ Special Commonwealth African Assitances Programme (SCAAP) of the Ministry of External Affairs, Government of India, while one trainee is supported by a fellowship of the Central Bank of Sri Lanka.

The trainees represented from the following eleven countries, namely,

Democratic Republic Congo, Ethiopia, Fiji, Kenya, Liberia, Malawi, Niger, Sri Lanka

Tajikistan, Tanzania, Tunisia

Two special courses were conducted during the year at the request of the National Statistical Bureau of Bhutan. The first one was a two-week training program on “Sampling Methodologies for Conducting Household Surveys” while the second was a two- week special course on “Population Projection and Life Table Construction”.

Professor Sanghamitra Bandhopadhyay, Director, ISI took special interest in enhancing the international image of the ISEC courses and its infrastructure. The ISEC class rooms have shifted to the first floor of Deshmukh Bhavan, a new building in the campus. The new facilities include four class rooms with all modern amenities including scope for interactive presentations, a computer laboratory, one library and faculty rooms for the Member-Secretary, Programme Coordinator and faculty members. Computer Laboratories are available for the trainees at the ISEC office and the ISEC hostel. The trainees also have access to the books of the ISI library. Teachers at the headquarter of the Indian Statistical Institute and officers of the Government of India at the National Statistical Systems Training Academy, the National Sample Survey Office and various ministries have participated in teaching the Regular Course during this year.

This batch will be awarded the Statistical Training Diploma in the Convocation on 30th May 2019.

Till date, more than 1665 trainees from some 84 countries have received the Statistical Training Diploma.

GRADUATING STUDENTS (2018-19)

Number of candidates who received Degrees and Diplomas at the Convocation held on 10th January, 2019

	Degree/Diploma	Number of candidates
1	Doctor of Philosophy (Ph.D.)	55*
2	Master of Technology (M. Tech.) in Computer Science	20
3	Master of Technology (M. Tech.) in Quality, Reliability and Operations Research	17
4	Master of Statistics (M. Stat.)	36
5	Master of Mathematics (M. Math.)	14
6	Master of Science (M.S.) in Quantitative Economics	39
7	Master of Science (M.S.) in Library and Information Science	09
8	Master of Science (M.S.) in Quality Management Science	11
9	(a) Bachelor of Statistics (Honours) (B. Stat. (Hons.))	31
	(b) Bachelor of Statistics (B. Stat.)	01
10	(a) Bachelor of Mathematics (Honours) (B. Math. (Hons.))	23
11	Post-Graduate Diploma in Statistical Methods and Analytics	12
12	Post-Graduate Diploma in Computer Applications	07
	Total	275

*(Including those who worked in the Institute but were awarded Ph.D. degree by other academic bodies.)

Recipients of various medals and prizes in recognition of their outstanding performance

UG Programmes

RAJANALA SAMYAK

S. H. Aravind Gold Medal for outstanding performance in ***B. Math. (Hons.) Programme*** (2015-2018)

ABHINAV CHAKRABORTY

ISI Alumni Association-***Mrs. M.R. Iyer Memorial Gold Medal,*** for outstanding performances in ***B. Stat. (Hons.) Programme***
Nikhilesh Bhattacharya *Memorial Gold Medal* for the best student in ***B. Stat. (Hons.) Programme*** (2015–2018)

SIDDHAARTH SARKAR

D. Basu Memorial Gold Medal for best performance in ***B. Stat. (Hons.) Programme*** (2015–2018)

UG Programmes

DISHA GHANDWANI

Usri Gangopadhyay Memorial Medal for the best female student in ***B. Stat. (Hons.) Programme*** (2015 – 2018)

DEBOLINA PAUL

Mukul Chaudhuri Memorial Prize for the best female student in ***B. Stat. (Hons.) Programme*** - second year batch (2017-2018)

ARCHI DE

Mukul Chaudhuri Memorial Prize for the best female student in ***B. Stat. (Hons.) Programme*** - first year batch (2017-2018)

PG Programmes

TIAS KUNDU

ISI Alumni Association ***P. C. Panesar Gold Medal***, for outstanding performance in ***M. Math. Programme*** (2016- 2018)

SOUVIK RAY

ISI Alumni Association ***J. K. Ghosh Memorial Gold Medal***, for outstanding performance in ***M. Stat. Programme*** (2016-2018):

SAYAN DAS

Prasanta Chandra Mahalanobis Gold Medal for the most outstanding performance in ***M. Stat. Programme*** (2016- 2018)

SUMIT KUMAR KAR

Sabyasachi Roy Memorial Gold Medal for the best project work in second year of ***M. Stat. Programme*** (2016-2018)

PG Programmes

SHRESTH GARG

Sanghamitra Das Memorial Gold Medal for outstanding performance in ***M.S. (Q.E.) Programme*** (2016-2018)

MANISHA LADHA

Dr. N. S. Iyenger Award for best student of ***Econometrics*** (2016-2018)

SUBHRA MAZUMDAR

ISI Alumni Association ***Rashi Ray Memorial Medal***, for outstanding performance in ***M. Tech. (CS) Programme*** (2016-2018)

MANASWI

Sunity Kumar Pal Gold Medal for the best dissertation in ***M. Tech. (CS) Programme*** (2016-2018)

DEBOJYOTI SAMADDER

ISI Alumni Association ***Mrs. M.R. Iyer Memorial Gold Medal,*** for outstanding performances in ***M. Tech. (QROR) Programme***

DOCTORAL DEGREES AWARDED

A) Ph.D degrees awarded by ISI

Sl. No.	Name of the Scholar	Name of the Supervisor(s)	Title of the Thesis
Computer Science			
1.	Ankan Bhattacharya M. Tech. (Computer Science, ISI)	Dr. Sarbani Palit, CVPRU, Kolkata	Blind approaches for quality assessment of images and video
2.	Ayan Nandy M. Tech. (Computer Science,ISI)	Professor Sandip Das, ACMU, Kolkata	On Some Variants of the Center Location Problem
3.	Binanda Sengupta Master of Science (MS, IIT,Kharagpur)	Dr. Sushmita Ruj, CSRU, Kolkata	Proof-of-Storage Constructions for Checking Integrity of Cloud Data
4.	Kingshuk Chatterjee M. Tech. (Computer Science and Engineering, University of Calcutta)	Professor Kumar Sankar Ray, ECSU, Kolkata	Computational power of Watson-Crick automata and its variants
5.	Niharika Gauraha B.E. (Computer Science, University of Allahabad)	Professor Swapan Kumar Parui, CVPRU, Kolkata	Some Studies on High-dimensional Data Analysis and Graphical Models
6.	Oendrila Samanta M.C.A. (West Bengal University of Technology)	Professor Swapan Kumar Parui, CVPRU, Kolkata	Online Bangla Handwriting Recognition
7.	P.N. Swathy Prabhu M. E. (Computer Science, Indian Institute of Science)	Professor Sandip Das, ACMU, ISI, Kolkata	Variants of Coloring for Oriented Graphs
8.	Soumen Nandi M. Tech. (Multimedia & Software Systems, West Bengal University of Technology)	Professor Sandip Das, ACMU, Kolkata	Channel Assignment Problems and Some Graph Homomorphism Techniques
9.	Subhash Bhagat M. Tech. (Computer Science, Indian Statistical Institute)	Professor Krishnendu Mukhopadhyay, ACMU, Kolkata	Distributed Gathering Algorithms for Swarm Robots
Mathematics			
10.	Apurba Das M. Sc. (Mathematics, IIT, Kanpur)	Professor Goutam Mukherjee, SMU, Kolkata	A Study of Numbu Structure
11.	Mithun Bhowmik M. Sc. (Mathematics, IIT, Kanpur)	Professor Swagato Kumar Ray, SMU, Kolkata	Theorems of Ingham, Levinson and Paley-Wiener on Certain Lie Groups
12.	Narayan Rakshit M. Sc. (Mathematics, IIT, Kanpur)	Dr. Paramita Das, SMU, Kolkata	Annular Algebra of Group-Type Subfactors
13.	Pranabesh Das M. Sc. (Mathematics, Ramakrishna Mission Vivekananda University)	Professor Shanta Laishram, SMU, Delhi	Perfect Powers in Certain Diophantine Equations and Recurrence Sequences
14.	Ratnadeep Acharya M. Sc. (Mathematics, Ramakrishna Mission Vivekananda University)	Dr. Satadal Ganguly, SMU, Kolkata	On the Distribution of Hecke Eigenvalues
15.	Srijan Sarkar M. Sc. (Mathematics, University of Hyderabad)	Dr. Jaydeb Sarkar, SMU, Bangalore	Factorizations of Reproducing kernels and contractions on Hilbert spaces
Quantitative Economics			
16.	Digvijay Singh Negi M. A. (Economics, University of Delhi	Professor Bharat Ramaswami, EPU, Delhi	Essays on Risk, Insurance and Welfare
17.	Dyotona Dasgupta M. Sc. (Economics, University of Calcutta)	Professor Prabal Roy Chowdhury, EPU, Delhi	Essays on the Dynamics of Credit Contracts
18.	Gopakumar Achuthankutty M. S. (Q.E., Indian Statistical Institute)	Dr. Souvik Roy, ERU, Kolkata	Domain Restrictions in Strategy-proof Social Choice
19.	Mahamitra Das M. Sc. (Economics, University of Calcutta)	Professor Nityananda Sarkar, ERU, Kolkata	Modeling REIT Returns with Macroeconomic, Monetary Policy and Financial Variables in the Frameworks of Structural Break and Regime-Switching VAR: Evidence from the USA and the UK
20.	Mannu Dwivedi M. Sc. (Economics, University of Calcutta)	Professor Manoranjan Pal, ERU, Kolkata	Gender Difference in Indian Consumption Expenditure
21.	Tanmoy Das M. Sc. (Economics, University of Calcutta)	Dr. Priyodorshi Banerjee, ERU, Kolkata	Essays on Boundedly Rational Choice
Quality, Reliability and Operations Research			
22.	Sonal Budhiraja M. Sc. (Mathematics, University of Delhi)	Dr. Biswabrata Pradhan, SQC & OR Unit, Kolkata	Inference and optimum life testing plans with censoring
Statistics			
23.	Debolina Ghatak M. Sc. (Statistics, University of Calcutta)	Professor Bimal K. Roy, ASU, Kolkata	Data Obfuscation
24.	Dibyendu Bhaumik M. Sc. (Statistics, University of Calcutta)	Professor Debasis Sengupta, ASU, Kolkata	Feature Sensitive Curve Registration and Related Inference from Functional Data with Paleoclimatic Applications
25.	Durba Bhattacharya M. Sc. (Statistics, University of Calcutta)	Dr. Sourabh Bhattacharya, ISRU, Kolkata	Bayesian Nonparametric Approaches to Investigating Gene-Gene and Gene-Environment Interactions in Case-Control Studies
26.	Gursharn Kaur M. Stat. (Indian Statistical Institute)	Dr. Antar Bandyopadhyay, SMU, Delhi	Negatively Reinforced Balanced Urn Models
27.	Hemant Shripad Kulkarni M. Sc. (Statistics, Shivaji University, Kolhapur)	Professor Saurabh Ghosh, HGU, Kolkata	Statistical Strategies to Improve Powers of Transmission Based Association Tests for Continuous, Count, Categorical and Combined Phenotypes
28.	Moumita Das (M. Stat., ISI)	Dr. Sourabh Bhattacharya, ISRU, Kolkata	A Novel Nonstationary Bayesian Space-Time Model with a New Transdimensional Transformation Based Markov Chain Monte Carlo
29.	Noirrit Kiran Chandra M. Stat. (Indian Statistical Institute)	Dr. Sourabh Bhattacharya, ISRU, Kolkata	A Novel Bayesian Non-Marginal Multiple Testing Procedure: Theory and Applications
30.	Soham Sarkar M. Sc. (Statistics, University of Calcutta)	Professor Anil K. Ghosh, SMU, Kolkata	Some Distance Based Statistical Methods for High Dimensional Data
31.	Soumen Dey M. Sc. (Statistics, University of Calcutta)	Professor Mohan Delampady, SMU, Bangalore	Bayesian Methods in Statistical Ecology

B) Ph.D. degrees awarded to ISI Research Fellows by other Academic bodies

Sl. No.	Name of the Fellow	Name of the Supervisor (s)	Title of the Thesis	Department	University
1.	Ajoy Mondal	Professor Ashish Ghosh, MIU, ISI, Kolkata	Online tracking of moving objects from video scenes using classifier.	Computer Science and Engineering	Jadavpur University
2.	Anurupa Kundu	Professor Debdulal Duttaroy, ISI, PRU, Kolkata	A Study on Innovative Self-Efficacy of School Teachers	Psychology	University of Calcutta
3.	Bhaskar Dey	Professor Malay Kundu, MIU, ISI, Kolkata	On analysis of compressed visual information and its application	Computer Science	University of Calcutta
4.	Bidesh Kumar Bera	Dr. Dibakar Ghosh, PAMU, ISI, Kolkata	On the study of chimera states in a network of coupled oscillators	Applied Mathematics	University of Calcutta
5.	Debarati Bhunia Chakraborty	Professor Sankar K. Pal, CSCR, ISI, Kolkata & Professor Debesh Kumar Das, Dept. of CSE, Jadavpur University	Rough sets and granular computing in video processing	Computer Science and Engineering	Jadavpur University
6.	Dibakar Saha	Professor Nabanita Das, ACMU, ISI, Kolkata	Distributed Coverage and Area Estimation in Wireless Sensor Networks	Computer Science	University of Calcutta
7.	Esita Chattopadhyay	Professor Bidyut Roy, HGU, ISI, Kolkata	Assessment of role of mutations and expression in mitochondria and associated nuclear genes in oral precancer and cancer	Genomics	University of Calcutta
8.	Jayamma	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	Automation of College Libraries in Karnataka: A Study	Library and Information Science	Bharathiar University, Coimbatore, TN
9.	Jayanta Kumar Das	Professor Pabitra Pal Choudhury, ASU, ISI, Kolkata	Efficient Computational Techniques To Characterize And Classify Biological Sequences	Computer Science	University of Calcutta
10.	Meeramani	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	Innovative and Emerging Library and Information Services in Management Schools affiliated to Bangalore University and VTU: An Analytical Study	Library and Information Science	Bharathiar University, Coimbatore, TN
11.	Padmavathi	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	Ontological Representation of Knowledge towards creating Food Science and Technology Information Services	Library and Information Science	Bharathiar University, Coimbatore, TN
12.	Punyasha Ganguly	Professor Nabanita Das, ACMU, ISI, Kolkata	Energy-Efficient Distributed Data Gathering Algorithms for Multi-hop Wireless Sensor Networks	Information Technology	University of Calcutta
13.	R.M Putta Swamy	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	Information Seeking Behaviour of Users in Electronic Environment: A study of VTU Engineering College Libraries of Bangalore Region	Library and Information Science	Bharathiar University, Coimbatore, TN
14.	Roopa	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	Design and Implementation of Digital Information Services in Engineering Colleges in Karnataka: An Evaluative Study	Library and Information Science	Bharathiar University, Coimbatore, TN
15.	Sandip Banerjee	Professor Bhargab B Bhattacharya, ACMU, ISI, Kolkata	Studies in Four Geometric Optimization Problems based on Neighborhood-Attributes of Point Sets	Information Technology	IIEST, Shibpur
16.	Sanghita Banerjee	Professor Rajat K. De, MIU, ISI, Kolkata	Deciphering Molecular Evolution Of Unstructured Proteins In Light Of Gene Regulation	Biophysics	University of Calcutta
17.	Saurav Mallik	Professor Sanghamitra Bandyopadhyay, Director, ISI, Kolkata Professor Ujjwal Maulik, Former Head, Department of Computer Science and Engineering, Jadavpur University, Kolkata Professor Anirban Mukhopadhyay, Former Head, Department of Computer Science and Engineering, University of Kalyani	Computational and Statistical Approaches in Data Mining and Bioinformatics	Computer Science and Engineering	Jadavpur University
18.	Subramanyam	Dr. M. Krishnamurthy, DRTC, ISI, Bangalore	An Evaluative Study of Bibliographic Databases in the field of biomedical	Library and Information Science	Bharathiar University, Coimbatore, TN
19.	Sudipta Biswas	Professor Devika P. Madalli, DRTC, ISI, Bangalore	Integrated Ontology for Information Resource Description	Library Science	University of Calcutta
20.	Suman Kundu	Professor Sankar K. Pal, CSCR, ISI, Kolkata & Professor Debesh Kumar Das, Dept. of CSE, Jadavpur University Professor Ujjwal Maulik, Department of Computer Science and Engineering, Jadavpur University	Granular model for social networks, target set selection and fuzzy-rough community detection	Computer Science and Engineering	Jadavpur University
21.	Sumanta Ray	Professor Anirban Mukhopadhyay, Department of Computer Science and Engineering, University of Kalyani Professor Sanghamitra Bandyopadhyay, Director, ISI, Kolkata	Development of New Computational Method for Predicting Modules in Large Network	Computer Science and Engineering	Jadavpur University
22.	Tapas Bhadra	Professor Sanghamitra Bandyopadhyay, Director, ISI, Kolkata Professor Ujjwal Maulik, Dept. of Computer Sc. &Engg., Jadavpur University	Machine Learning And Pattern Recognition Algorithms For Knowledge Discovery	Computer Science and Engineering	Jadavpur University
23.	Trisha Maitra	Dr. Sourabh Bhattacharya, ISRU, Kolkata	Asymptotic Theories of Inference and Model Selection in Systems of Stochastic Differential Equations	Applied Mathematics	University of Calcutta
24.	Usashi Chatterjee	Professor A.R.D. Prasad, DRTC, ISI, Bangalore	Formalizing Concept for Knowledge Representation and Facet Discovery	Library Science	University of Calcutta

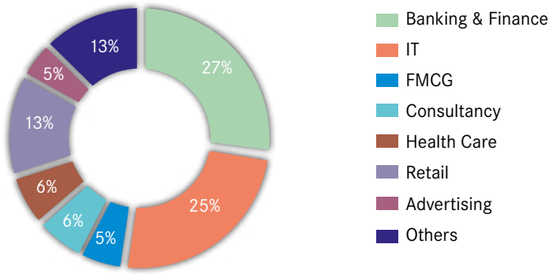
PLACEMENTS

Students of the Indian Statistical Institute are well equipped with a global perspective, communication/leadership skills and enthusiasm to bring about a change. While many go in for higher education others are successfully placed in the industry through the Placement cell.

Industry

In the 2018-19 sessions, the students from our institute had a very successful industry placement season. The average salary (cost to company) from the campus placement for students of the master degree programmes have gone up to about 19 lakhs per annum, nearly 2 lakhs more than the previous year. The maximum salary offered was 31.5 lakhs per annum.

Placement statistics for 2018-19



Companies who recruited our students include reputed organizations such as:

Higher Education

In the 2018-19 sessions, students from our institute have also secured admission and scholarships for higher studies in top international Universities, some of which are mentioned below:

CONVOCATIONS

International Statistical Education Center (ISEC)

Batch of 2017-18

During the period under review (April 1, 2018- March 31, 2019), the 71st term of the ISEC Regular Course which had commenced on August 01, 2017 received their Statistical Training Diploma in the Convocation held on 31st May 2018 at New Academic Building, Kolmogorov Bhavan, Indian Statistical Institute.

The Convocation address was given by Professor Saibal Chattopadhyaya, Ex.-Director of Indian Institute of Management, Calcutta and the diploma certificates were awarded by Professor Dipti Prasad Mukherjee, ISI, Kolkata.

This batch consisted of twenty-five trainees from the following eleven countries namely,


Bhutan


Cambodia


Fiji


Mongolia


Myanmar


Niger


Nepal


South Africa


South Sudan


Sri lanka


Tanzania

Indian Statistical Institute

ISI held its 53rd Convocation on 10th January, 2019. The event started with a Vedic Hymn by the ISI Club. Shri Bibek Debroy, President, ISI gave the welcome address which was followed by a speech given by Professor Sanghamitra Bandyopadhyay, Director, ISI where she gave a detailed account of all the illustrious activities that took place during the academic year 2018-19. Lord Meghnad Jagdishchandra Desai, Padma Bhushan, Emeritus Professor, London School of Economics graced the event as the Chief Guest and delivered the Convocation address. He congratulated the students for their accomplishment and urged them to achieve greater heights. Mr. Pravin Srivastava, Chief Statistician of India and Secretary, Ministry of Statistics & Programme Implementation was a special guest at the ceremony.

M. Tech. (CS) students with their degrees

The Convocation ceremony then felicitated the outgoing batch of all the degree and diploma programmes. The meritorious students were awarded medals and prizes for their outstanding performance in the programmes by Shri.Bibek Debroy after which the students were individually presented with their degrees and diplomas. Professor Goutam Mukherjee, Dean of Studies, ISI offered the vote of thanks.

A Ph.D. student receiving her degree

B. Stat. student being awarded a medal

DIVISIONS

Areas of Research, Projects and Publications

The activities of the Institute are organized into divisions. The Divisions have multi-locational units. Apart from the Headquarters in Kolkata and Centres in Bengaluru, Delhi, Chennai and Tezpur, a Branch in Giridih, there are offices in Coimbatore, Hyderabad, Mumbai, Pune primarily for consultancy on statistical quality control and operations research in a wide range of industries.

The Seven divisions for research, development and consultancy activities:

- Applied Statistics Division (ASD)
- Biological Sciences Division (BSD)
- Computer and Communications Sciences Division (CCSD)
- Social Sciences Division (SSD)
- Statistical Quality Control and Operations Research Division (SQCOR)
- Theoretical Statistics and Mathematics Division (TSMD)

Two divisions providing services

- Computer and Statistical Services Centre (CSSC), Kolkata
- Library, Documentation and Information Science Division (LDISD)

Two national facilities

- The Centre for Soft Computing Research, Kolkata
- R. C. Bose Centre for Cryptology and Security

APPLIED STATISTICS DIVISION

Professor In-Charge: Professor Sumitra Purkayastha, ASU Kolkata
Office: 8th floor, S.N. Bose Bhawan, ISI, Kolkata-700 108

Applied and Official Statistics Unit, North-East Centre, Tezpur

Office: Punioni, Solmara Tezpur, Assam- 784501

Applied Statistics Unit, Chennai

Office: 110 Nelson Manickam Road, Aminjikarai, Chennai-600 029

Applied Statistics Unit, Kolkata

Office: 8th floor, S.N. Bose Bhawan, ISI, Kolkata-700 108

Interdisciplinary Statistical Research Unit, Kolkata

Office: 4th floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

APPLIED STATISTICS DIVISION (ASD)

The Applied Statistics Division came into being in September 1996 in place of the Applied Statistics, Survey and Computing Division. The Computer Science Unit was renamed as the Applied Statistics Unit and the Biometry Unit was transferred to the Biological Science Division. Till 2005-2006, the Applied Statistics Division consisted solely of the Applied Statistics Unit. In 2006, a new unit, namely, the Bayesian and Interdisciplinary Research Unit was created within this Division. Later in 2012, two more units named Applied and Official Statistics unit, North East centre, Tezpur and Applied Statistics Unit, Chennai became parts of this Division. In October 2014 Bayesian and Interdisciplinary Research Unit of this Division was renamed Interdisciplinary Statistical Research Unit.

The main activities of the Division include teaching, training, research and PhD guidance, projects and consultancy, academic administration, editorial work, etc., along with many others miscellaneous duties. All the members of the Division take active part in teaching in the degree and diploma courses of the institute. They also take part in ISEC and other short-term courses. The members of the Division regularly conduct North East workshops and Winter/ Summer schools and training programs on topics of general interest for users of Statistics, including researchers/ teachers, ISS officers and probationers, summer interns, high school students, officials from government and other agencies, etc. The Statistical Trainee programme for fresh MSc (Statistics) students is a unique training programme in which the trainees get hands-on experience with application-oriented research and projects and eventually assist the faculty members.

The research activities of the scientists of the Division have a wide focus. The topics of interest include Sample Surveys, Design of Experiments/ Optimal Designs, Statistical Inference/ Robust Inference, Bayesian Methods/ Decision Theory, Large Sample Theory/ Asymptotic Theory, Multivariate Analysis, Directional Data Analysis, Time Series Analysis, Reliability/Survival Analysis/ Actuarial Statistics, Epidemiology/ Clinical Trials, Environmental Statistics, Demography/ Population Studies, Image Processing/ Pattern and Speech Recognition/Neural Networks, Classification of Multivariate data, Financial Statistics, Stochastic Modelling/ Applied Stochastic Processes, Statistical Computing/ Big Data Analysis, Cellular Automata/ Mathematical Genetics, Cryptology and Security, and several others.

Applied and Official Statistics Unit (AOSU), North-East Centre, Tezpur

Areas of Research

Faculty Name	Collaborators	Research topic
Holendro Singh Chungkham	Hugo Westerlund, Jenny Head and Linda Magnusson Hanson	Understanding determinants of healthy life expectancy with applications of advanced statistical methods

Publications

Publication in Journals

1. Magnusson Hanson, L.L., Westerlund, H., Chungkham, H.S., Vahtera, J., Rod, N.H., Alexanderson, K., Goldberg, M., Kivimaki, M., Stenholm, S., Platts, L.G., Zins, M. and Head, J.: Job strain and loss of healthy life years between ages 50 and 75 by sex and occupational position: analyses of 64934 individuals from four prospective cohort studies, *Occupational and Environmental Medicine,* **75**, 486-493, 2018.

2. Head, J., Chungkham, H.S., Hyde, M., Zaninotto, P., Alexanderson, K., Stenholm, S., Salo, P., Kivimaki, M., Goldberg, M., Zins, M., Vahtera, J. and Westerlund, H.: Socioeconomic differences in healthy and disease-free life expectancy between ages 50 and 75: a multi-cohort study, *European Journal of Public Health,* **29(2)**, 1-6, 2018.

Applied Statistics Unit (ASU), Chennai

Areas of Research

Faculty Name	Research topic(s)
K. K. Sudheesh	Empirical likelihood Inference for Sen index, Test for regularly varying distribution, An exact test for decreasing renewal dichotomous Markov shock model
Rituparna Sen	Statistical Finance

Projects

Ongoing projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Randomly censored linear transformation model with measurement error in covariates	K.K. Sudheesh	SERB, DST, Government of India

Publications

Publication in Journals

1. Anjana S, IshaDewan and Sudheesh, K. K.: Test for independence between time to failure and cause of failure in competing risks with k causes of failure. *Journal Of Nonparametric Statistics,* **31**, 322-339, 2019.
2. Lahiri, A. and Sen, R.: Fractional Brownian Markets with Time-Varying Volatility and High-Frequency Data, *Econometrics and Statistics,* Online Version: https://doi.org/10.1016/ jecosta.2018.10.004, 2018.
3. Sen, R. and Manavathi, S.: Stylized Facts of the Indian Stock Market, *Asia-Pacific Financial Markets,* Online Version: https://doi.org/10.1007/s10690-019-09275-3, 2019.
4. Sen, R. and Klueppelberg, C.: Time Series of Functional Data with Application to Yield Curves, *Applied Stochastic Models in Business and Industry*, **35(4)**, 1028-1043, Online Version:https://doi.org/10.1002/ asmb.2443, 2019.
5. Sreelakshmi, N., Sudheesh, K.K. and Asha G.: Qauntile based test for exponentiality against DMRQ and NBUE alternatives. *Journal of Korean Statistical Association,* **47,** 185-200., 2019.
6. Sreelakshmi, N., Kattumannil, S.K. and Sen, R.: Jackknife Empirical Likelihood-based Inference for S-Gini Indices, *Communications in Statistics - Simulation and Computation*, Online Version:https://doi.org/10.1080 /03610918.2019.1586930, 2019.
7. Sudheesh, K.K. and Anisha, P.: A simple non-parametric test for decreasing mean time to failure. *Statistical Papers,* **60**, 73-87,2019.

Publication in Books

1. Chakrabarti, A. and Sen, R.: Some Statistical Problems with High Dimensional Financial data, *New Perspectives and Challenges in Econophysics and Sociophysics,* Abergel, F., Chakrabarti, B.K., Chakraborti, A., Deo, N. and Sharma, K. (eds.), 147-167, 2018.

Applied Statistics Unit (ASU), Kolkata

Areas of Research

Faculty Name	Research topic(s)
Anup Dewanji	Reliability, survival analysis, social mobility, screening studies
Pabitra Pal Chaudhury	Application of Statistical Methodology in Data Science
DebapriyaSengupta	Computational Genomics: Computational Genomics:Understanding the Classification of Various Protein Families and Protein Protein Interaction Networks
Sumitra Purkayastha	Collaborative Work of National and Social Importance with Quality Council of India (QCI) - some of the projects for which support has been provided include (i) Implementation of Swachh Bharat Mission in UP, (ii) Quality Improvement in New Delhi Municipal Corporation (NDMC) schools, (iii) Quality Assessment of rural electrification under DDUGJY scheme, (iv) Testing and Analysis of Coal.

Projects

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Changes in pattern of irrigation, cultivation and livelihood of rural Bengal: The experience of Jamalpur block of Bardhaman	DebasisSengupta	DST, Govt. of West Bengal.
2.	Indo-German DST Project	Mridul Nandi & Sanjit Chatterjee	IISc. Bangalore
3.	Critical Appraisal and Methodological Recommendations on TV-Viewership Study(CAMROTS)	Ashis Sen Gupta	BAARC
4.	Cryptography & Cryptanalysis	SubhamoyMaitra	Department of Atomic Energy, Board of Research in Nuclear Sciences, Govt. of India.

Pubications

Publication in Books

1. Chakraborty, A.: *Complex Analysis,* Levant Publications, ISBN 978-93-88069-22-9, 2019.

Publication in Journals

1. Basak, J. and Maitra, S.: Clauser-Horne-Shimony-Holt versus three-party pseudo-telepathy: on the optimal number of samples in device-independent quantum private query, *Quantum Information Processing,* **17(4**), *77*, 2018.
2. Das, J.K., Choudhury, P.P., Chaudhuri, A., Hassan, Sk. S. and Basu, P.: Distribution of Purines and Pyrimidines over miRNAs of Human, Gorilla and Chimpanzee, *Scientific Reports (Nature),* Online Version: DOI: 10.1038/ s41598-018-28289-x (SCI), 2018.
3. Ghosh, S. and Sarkar, P.: Evaluating Bernstein-Rabin-Winograd Polynomials, *Designs, Codes and Cryptography,* Online Version: DOI: 10.1007/s10623-018-0561-7, 2019.
4. Gravel, C.A., Dewanji, A., Farrell, P.J. and Krewski, D.: A Validation Sampling Approach for Consistent Estimation of Adverse Drug Reaction Risk with Misclassified Right Censored Survival Data, *Statistics in Medicine,* **37**, 3887-3903, 2018.

5. Gupta, K.C., Pandey, S.K. and Venkateswarlu, A.: Almost involutory recursive MDS diffusion layers, *Design, Codes and Cryptography,* **87(2-3)**, 609 -626, 2019.

6. Karati, S. and Sarkar, P.: Kummer for Genus One over Prime Order Fields, *Journal of Cryptology,* Online Version: https://doi.org/10.1007/s00145-019-09320-4, 2019.

7. Karati, S. and Sarkar, P.: Connecting Legendre with Kummer and Edwards, *Advances in Mathematics of Communications,* **13(1),** 41-66, 2019.

8. Kavut, S., Maitra, S. and Deng, Tang: Construction and search of balanced Boolean functions on even number of variables towards excellent autocorrelation profile. Des, *Codes Cryptography,***87(2-3),** 261-276, 2019.

9. Maitra, S., Sinha, Nishant Akhilesh Siddhanti, Anand, R., Gangopadhyay, S.: TMDTO Attack Against Lizard, *IEEE Trans. Computers,* **67(5),** 733-739, 2018.

10. Mandal, Bimal, Singh, Bhupendra, Gangopadhyay, Sugata, SubhamoyMaitra, SubhamoyVetrivel, Vellaichamy: On non-existence of bent-negabent rotation symmetric Boolean functions, *Discrete Applied Mathematics,* **236(1-6)**, 2018.

11. Rout K.R., Maity S.P., Choudhury P.P., Das, J.K., Hassan, SK. and Pandey, H.: Analysis of Boolean functions based on Interaction graphs and their influence in System Biology, *Neural Computing and Applications,* Online Version: https://doi.org/10.1007/s00521-019-04102-2 (SCI), 2019.

12. Samajder, S. and Sarkar, P.: Multiple (Truncated) Differential Cryptanalysis: Explicit Upper Bounds on Data Complexity, *Cryptography and Communications - Discrete Structures, Boolean Functions and Sequences,* **10 (6),** 1137-1163, 2018.

13. Samajder, S. and Sarkar, P.: Success Probability of Multiple/Multidimensional Linear Cryptanalysis under General Key Randomisation Hypotheses, *Cryptography and Communications-Discrete Structures, Boolean Functions and Sequences,* **10(5),** 835-879, 2018.

14. Sarkar, P.:CarvakismRedivivus, *Newsletter of the American Philosophical Association on Asian and Asian-American Philosophers and Philosophies,* 26–31, 2018.

15. Sarkar, P. and Singh, S.: A Unified Polynomial Selection Method for the (Tower) Number Field Sieve Algorithm, *Advances in Mathematics of Communications,* Online Version: http:// aimsciences.org//article/doi/10.3934/amc. 2019028, 2019.

16. Sengupta, A., Choudhury, P.P., Manners, H.M., Guzzi, P.H. and Roy, S.: Chemical Characterization of Interacting Genes in Few Subnetworks of Alzheimer, *Disease,* Online Version: DOI: https://doi.org/10.1101/364802, 2018.

17. Siddhanti, A.A., Maitra, S. and Sinha, N.:Certain Observations on ACORN v3 and Grain v1–Implications Towards TMDTO Attacks, J. Hardware and Systems Security, **3(1)**, 64-77, 2019.

18. Tang, D., Kavut, S., Mandal, B. and Maitra, S: Modifying Maiorana-McFarland Type Bent Functions for Good Cryptographic Properties and Efficient Implementation, *SIAM J. Discrete Math*, **33(1)**, 238-256, 2019.

Publication in Conference Proceedings

1. Barua, R., Gupta, K.C., Pandey, S.K. and Roy, I.G.: On Diffusion Layers of SPN Based Format Preserving Encryption Schemes: Format Preserving SetsRevisited, *Indocrypt 2018*, Progress inCryptology, LNCS,**11356**, 91-104, 2018.

2. Nandi, M., Roy, B., Bakshi, A. and Dewanji, A.: Selection of Events under Fault Detection in Wireless Sensor Networks, *IEEE International Conference on Sensor Networks and Signal Processing (SNSP),* 1-12, Online Version: DOI: 10.1109/SNSP.2018. 00011, 2018.

Interdisciplinary Statistical Research Unit (ISRU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Abhik Ghosh		Robust Inference for Beta Regression Model
	Magne Thoresen	On the selection of fixed effects variables and parameter estimation in high-dimensional Linear Mixed-Effect Models
	Elena Castilla, Nirian Martin and Leandro Pardo	Robust inference for polytomous logistic regression models
Abhik Ghosh and Ayanendranath Basu	Adhidev Biswas, Pushpinder Singh, Sumitra Purkayastha, Saptarshi Roy, Kaustav Chakraborty, Somnath Bhadra	Weighted likelihood, Bregman divergence and Robust Inference
		Robust Estimation in the Cox-Regression Model
Abhik Ghosh and Rita Saha Ray	Sayan Chakraborty	Multivariate classification problem to discriminate between two elliptically symmetric distributions In the presence of outliers
Ayanendranath Basu	Sancharee Basak	Minimum distance estimation based on a variant of the Bregman divergence and estimating the optimal tuning parameter
	Soumendu Sundar Mukherjee	Minimum disparity estimation with density ratios
	Adhidev Biswas	Weighted likelihood Estimation using a new class of residual and weight functions
Rita Saha Ray	Ganesh Dutta	Optimal estimation of treatment control comparisons in a heteroscedastic CRD set up in the presence of controllable covariates
Soumendu Sundar Mukherjee	Sharmodeep Bhattacharyya, PeterBickel and Shirshendu Chatterjee	Changepoint detection in network-valued time series
	Arup Bose	Spectrum of the "visible" Wigner matrix
	Sayak Chakrabarti	Estimation of graphons based on partially observed networks
	Rajarshi Mukherjee	Testing the number of spikes in a spiked Wigner model
	Purnamrita Sarkar and Y.X. Rachel Wang	Optimization landscape of latent variable models
Sourabh Bhattacharya	Debashis Chatterjee	Posterior Convergence of Gaussian and General Stochastic Process Regression Under Possible Misspecifications
		Posterior Convergence of Nonparametric Binary and Poisson Regression Under Possible Misspecifications
	Durba Bhattacharya	A Non-Gaussian, Nonparametric Structure for Gene-Gene and Gene-Environment Interactions in Case-Control Studies Based on Hierarchies of Dirichlet Processes
	Noirrit Kiran Chandra	Asymptotic Theory of a Non-Marginal Multiple Testing Procedure and Comparison with Existing Methods
	Sucharita Roy	Bayes Meets Riemann – Bayesian Characterization of Infinite Series with Application to Riemann Hypothesis
		Bayesian Characterization of Random Infinite Series
		Bayesian Characterization of Stationary Stochastic Processes with Applications
	Trisha Maitra	On Classical and Bayesian Asymptotics in Stochastic Differential Equations with Random Effects having Mixture Normal Distributions

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Robust minimum divergence inferences for biostatistics and bioinformatics	Abhik Ghosh

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Robust minimum divergence inferences for Non-Standard data problems: Emphasis on Censored, Longitudinal & High-dimensional data and Machine Learning &Multisample set-ups	Abhik Ghosh	DST, Govt. of India

Publications

Publication in Journals

1. Basu, A., Mandal, A., Martin, N. and Pardo, L.: Testing composite hypothesis based on the density power divergence, *Sankhya B,* **80**, 222-262, 2018.

2. Basu, A., Mandal, A., Martin, N. and Pardo, L.: A Robust Wald type test for testing the equality of two means from log-normal samples, *Methodology and Computing in Applied Probability,* **21**, 85-107, 2019.

3. Basu, A., Ghosh, A., Martin, N. and Pardo, L.: Robust Wald-type tests for non-homogeneous observations based on minimum density power divergence estimator, *Metrika*, **81(5)**, 493-522, 2018.

4. Basu, P., Cai, T.T., Das, K and Sun, W.: Weighted False Discovery Rate Control in Large Scale multiple Testing, *Journal of the American Statistical Association,* **113(523)**, 1172-1183, 2018.

5. Bhattacharya, D. and Bhattacharya, S.: A Bayesian Semiparametric Approach to Learning about Gene-Gene Interactions in Case-Control Studies, *Journal of Applied Statistics,* **45(16)**, 1–23, 2018.

6. Bhuyan, P., Biswas, J., Ghosh, P., and Das, K.: A Bayesian two-stage regression approach of analyzing longitudinal outcomes with endogeneity and incompleteness, *Statistical Modelling,* **19(2)**, 157-173, 2019.

7. Biswas, J., and Das, K.: A Bayesian approach of analyzing semi-continuous longitudinal data with monotone missingness, *Statistical Modelling,* Online Version:https://doi.org/10.1177/ 1471082X18810119, 2019.

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9. Chandra, N. K. and Bhattacharya, S.: Non-marginal Decisions: A Novel Bayesian Multiple Testing Procedure, *Electronic Journal of Statistics*, **13(1)**, 489–535, 2019.

10. Chandra, N.K., Singh, R. and Bhattacharya, S.: A Novel Bayesian Multiple Testing Approach to Deregulated miRNA Discovery Harnessing Positional Clustering, *Biometrics,* Online Version: https://doi.org/ 10.1111/ biom.12967, 2019.

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13. Ghosh, A., Martin, N., Basu, A. and Pardo, L.: A New Class of Robust Two-Sample Wald-Type Tests, *International Journal of Biostatistics,* **14(2)**, 20170023, 2018.

14. Ghosh, A.: Robust Inference under the Beta Regression Model with Application to Health Care Studies*, Statistical Methods in Medical Research,* **28(3)**, 871-888, 2019.

15. Ghosh, A. and Basu, A.: Robust Bounded Influence Tests for Independent but Non-Homogeneous Observations, *Statistica Sinica,* **28**, 1133-1155, 2018.

16. Ghosh, A. and Basu, A.: A Generalized Relative (α, β)-Entropy from Robust Statistical Divergence: Properties and Applications, *Entropy*, **20(5)**, 347, 2018.

17. Ghosh, A. and Basu, A: A New Family of Divergences Originating from Model Adequacy Tests and Application to Robust Statistical Inference*, IEEE Trans. on Information Theory*, **64(8)**, 5581 – 5591, 2018.

18. Gupta, S., Bhaduri, D., Bose, S., Nath, S. and Das, H.N.: Development of a Model with a Panel of Biochemical Parameters to Identify Major Depressive Disorder, *Annals of Applied Biosciences,* **5(2)**, Online Version: DOI: 10.21276/AABS.2105, 2018.

19. Hazra, A., Bhattacharya, S. and Banik, P.: A Bayesian Zero-Inflated Exponential Distribution Model for the Analysis of Weekly Rainfall of the Eastern Plateau Region of India, *Mausam*, **695773(1540),** 19–28, 2018.

20. Kulkarni, H., Biswas, J., and Das, K.: A Joint Quantile Regression Model for Multiple Longitudinal Outcomes, *Advances in Statistical Analysis,* Online Version: doi.org/10.1007/s10182-018-00339-9, 2018.

21. Maitra, T. and Bhattacharya, S.: On Asymptotic Inference in Stochastic Differential Equations with Time-Varying Covariates, *Canadian Journal of Statistics,* **46(4)**, 635–655, 2018.

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23. Mukherjee, S.S., Sarkar, P., Wang, Y.X.R. and Yan, B.: Mean Field for the Stochastic Block model: Optimization Landscape and Convergence Issues, *Advances in Neural Information Processing Systems,* 10717-10727, 2018.

24. SahaRay, R. and Dutta, G.: Optimal and Efficient Treatment Control Design in the Heteroscedastic CRD Set-up with Covariates, *Statistics,* **53(2),** 459-469, 2019.

BIOLOGICAL SCIENCES DIVISION

Professor In-Charge: Professor Susmita Mukhopadhyay, BAU Kolkata
Office: 3rd floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

Agricultural & Ecological Research Unit, Giridih & Kolkata

Office: 2nd floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

Biological Anthropology Unit, Kolkata

Office: 3rd floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

Human Genetics Unit, Kolkata

Office: 2nd floor, A.N. Kolmogorov Bhavan, ISI, Kolkata-700 108

BIOLOGICAL SCIENCES DIVISION (BSD)

Agricultural & Ecological Research Unit (AERU), Kolkata & Giridih

The core areas of research in the Agricultural and Ecological Research Unit are:- (a) Agriculture (Agronomy, Soil Chemistry, Soil Microbiology, Entomology and Nano science), (b) Ecology (Invasive plants, Allelopathic interactions, Molecular breeding of Indian tea) and (c) Statistical/ Mathematical modelling.

Areas of Research

Faculty Name	Research topic(s)
Abhishek Mukherjee (AERU, Giridih)	Plant-pest interaction; Species distribution modelling; Biological control of pests
Anjana Dewanji	Invasive alien plant species- ecological and social effects, influence of invasive species on community composition
Arunava Goswami	Nanobiotechnology - screening of nanoparticles for generating novel photosynthetic enhancer, nano-pesticides and nano-antifungals
Joydev Chattopadhyay	Mathematical and stochastic modelling on plankton dynamics; Infectious disease (dengue, cholera, VL) and Eco-epidemiology
Pabitra Banik	Biophysical and socio-economic components of the fragile Sundarban biosphere as affected by climate change
Pradip Bhattacharyya (AERU, Giridih)	Environmental Pollution and Remediation, Waste Management, Soil Chemistry and Soil Microbiology
Rabi Ranjan Chattopadhyay	Multi-drug resistant microbes; Botanical medicine; Food preservation
Sabyasachi Bhattacharya	Statistical modelling in ecology, Deterministic and stochastic population dynamics, Behavioural ecology, System biology, Stochastic epidemiology
Samarendra Barik	Sweet sorghum, Sorghum bicolor (L) Moench, as an alternative source of biofuel
Sauren Das	Tea nutrient management and shelf-life assessment; Biochemical and molecular marker assisted genotype selection of Indian tea
Sujit Adhikary	Management practices of field crops and horticultural crops; Cropping system development for better productivity, profitability and maintenance of soil health
Suparna Mandal Biswas	Allelopathic interaction between plants; Exploring bioactive compounds from natural resources; Plant-insect interactions

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Invasive alien species – a friend or foe?	A. Dewanji
2.	Cadencing photosystem-II with naturally occurring $CaMn_4O_5$ nano-cluster and nanoparticles of hematite (α-Fe_2O_3)	A. Goswami
3.	A search for novel natural antioxidants from peels of some selected varieties of potato for developing omega-3 fatty acids fortified food	R.R. Chattopadhyay
4.	Management Practices for growth, yield and quality of maize (Zea mays L.)	S. Adhikary
5.	Sterculiafoetida, L.– Eco-friendly, cost effective and rich sources of nutritious edible oil, animal food supplements as well as biofuel and its multimodal application to environmental perspectives	S. Mandal Biswas
6.	Biochemical and physiological portrayal of Darjeeling tea cultivars towards the selection of superior clones against abiotic stress.	S. Das

Sl. no.	Name of the project	Principal Investigator(s)
7.	Utilization of Brick factory coal ash and fly ash through application of vermitechnology:	P. Bhattacharyya
8.	Host-parasite interaction between the rice root knot nematode (Meloidogyn graminicola) and rice	A. Mukherjee

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Study of soil carbon dynamics through integrated nutrient management in different agroecosystems of Assam	Pradip Bhattacharyya
2.	Parallel analysis of transport of contaminants in soil-plant systems in different soil types of eastern India: a sustainable approach	Pradip Bhattacharyya

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Modulation and demodulation of photosystem II with nanoparticles	Arunava Goswami	DST, Government of India
2.	Characterization, hazard prediction of tannery waste sludge in West Bengal and resource recovery through vermiremediation	Pradip Bhattacharyya	DST, Government of West Bengal
3.	Plant Parasitic Nematodes with Integrated Approach for their Control	Abhishek Mukherjee	ICAR

Publications

Publication in Journals

1. Adak, S., Chakraborty, D., Maji, H.S., Basu, S., Roy, P., Mitra, S., Mukherjee, N., Barik, S. and Goswami, A.: Comparison of the antimicrobial activity of the phyto-constituents obtained from the stem bark and leaf extracts of *Phyllanthusemblica* L. against different strains of *Staphylococcus aureus* and *Salmonella typhi*, *Research Journal of Pharmacology and Pharmaco dynamics*, **10(2)**, 53-60, 2018.

2. Banerjee, A.K., Medda, C., Bhattacharya, S. and Dewanji, A.: What matters most–role of environment, arrival order and population fitness in invaded community assembly, *Acta Oecologia,* **93**, 56-64, 2018.

3. Banerjee, S., Sarkar, S.S. and Chattopadhyay, J.: Effect of copper contamination on zooplankton epidemics. *J. Theor. Biol.,* **469**, 61-74, 2019.

4. Bera, R., Seal. A., Chatterjee, A.K. and Bhattacharyya P.: Distribution of Forms of Sulphur and Their Relationships with Soil Attributes in Tea Growing Soils under Different Agro-climatic Zones of Northeastern India, *NASS Journal of Agricultural Sciences,* **1**, 1-5, 2019.

5. Bhagat, D.V., Gawade, S.N., Sharma, R.C., Kale, A.P., Shaikh, J.A. and Banik, P.: Effect of Different Levels of Water Soluble Phosphorus in Complex Fertilizers on Crop Productivity and Soil Health, *NASS Journal of Agricultural Sciences,* **1(1)**, 32-45, 2019.

6. Bordoloi, N., Baruah K.K., Bhattacharyya P. and Gupta, P.K.: Impact of nitrogen fertilization and tillage practices on nitrous oxide emission from a summer rice ecosystem, *Archives of Agronomy and Soil Science,* Online version: https://doi.org/10.1080/03650340.2019.1566716, 2019.

7. Chakraborty, M., Mitra, I., Sarkar, K., Bardhan, M., Paul, S., Basu, S., Goswami, A., Saha, A., Show, B. and Ganguly, T.: Fluorescence enhancement via aggregation effect due to micro-environmental alterations in human hemoglobin protein in presence of carbon quantum dots (CQD): Comparative spectroscopic approach, *Spectrochimica Acta Part A: Molecular and Bio-molecular Spectroscopy,* **215**, 313–326, 2019.

8. Deb, S., Kumar, D., Chakraborty, S., Weindorf, D.C., Choudhary, A., Banik, P., Deb, D., De, P., Saha, S., Patra, A.K., Majhi, M., Naskar, P., Panda, P. and Hoque, A.: Comparative carbon stability in surface soils and subsoils under submergedrice and upland non-rice crop ecologies: A physical fractionation study, *Catena,* **175**, 400-410, 2019.

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10. Ghosh, I., Tiwari, P.K., Mandal, S., Martcheva, M. and Chattopadhyay, J.: A mathematical study to control Guinea Worm Disease: A case study on Cha,. *J. Biol. Dyn.*, **12(1)**, 846-871, 2018.

11. Ghosh, I., Tiwari, P.K., Samanta, S., Elmojtaba, I.M., Al-Salti, N. and Chattopadhyay, J.: A simple SI-type model for HIV/AIDS with media and self-imposed psychological fea, *Math. Biosci.,* **306**, 160-169, 2018.

12. Hazra, A., Dasgupta, N., Sengupta, C., and Das, S.: MIPS: Functional dynamics in evolutionary pathways of plant kingdom, *Genomics,* Online Version: https://doi.org/10.1016/j.ygeno.2019.01.004), 2019.

13. Hazra, A., Dasgupta, N., Sengupta, C., and Das, S.: Next generation crop improvement program: Progress and prospect in tea (*Camellia sinensis* (L.) O. Kuntze, *Annals of Agrarian Science,* **16(2)**, 128-135, 2018.

14. Hazra, A., Dasgupta, N., Sengupta, C., Kumar, R., and Das, S.: On some biochemical physiognomies of two common Darjeeling tea cultivars in relation to blister blight disease, *Archives of Phytopathology and Plant Protection,* **51(17-18)**, 915-926, 2018.

15. Karmakar, N.C., Hazra, A and Das, S.: *Bidenspilosa* L.: exclusive report of vivipary in a non-mangrove taxon from Eastern Himalayas, *Plant Species Biology,* Online Version: https:// doi.org/10.1111/1442-1984.12237, 2019.

16. Kunda, P, Dhal P.K. and Mukherjee A.: Endophytic bacterial community of rice (Oryza sativa L.) from coastal saline zone of West Bengal: 16S rRNA gene based metagenomics approach, *Meta Gene,* **18**, 79-86, 2018.

17. Kundu, K., Samanta, S., Panday, P., Pal, N., Khan, Q. and Chattopadhyay, J.: Study of a symbiotic system with disease and delay, *Nonlinear Studies,* **25(3)**, 535-557, 2018.

18. Kundu, S., Mukherjee, J., Yeasmin, F., Basu, S., Chattopadhyay, J., Ray, S. and Bhattacharya, S.: Growth profile of Chaetoceros sp. and its steady state behavior with change in initial inoculum size: a modeling approach, *Current Science,* **115(12)**, 2275-2286, 2018.

19. Majumder, S. and Banik, P.: Geogrphical variation of arsenic distribution in paddy soil, rice and rice-based products: A meta-analytic approach and implication to human health, *Journal of Environmental Management,* **233**, 184-199, 2019.

20. Mandal, B.S., Ghosh, S., Chakraborty, N. and Patra, S.: Galls in *Trewianudiflora* L. - Contextual Divergence Toward Plant Defense Tropism, *Biopesticides International,* **14**, 91-99, 2018.

21. Mandal, D.S., Sha, A. and Chattopadhayay, J.: Dynamical study of fractional order differential equations of predator-pest models, *Math. Meth. Appl. Sci.,* Online Version: https://doi.org/ 10.1002/mma.5641, 2019.

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23. Mondal S., Sarkar P., Singh A., Khan M.R. and Mukherjee A.: Distribution and community structure of plant parasitic nematodes and their relationship with some soil properties in betel vine growing regions of West-Bengal, India, *Nematology*, Online Version: https://doi.org/10.1163/15685411-00003237, 2018.

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signals on the stability of a predator-prey system: a Z-control approach, *Differential Equations and Dynamical Systems,* Online Version: https://doi.org/10.1007/s12591-018-0430-x, 2018.

25. Pal, S., Pal, N. and Chattopadhyay, J.: Hunting cooperation in a discrete-time predator-prey system, *Int. J. Bifur. Chaos.,* **28(07)**, 1850083:1-22, 2018.

26. Panja, P., Mondal, S.K. and Chattopadhyay, J.: Stability, bifurcation and optimal control analysis of a malaria model in a periodic environment, *Int. J. Nonlin. Sci. Num. Simul.*, **19(6)**, 627-642, 2018.

27. Roy, P., Basu S., Chatterjee J., Chakraborty I., Dutta R., Barik S. and Goswami A.: Management of low nitrogen input with potassium and phosphorus fertilizers for cropping system and yield of Sweet Sorghum Crop (Sorghum bicolour L. Moench) in a field experiment at Panskura, East Midnapore, West Bengal, *Indian J. Agric. Res.*, **53(1)**, 73-77, 2019.

28. Roy, S., Kumar U. and Bhattacharyya, P.: Synthesis and characterization of exfoliated biochar from four agricultural feedstock, *Environmental Science and Pollution Research,* **26**, 7272-7276, 2019.

29. Sasmal, S.K., Ghosh, I., Huppert, A. and Chattopadhyay, J.: Modeling the spread of Zika virus in a stage-structured population: effect of sexual transmission, *Bull. Math. Biol.,* **80(11)**, 3038-3067, 2018.

30. Senapati, A., Sardar, T. and Chattopadhyay, J.: A cholera metapopulation model interlinking migration with intervention strategies: A case study of Zimbabwe, *J. Biol. Syst.,* **27(2)**, 185-223, 2019.

31. Sha, A., Samanta, S., Martcheva, M. and Chattopadhyay, J.: Backward bifurcation, oscillations and chaos in an eco-epidemiological model with fear effect, *J. Biol. Dyn.,* **13(1)**, 301-327, 2019.

32. Sharma, R.C., Fuwa, N. and Banik, P.: System of Rice Intensification Verses Conventional Rice System: Off-farm Field Studies, *NASS Journal of Agricultural Sciences,* **1(1)**, 7-17, 2019.

Publication, Paper: Books

1. Barik, S., Pradhan, S. and Goswami, A.: Interaction of with crop plants: their implication in nutritional imbalance and environmental toxicity, Nanoscale Engineering in Agricultural Management, CRC Press, 140-150, ISBN 9781138567016, 2019.

2. Das, S., Goswami, A. and Debnath, N.: Application of baculoviruses as biopesticides and the possibilities of nanoparticle mediated delivery, Nano-Biopesticides Today and Future Perspectives, Academic Press, 261-280, 2019.

Biological Anthropology Unit (BAU), Kolkata

Biological Anthropology Unit conducts bio-anthropological research on bio-cultural determinants of: (a) Physical growth and development including secular trends; (b) Health and well-being of various occupational groups; (c) Aging and senescence with reference to health of slum dwelling elderly women and (d) Health and well-being studies on Alzheimer's caregivers in Kolkata and its surroundings.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Subrata Kumar Roy	A Mallick	Health status and survival strategy of the tea garden labourers of locked tea gardens
	A. Bhattacharya	Health and nutritional status of Oraon labourers engaged in tea garden and agricultural sectors of Alipurduar district, West Bengal
Susmita Mukhopadhyay	A Ghosh	Aging in Kolkata Slums-An Anthropological Study of Women
	I Basu	A Study on mental health and well-being of dementia caregivers in urban areas of West Bengal
	S Das	Burden of frailty: A study on community dwelling rural elderly population in West Bengal
	S Debnath	Health and Health-Related Quality of Life in Relation to Socio-Cultural Factors: A Study among the Elderly of Rural West Bengal

Publications

Publication in Journals:

1. Das, S.: Frailty Syndrome: A Problem Lurking in Indian Geriatric Population, *Indian journal of social research,* **60(2)**, 269-277, 2019.

2. Ganguly, N., Roy, S. and Mukhopadhyay, S.: Association of socio-culture factors with disordered eating behavior: An empirical study on urban young girls of West Bengal, India, *Anthropological Review,* **81(4)**, 364-378, 2018.

3. Mallick, A., Bhattacharya, A. and Roy, S.K.L.: Spatial and Temporal Somatotype Variation in Oraon Tea Garden and Agricultural Labourers of Alipurduar District, West Bengal, Oriental Anthropologists, **18(2)**, 297-303, 2018.

Publication in Books

1. Basu, I., Mukhopadhyay, S., Som, N. and Roy, S.: Mental health of school going urban adolescents: A study on West Bengal, *Readings in biological Anthropology,* S. Ghosh & D.K. Limbu (eds.), B.R. Publishing Corporation, Delhi, 183-194, 2018.

2. Ghosh, A., Som, N. and Ray, S.: A comparative study on body composition and blood pressure levels between Marwari Hindu and Bengali Hindu groups living in West Bengal, India, *Readings in Biological Anthropology,* S. Ghosh & D.K. Limbu (eds.), B.R. Publishing Corporation, Delhi, 2018.

Human Genetics Unit (HGU), Kolkata

The focus of research in the Human Genetics Unit is on (a) Statistical Methods for Analysis of Complex Traits and (b) Genetic and epigenetic factors associated with Human diseases, with special emphasis on Oral cancer and Psoriasis.

Areas of Research

Faculty Name	Research topic(s)
Bidyut Roy	Studies on understanding the progression of oral leukoplakia to cancer
Indranil Mukhopadhyay	On integrating several data sources in genetic association study
Raghunath Chatterjee	Role of genetic and epigenetics in psoriasis and oral cancer
Saurabh Ghosh	Genetic epidemiology and statistical genetics

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Whole exome somatic mutation analysis in oral cancer and adjacent leukoplakia tissues: A study to understand progression of oral leukoplakia to cancer	B. Roy
2.	Role of epigenetics in psoriasis: Identification of DNA methylation biomarker	R. Chatterjee

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Genetic Mapping of rare variants, multivariate and longitudinal phenotypes	Saurabh Ghosh
2.	On integrating several data sources in genetic association study	Indranil Mukhopadhyay

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Identification of Genetic and Epigenetic Associations Among Psoriasis patients in India	Raghunath Chatterjee	DST-SERB, Government of India
2.	Identification of the contribution of Human Leukocyte Antigen (HLA) alleles and functional coding variants to the risk of psoriasis in patients from West Bengal	Raghunath Chatterjee	DBT, Government of West Bengal
3.	Understanding genetics and genomics of gastric cancer patients in India	Shalini Datta (Ramanujan Fellow)	DST, Government of India
4.	Histological Subtype Specific Gene Expression Profiling of Gastric Cancer in India	Shalini Datta (Ramanujan Fellow)	DST-SERB, Government of India
5.	A Comprehensive Genomic and genetic characterization of Pancreatic Cancer patients in Indian Population	Nilabja Sikdar (Ramalingaswami Fellow)	DBT, Government of India
6.	Identification of Significantly Mutated Genes and candidate driver networks in Gallbladder Adenocarcinoma	Nilabja Sikdar (Ramalingaswami Fellow)	DBT, Government of West Bengal

Publications

Publication in Journals

1. Chanda, K., Das, S., Chakraborty, J., Bucha, S., Maitra, A., Chatterjee, R., Mukhopadhyay, D. and Bhattacharyya, N.P.: Altered Expression of Long Non-Coding RNAs Meg3 and Neat1 in Cell and Animal models of Huntington's Disease, *RNA Biology,* **15(10)**, 1348-1363, 2018.

2. Chandra, A., Senapati, S., Roy, S., Chatterjee, G. and Chatterjee, R.: Epigenome-wide DNA methylation regulates cardinal pathological features of psoriasis, *Clinical Epigenetics*, **10**, 108, 2018.

3. Das, S., Majumder, P.P., Chatterjee, R., Chatterjee, A. and Mukhopadhyay I.: A powerful method to integrate genotype and gene expression data for dissecting the genetic architecture of a disease, *Genomics,* Online Version: https://doi.org/10.1016/j.ygeno.2018.09.011, 2018.

4. Das, S., Mondal, P K., Ghosh, S. and Mukhopadhyay, I.: Family based genome wide association of inflammation biomarkers and fenofibrate treatment response in GOLDN study, *BMC Proceedings,* **12(Suppl 9)**, 41, 2018.

5. Ghosh, S. and Fardo, D.W.: Association analyses of repeated measures on triglyceride and high-density lipoprotein levels: insights from GAW20, *BMC Genetics,* **19(Suppl 1)**, 73, 2018.

6. Karmakar, B., Das, S., Bhattacharya, S., Sarkar, R. and Mukhopadhyay, I.: Tight clustering for large datasets with an application to gene expression data, *Scientific Reports,* **9**, 3053, 2019.

7. Kulkarni, H., Mukhopadhyay, I. and Ghosh, S.: Transmission-based association mapping of triglyceride levels in a longitudinal framework using quasi-likelihood, BMC Proceedings, **12 (Suppl 9)**, 39, 2018.

8. Majumder, S., Dutta, S., Roy, J.G., Chaudhuri, K. and Chatterjee, R.: Liquid biopsy: miRNA as a potential biomarker in oral cancer, *Cancer Epidemiology,* **58**, 137-145, 2019.

9. Nadim, Sk. S., Samanta, S., Pal, N., Elmojtaba, I.M., Mukhopadhyay, I. and Chattopadhyay, J.: Impact of predator signals on the stability of a predator-prey system - a Z-control approach. *Differential Equations and Dynamical Systems,* Online Version: https://doi.org/10.1007/s12591-018-0430-x, 2018.

10. Pal, S., Nandi, M., Dey, D., Chakraborty, B.C., Shil, A., Ghosh, S., Banerjee, S., Santra, A., Ahammed, S.K.M., Chowdhury, A. and Datta, S.: Myeloid-derived suppressor cells induce regulatory T cells in chronically HBV infected patients with high levels of hepatitis B surface antigen and persist after antiviral therapy, *Aliment PharmacolTher,* **49(10)**, 1346-1359, 2019.

11. Ray, J.G., Chatterjee, R. and Chaudhuri, K.: Oral Submucous Fibrosis: a global challenge. Rising incidence; risk factors; management and research priorities, *Periodontology 2000*, **80(1)**, 200-212, 2019.

12. Roy, R., Chatterjee, A., Das, D., Ray, A., Singh, R., Chattopadhyay, E., De Sarkar, N., Eccles, M., Pal, M., Maitra, A. and Roy, B.: Genome-wide microRNA methylome analysis in oral cancer: possible biomarkers associated with patient survival, *Epigenomics,* **11 (5)**, 473-87 2019.

13. Sikdar, N., Saha, G., Dutta, A., Ghosh, S., Shrikhande, S.V. and Banerjee, S.: Genetic alterations of periampullary and pancreatic ductal adenocarcinoma: An overview, *Current Genomics,* **19(6)**, 444-463, 2018.

14. Tintle, N.L., Fardo, D.W., de Andrade, M., Aslibekyan, S., Bailey, J.N., Bermejo, J.L., Cantor, R.M., Ghosh, S., Melton, P., Wang, X., MacCluer, J.W. and Almasy, L.: GAW20: methods and strategies for the new frontiers of epigenetics and pharmacogenomics, *BMC Proceedings,* **12 (Suppl 9)**, 26, 2018.

Publication in Conference Proceedings

1. Basak, D., Mondal, P.K., Mondal, B., Ghosh, R., Halder, A., Dhali, G.K., Chowdhury, A., Mukhopadhyay, I. and Datta, S.: Gene expression of trefoil proteins, gastrokines and mucins in Indian gastric cancer patients, *AACR Annual Meeting 2018,* Chicago, Illinois, Online Version: DOI: 10.1158/1538-7445.AM2018-1518, 2018.

2. Pal, A., Chaturvedi, A., Garain, U., Chandra, A., Chatterjee, R. and Senapati, S.: CapsDeMM: Capsule Network for Detection of Munro's Microabscess in Skin Biopsy Images, *Medical Image Computing and Computer Assisted Intervention – MICCAI 2018,* Frangi A.F., Schnabel J.A., Davatzikos C., Alberola-López C. and Fichtinger G. (eds.), Lecture Notes in Computer Science, **11071**, Springer, Cham, Online Version: DOI: https://doi.org/10.1007/978-3-030-00934-2_44, 2018.

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1. Chatterjee, R., Das, S., Chandra, A. and Basu, B.: Epigenome-wide DNA methylation profiles in oral cancer, *Computational Epigenetics and Diseases,* L.K. Wei (ed.), Translational Epigenetics, T. Tollefsbol (ed.), Elsevier, **9** 219-231, Online Version: DOI: 10.1016/B978-0-12-814513-5.00014-3, 2019.

COMPUTER AND COMMUNICATION SCIENCES DIVISION

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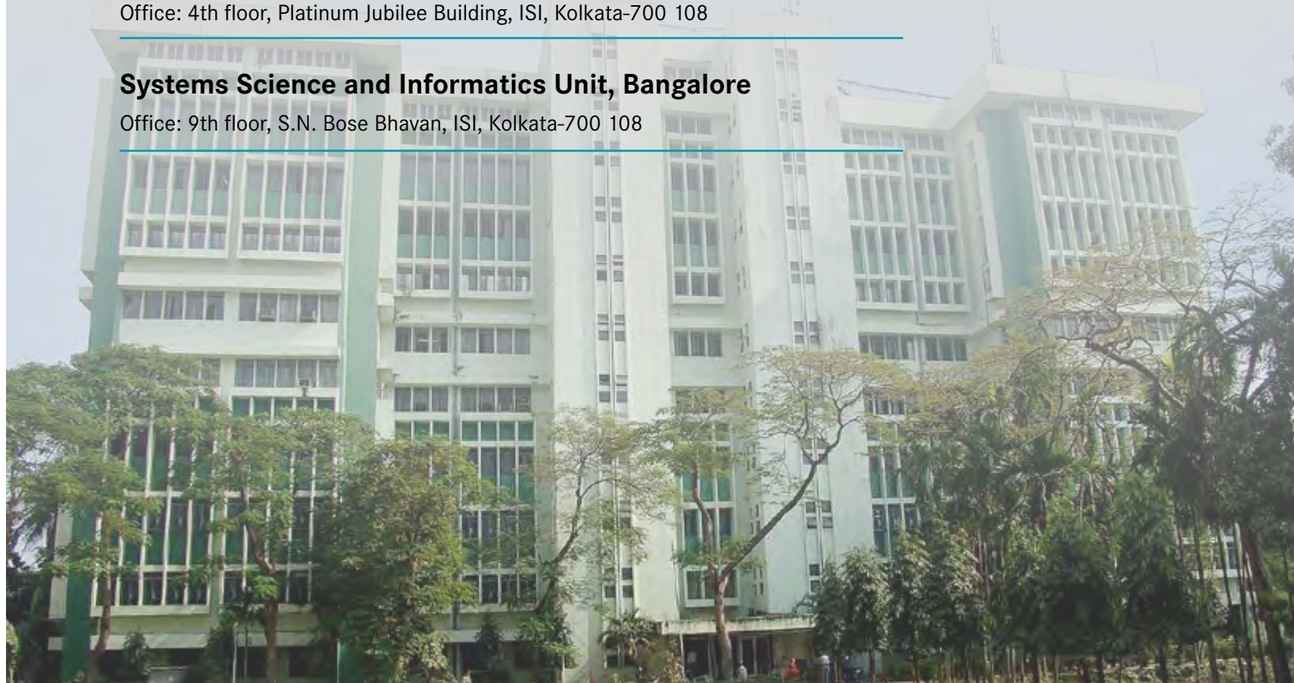

COMPUTER AND COMMUNICATION SCIENCES DIVISION (CCSD)

CCSD counts amongst its faculty a number of highly decorated scientists, as well as fellows of various prestigious national and international academies and societies. The various activities undertaken by the staff of this division are summarised in the following pages under the heads of teaching, research, externally and internally funded project work, workshops and conferences conducted, editorial work, etc.

Advanced Computing and Microelectronics Unit (ACMU), Kolkata

The research activities in the Advanced Computing and Microelectronics Unit (ACMU) comprise of theoretical and applied research in the areas of high performance computing, pervasive and mobile computing, wireless networks, cognitive radio, electronic design automation and testing for nanotechnology and giga-scale integration, embedded systems, system-on-a-chip, intellectual property protection of electronic design, low-power architectures, computational geometry, algorithms, computational biology, and hardware for image processing.

We give here a brief account of ongoing research projects and activities of this unit.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Ansuman Banerjee		Scalable Algorithms for Design, Analysis and Verification for Web Services
Arijit Bishnu, and Arijit Ghosh	Subhabrata Paul	Algorithms and Bounds for Dominating Set, Geodetic Set and Obstacle Number in Graphs
Nabanita Das		Cellular Spectrum Sharing by Cognitive Radio for Ad Hoc Networks
Sandip Das		The Cops and Robber Game on Graphs
Sasanka Roy		Geometric Optimization Problems (Geometric Knapsack Problem, Covering with minimum depth, Maximum Independent set Problem, Maximum Balance Depth Problem)
Sasthi C. Ghosh		Efficient Vertical Handover Techniques in Heterogeneous Wireless Networks
Subhas C. Nandy		Massive Data Algorithms - Phase 2
Susmita Sur-Kolay		Logic Synthesis for Quantum Computing (QCS), Algorithms for Design Automation in Next Generation Technologies

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	The Cops and robber game on graphs	S. Das
2.	Massive Data Algorithm - Phase II	S.C. Nandy
3.	Algorithms for Design Automation in next Generation Technologies	S. Sur-Kolay
4.	Efficient Vertical handover techniques in heterogeneous Wireless networks (VHO)	S.C. Ghosh
5.	Algorithms and Bounds for Dominating Set, Geodetic Set, and Obstacle Number in Graphs	A. Bishnu
6.	Geometric Optimization Problem	S. Roy
7.	Co-operative Channel Sharing in Cognitive Radio ad Hoc Networks	N. Das
8.	Scalable Algorithms for Web Services	A. Banerjee

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Holy Grail of Error-Resilient Bio-Assay on a Lab-on-a-chip (HERBAL)	B.B. Bhattacharya
2.	A framework for Collaborative Application Execution for Mobile cloud Computing (MCC)	A. Banerjee
3.	GP-GPU Computing for Large Scale Networks (GPLN)	N. Das

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Design for Manufacturability aware Global Routing	S. Sur-Kolay	IBM, USA
2.	Automated Methods for Implementing Robust and Secured Biochemical-Assays with Microfluidic Lab-on-chip	A. Banerjee	SERB, New Delhi
3.	Characterization and analysis of interaction networks	S. Goswami	DST, New Delhi
4.	Ramanujan Fellow	A. Ghosh	SERB, New Delhi
5.	Method for analysis and Improvement of Branch Prediction Policies in Modern Architectures	M. Das	DST, New Delhi

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	A Framework for Response Time Analysis for Embedded Programs on Modern Processors	Ansuman Banerjee	Advanced Systems Lab Hyderabad, DRDO, Government of India
2.	Binary Analysis for Software Security	Ansuman Banerjee	Scientific Analysis Group, DRDO, Government of India
3.	Approximate Computing Techniques for Robotics	Ansuman Banerjee	Tata Consultancy Services Innovation Labs
4.	Optimization Problems on Geometric Graphs	Joydeep Mukherjee	Science & Engineering Research Board (SERB), DST
5.	Restricted Geometric Covering and Packing: Algorithms, Complexity and Approximation	Supantha Pandit	Science & Engineering Research Board (SERB), DST

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3. Audhya, G.K., Ghosh S.C. and Sinha, B.P.: Lower bound on bandwidth and channel assignment algorithm for multimedia communication in cellular networks, IEEE Transactions on Mobile Computing (IEEE), **18(8)**, 1816-1830, 2019, Online Version: DOI: 10.1109/TMC.2018.2865934, 2018.

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6. Bhattacharyya, R. and Chakraborty, S.: Property Testing of Joint Distributions using Conditional Samples, *ACM Transactions on Computation Theory,* **16**, 1-20, 2018.

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10. Chattopadhyay, S. and Banerjee, A.: QoS constrained service large scale web service composition using Abstraction Refinement, IEEE Transactions on Services Computing, Online Version: DOI: 10.1109/TSC.2017.2707548, 2018.

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12. Das, S., Prabhu, S. and Sen, S.: A study on oriented relative clique number, *Discrete Mathematics,* **341(7)**, 2049-2057, 2018.

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15. Lu, G.-R., Banerjee, A., Bhattacharya, B.B., Ho, T.-Y. and Chen, H.-M.: Reliability Hardening Mechanisms in Cyber-Physical Digital-Microfluidic Biochips, *ACM Journal on Emerging Technologies in Computing Systems,* **14(3)**, 34:1-34:22, 2018.

16. Lu, G.-R., Hao, C.-H., Chiang, K.-C., Banerjee, A., Bhattacharya, B.B., Ho, T.-Y., and Chen, H.-M.: Flexible Droplet Routing in Active-Matrix Based Digital Microfluidic Biochips, *ACM Transactions on Design Automation for Electronic Systems,* **23(3)**, 37:1-37:25, 2018.

17. Majumdar, R., Basu, S., Ghosh S. and Sur-Kolay, S.: Quantum Error Correcting Code for Ternary Logic, *Physical Review A,* **97(5)**, 052302, 2018.

18. Nongpoh, B., Ray, R., Das, M., and Banerjee, A.: Enhancing Speculative Execution with Selective Approximate Computing, *ACM Transactions on Design Automation of Electronic Systems,* **24(2)**, 26:1-26:29, 2019.

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2. Jammigumpula, A. and Roy, S.: Collision-Free Routing Problem with Restricted L-Path, *29th Int. Workshop on Combinatorial Algorithms (IWOCA),* 1-13, 2018.

3. Acharyya, A., Maheshwari, A. and Nandy, S.C.: Localized query: color spanning variations, *5th Annual Int. Conf. on Algorithms and Discrete Applied Mathematics (CALDAM),* 150-160, 2019.

4. Basak Chowdhury, A., Banerjee, A., and Bhattacharya, B.B.: ATPG Binning and SAT-Based Approach to Hardware Trojan Detection for Safety-Critical Systems, *12th International Conference on Networks and System Security (NSS),* 391-410, 2018.

5. Bhaumick, D. and Ghosh, S.C.: A pseudo-dynamic scheme for mixed unicast and multicast traffic scheduling in IEEE 802.11 WLAN, *10th International Conference on Communication Systems & Networks,* COMSNET 2019, Bengaluru, 2019.

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8. Bishnu, A., Ghosh, A., Kolay, S., Mishra, G. and Saurabh, S.: Parameterized Query Complexity of Hitting Set Using Stability of Sunflowers, *ISAAC 2018,* **25**, 1-12, 2018.

9. Chakraborty, D., Das, S., Francis, M.C. and Sen, S.: On Rectangle Intersection Graphs with Stab Number at Most Two, *The International Conference on Algorithms and Discrete Applied Mathematics (CALDAM)*, 124-137, 2019.

10. Chakraborty, S. and Meel, K.: On Testing of Samplers, *AAAI Conference on Artificial Intelligence,* 7777-7784, Online Version: URL: https://aaai.org/ojs/index.php/AAAI/article/view/4774, 2019.

11. Chattopadhyay, S. and Banerjee, A.: A Variation Aware Composition Model for Dynamic Web Service Environments, *16th International Conference on Service-Oriented Computing (ICSOC),* 694-713, 2018.

12. Das, M., Banerjee, A. and Sardar, B.: A Shared BTB design for Multicore Systems, I*EEE/ACM International Symposium on Code Generation and Optimization (CGO),* 267-268, 2019.

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14. Das, S. and Gahlawat, H.: Bumblebee Visitation Problem, *The International Conference Algorithms and Discrete Applied Mathematics (CALDAM)*, 254-262, 2019.

15. Das, S., Nandi, S., Sen, S. and Seth, R.: The Relative Signed Clique Number of Planar Graphs is 8, *The International Conference on Algorithms and Discrete Applied Mathematics (CALDAM),* 245-253, 2019.

16. Dey, S., Jallu, R.K. and Nandy, S.C.: Minimum spanning tree of line segments, *The 24th Computing and Combinatorics Conference,* 529-541, 2018.

17. Ghosh S. and Ghosh, S.C.: Analyzing the Performance of Dual Connectivity in Control/User plane Split Heterogeneous networks, *15th Wireless On-demand Network systems and Services Conference,* IEEE/IFIP WONS 2019, Wengen, Switzerland, **1**, 64-71, Online Version: https://doi.org/10.23919/WONS.2019.8795482, 2019.

18. Ghosal S. and Ghosh, S.C.: A Decentralized Algorithm for Perturbation Minimization in 5G D2D Communication, *15th Wireless On-demand Network systems and Services Conference,* IEEE/IFIP WONS 2019, Wengen, Switzerland, **1**, 72-78, Online Version: https://doi.org/10.23919/WONS.2019.8795481, 2019.

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20. Mondal, M. Sur-Kolay, S. and Bhattacharya, B.B.: Selective Sensitization of Useless Sneak-Paths for Test Optimization in Memristor-Arrays, *Proc. of the 32nd International Conference on VLSI Design,* IEEE, 383-388, Online Version:10.1109/VLSID.2019.00084, 2019.

21. Tripathi, N., Pal, M., De, M., Das, G.K. and Nandy, S.C.: Guarding polyhedral terrain by k-watchtowers, *12th Int. Frontiers of Algorithmic Workshop*, 112-125, 2018.

22. Boissonnat, J.D., Dyer, R., Ghosh, A., Wintraecken, M.: Local Criteria for Triangulation of Manifolds, *Int. Symp. on Computational Geometry (SoCG)*, Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, **99**, 9:1-9:14, 2018.

23. Boissonnat, J.D., Dutta, K., Ghosh, A. and Kolay, S.: Tight Kernels for Covering and Hitting: Point Hyperplane Cover and Polynomial Point Hitting Set, 13th *Latin American Theoretical Informatics Symposium (LATIN)*, Lecture Notes in Computer Science, Springer, **10807**, 187-200, 2018.

24. Ghosh, A., Kolay, S., Mishra, G.: FPT Algorithms for Embedding into Low Complexity Graph Metrics, *European Symposium on Algorithms (ESA),* Leibniz International Proceedings in Informatics (LIPIcs), Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, **112**, 35:1–35:13, 2018.

Computer Science Unit (CSU), Chennai

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Ayineedi Venkateswarlu		Cryptography, Design of efficient MDS Diffusion Layers
Sujata Ghosh	Sanjay Kumar	Mathematical Logic
T. Karthick and Mathew C. Francis		Graph Theory
Ayineedi Venkateswarlu		Design of efficient MDS Diffusion Layers

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Negotiating, one can learn: Developing a serious game	S. Ghosh

Projects

Publication in Journals

1. Top, J., Verbrugge, R. and Ghosh, S.: An automated method for building cognitive models for turn-based games from a strategy logic, *Games,* **9(3),** 44, 2018.

2. Gupta, Kishan Chand (ASU, Kolkata), Pandey, Sumit Kumar, Venkateswarlu, Ayineedi: Almost involutory recursive MDS diffusion layers, *Des. Codes Cryptography*, **87(2-3)**, 609-626, 2019.

3. Babu, Jasine, Basavaraju, Manu, Chandran, L. Sunil and Francis, Mathew C.: On Induced Colourful Paths in Triangle-Free Graphs, *Discrete Applied Mathematics*, **255**, 109-116, 2019.

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4. Chakraborty, Dibyayan, Das, Sandip, Francis, Mathew C. and Sen, Sagnik: On Rectangle Intersection Graphs with Stab Number at most Two, *5th Annual International Conference on Algorithms and Discrete Applied Mathematics (CALDAM 2019),* Lecture Notes in Computer Science, **11394**, 124-137, 2019.

5. Babu, Jasine, Chandran, L. Sunil, Francis, Mathew C., Prabhakaran, Veena, Rajendraprasad, Deepak and Warrier, J. Nandini: On Graphs with Minimal Eternal Vertex Cover Number, *5th Annual International Conference on Algorithms and Discrete Applied Mathematics (CALDAM 2019),* Lecture Notes in Computer Science, **11394**, 263-273, 2019

Computer Vision and Pattern Recognition Unit (CVPRU), Kolkata

The faculty memmbers of the Computer Vision and Pattern Recognition Unit (CVPRU), Kolkata, are engaged in research related to the broad area of Language Technology and Image Processing. They are currently working on projects in the following areas. Also, CVPRU has established a joint research cluster with University of Technology Sydney (UTS), Australia. Under this research cluster, UTS will support a PhD student every year who will work under the joint supervision of ISI and UTS.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Debapriyo Majumdar	Pabani Das	A Search Engine for Historical Events
	Ravisha Divyanshi and Debjyoti Paul	Aspect Detection from Reviews using Deep Learning
S. Palit	S. Sanyal	Assessment of Video degradation
	S. Sanyal, A. Banerjee and P. Sadhukhan	Image based crater detection
	H. Bhandari and J. El-Khoury	Image dehazing and its applications
Ujjwal Bhattacharya	Partha Sarathi Mukherjee	End to End Online Handwriting Recognition
	Chandan Biswas, Sudip Das, Partha Sarathi Mukherjee	Degraded Document Analysis
	Sudip Das, Partha Sarathi Mukherjee	Automatic Detection of Pedestrians Using Deep Architectures
Umapada Pal	Nilanjana Bhattacharya and Partha Pratim Roy	Strike-out detection from handwritten images
	Sangheeta Roy, Palaiahnakote Shivakumara and Tong Lu	Scene Text Recognition
	Prasun Roy, Subhankar Ghosh	Air-Writing Recognition
	Xuerong Wu, Palaiahnakote Shivakumara, Liping Zhu, Hualu Zhang, Jie Shi, Tong Lu and Michael Blumenstein	Clean and Polluted Water Image Classification
	B. J.Navya, G.C.Swetha, Palaiahnakote Shivakumara, Sangheeta Roy, D.S. Guruand, Tong Lu	Gender Identification
Utpal Garain	Akshay Chaturvedi	Visual Question Answering
	Akshay Chaturvedi, Kp,Abijith,Nezami,Omid Mohamad,Mark Dras	Generating Adversarial Examples for Vision and Language Analysis Tasks
	Abhisek Chakrabarty, Akshay Chaturvedi	Lemmatization and Morphological Tagging for Indian and Low Resourced Languages
	Anabik Pal, Akshay Chaturvedi, Aditi Chandra, Raghunath Chatterjee, Swapan Senapati	Deep Learning for Analysis of Psoriatic Skin
	Abhisek Chakrabarty, Akshay Chaturvedi, Anirban Ray	Duplicate Detection in Multiple Customer Databases
	Anabik Pal, Akshay Chaturvedi, S. Somasundaram, Supriya Sarkar	Deep Learning for Defect Detection in the Internal Surface of Tubes
	Mahdavi, Mahshad, Zanibbi, Richard, Mouchère, Harold and Christian Viard-Gaudin	ICDAR CROHME+TFD: Competition on Recognition of Handwritten Mathematical Expressions and Typeset Formula Detection (TFD)
	Snehasis Banerjee, Tanushyam Chattopadhyay	Interpretable Feature Recommendation for Sensor Data in IoT Analytics

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	The Social Science of Computer Science Authors and Organizations	D. Majumdar
2.	Multi-lingual Word Spotting	U. Pal
3.	DEER: Document Engineering based Envisioning of Reading Behavior	U. Garain
4.	Study Towards an End-to-End Online Handwriting Recognition System	U. Bhattacharya
5.	Automatic information retrieval from doctor's handwriting prescription.	T. Pal

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Detection and Assessment of Image and Video Quality Degradation	S. Palit

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Real-time end-to-end Text Detection and Recognition in the Wild	U. Pal	Ministry of Higher Education, Scientific Research of The Republic of Tunisia & DST, Government of India

Publications

Publication in Journals

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3. Srinivas, Raghunandan K., Shivakumara, Palaiahnakote, Jalab, Hamid A., Ibrahim, Rabha W., Kumar, G. Hemantha, Pal, Umapada and Lu, Tong: Riesz Fractional Based Model for Enhancing License Plate Detection and Recognition, *IEEE Trans. Circuits Syst. Video Techn,* **28(9)**, 2276-2288, 2018.
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19. Wu, Xuerong, Shivakumara, Palaiahnakote, Zhu, Liping, Zhang, Hualu, Shi, Jie, Lu, Tong, Pal, Umapada and Blumenstein, Michael: Fourier Transform based Features for Clean and Polluted Water Image Classification, *24th International Conference on Pattern Recognition,* Beijing, China, 1707-1712, 2018.

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22. Khare, Vijeta, Shivakumara, Palaiahnakote, Navya, B.J., Swetha, G.C., Guru, D.S., Pal, Umapada and Lu, Tong: Weighted-Gradient Features for Handwritten Line Segmentation, *24th International Conference on Pattern Recognition,* Beijing, China, 3651-3656, 2018.

23. Navya, B.J., Swetha, G.C., Shivakumara, Palaiahnakote, Roy, Sangheeta, Guru, D.S., Pal, Umapada and Lu, Tong: Multi-Gradient Directional Features for Gender Identification, *24th International Conference on Pattern Recognition,* Beijing, China, 3657-3662, 2018.

24. Das, Abhijit, Sengupta, Abira, Saqib, Muhammad, Pal, Umapada and Blumenstein, Michael: More Realistic and Efficient Face-Based Mobile Authentication using CNNs, *International Joint Conference on Neural Networks,* Brazil, 1-8, 2018.

25. Chakraborti, Tapabrata, McCane, Brendan, Mills, Steven and Pal, Umapada: Fine-grained Collaborative K-Means Clustering, *33rd International Conference on Image and Vision Computing,* Auckland, New Zealand, 1-6, 2018.

Cryptology and Security Research Unit (CSRU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Anisur Rahaman Molla	John Augustine (IIT Madras), Gopal Pandurangan (UoH, Texas, USA), Jared Saia (UNM, USA) and Valerie King (UV, Canada)	Security in Distributed Computing/ Byzantine Computation
	Ajay D. Kshemkalyani (UI, Chicago, USA),Gokarna Sharma (KSU, USA) and Jr. William K. Moses (Technion, Israel)	Mobile Agents/ Robotics
	Shay Kutten (Technion, Israel), Gopal Pandurangan (UoH, Texas, USA), Reza Fathi (UoH, Texas, USA), Fabian Kuhn (Uni Freiburg, Germany) and Alex Popa (Uni Bucharest, Romania)	Distributed Network Algorithms
Debrup Chakraborty and Palash Sarkar	Cuauhtemoc Mancillas Lopez (CINVESTAV IPN, Mexico) and, Sebati Ghosh (ASU)	Block Cipher Modes of Operations
	Cuauhtemoc Mancillas Lopez (CINVESTAV IPN, Mexico) and, Sebati Ghosh (ASU)	Secure and Efficient Implementations of Cryptographic Schemes
Goutam Paul	Atanu Acharyya (ASU), Nayana Das (ASU), Soumya Das, Pritam Chattopadhyay and Souvik Ray (SMU)	Quantum Information / Computing / Cryptography
	Mostafizar Rahman, Amit Jana and Sugata Gangopadhyay (IIT Roorkee)	Symmetric Cryptanalysis
	Imon Mukherjee (IIIT Kalyani), Nabanita Ganguly (JU) and Sanjay Kumar Saha (JU)	Steganography
Sushmita Ruj	Binanda Sengupta (ASU), Laltu Sardar, Sabyasachi Dutta, Ayantika Chatterjee, Nishant Nikam, Akanksha Dixit, Shahzaib Tahir (City University, London), Muthukrishnan Rajarajan (City University, London), Srinivasan Narayananmurthy (NetApp Inc) and Siddhartha Nandi (NetApp Inc)	Cloud Security
	Prabal Banerjee, Ram Govind Singh, Subhra Mazumdar, Nishant Nikam, Manish Kumar, Debendra Nath Das, Mauro Conti (Padua University, Italy), Chhagan Lal (Padua University, Italy) and Salil Kanhere (UNSW, Australia)	Blockchains
	Sarbani Ghosh, (Bit) ,Sipra Das (IIEST, Shibpur), Tanusree Chatterjee (IIEST, Shibpur), Ranit Chatterjee (IIEST, Shibpur) and Jayasree Sengupta (IIEST, Shibpur)	Network Security

Projects

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Cisco Grant	Sushmita Ruj	Cisco Systems Inc.
2.	NetApp Faculty Fellowship	Sushmita Ruj	NetApp Inc. USA
3.	Samsung GRO	Sushmita Ruj	Samsung Electronics, Kores
4.	Cryptanalysis of Symmetric Cipher Algorithms	Goutam Paul	BARC, DAE, India
5.	Distributed Computation in Dynamic Networks	Anisur Rahaman Molla	DST, Government of India

Publications

Publication in Books

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2. Khalid, A., Paul, G. and Chattopadhyay, A. (eds.): *Domain Specific High-Level Synthesis for Cryptographic Workloads*, Springer, Online Version: DOI: 10.1007/978-981-10-1070-5, 2019.

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13. Ahmadi, M., Ghodselahi, A., Kuhn, F. and Molla, A.R.: The Cost of Global Broadcast in Dynamic Radio Networks, *Theoretical Computer Science, Online Version: DOI: https://doi.org/10.1016/ j.tcs.2019.07.013,* 2019.
14. Tahir, Steponkus, L., Ruj, S., Rajarajan, M., and Sajjad A.: A Parallelized Disjunctive Query based Searchable Encryption Scheme for Big Data, *Future Generation Computer Systems (FGCS),* Elsevier, Online Version: https://doi.org/ 10.1016/j.future.2018.05.048., 2018.

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2. Fathi, Reza., Molla, A.R. and Pandurangan, Gopal.: Efficient Distributed Community Detection in the Stochastic Block Model, *39th IEEE International Conference on Distributed Computing Systems (ICDCS),* Texas, USA, Online Version: https://conferences.computer.org/icdcs/2019/#!/ toc/0, 2019.
3. Ahmadi, M., Kuhn, F., Kutten, S., Molla, A.R. and Pandurangan, G.: The Communication Cost of Information Spreading in Dynamic Networks, *39th IEEE International Conference on Distributed Computing Systems (ICDCS),* Texas, USA, Online Version: https://conferences.computer.org/ icdcs/2019/#!/toc/0, 2019.

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Documentation Research and Training Centre (DRTC), Bangalore

Areas of Research

Faculty Name	Research topic(s)
A.R.D. Prasad	Big Data, Data Curation, Data Repositories, Digital repositories, knowledge representation and management
Biswanath Dutta	Semantic Web, Linked Data, Network Analysis, Data Management
Devika P.Madalli	Knowledge organization, faceted systems and ontologies, open data and access to information, Knowledge management, open data infrastructures
M. Krishnamurthy	Digital Library, Semantic Web, Social Network Analysis, Library Automation

Publictions

Publication in Journals

1. Mike Thelwall, Carol Bailey, Meiko Makita, Pardeep Suda and Devika P.Madalli: Gender and research publishing in India: Uniformly high inequality?, *Journal of Informetrics,* Elsevier, **13(1)**, 118-131, 2019.

2. Meftah Zouai, Okba Kazar, Guadalupe Ortiz Bellot, Belgacem Haba, Nadia, Kabachi and Krishnamurhty, M.: Ambiance Intelligence Approach Using IoT and Multi-Agent System, *International Journal of Distributed Systems and Technologies,* **10(1)**, 37-55, 2019.

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4. Krishnamurthy, M., Roopa, E. and Reddy, Subhash: Provision of E-resources in Engineering College Libraries in India: A Pilot Study, *International Journal of Library and Information Science,* **10(8)**, 85-93, 2018.

5. Subhash Reddy, B. and Krishnamaurthy, M.: Information Use Behavior of Engineering Students: A Case Study, *SRELS Journal of Information Management,* **55(2**), 114-116, 2018.

6. Prakasha and Krishnamurthy, M.: Assessment of Knowledge Management in Health Science Librarianship: A Study, *Asian Journal of Information Science and Technology*, **8(1)**, 39-43, 2018.

7. Jonquet, C., Toulet, A., Dutta, B. and Emonet, V.: Harnessing the Power of Unified Metadata in an Ontology Repository: The Case of AgroPortal, *Journal on Data Semantics,* **7(4)**, 191-221, 2018.

8. Dutta, B. and Sinha, P.K.: A bibliometric analysis of automatic and semi-automatic ontology construction processes, *Annals of Lib. and Inf. Studies*, **65(2)**, 112-121, Online Version: DOI: 10.1007/s13740-018-0091-5, 2018.

9. Adhikari, A., Dutta, B., Dutta, A., Mondal, D. and Singh, S.: An Intrinsic Information Content Based Semantic Similarity Measure Considering The Disjoint Common Subsumers Of Concepts Of An Ontology, *Journal of the Association for Information Science and Technology,* **69(8)**, 1023-1034, 2018.

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1. Krishnamurthy, M.: Understanding Big Data in Library and Information Science: Issues and Challenges, *9th KSCLA National Conference on Library in the Life of the User,* Tumkur University, 158-162, ISBN 9789381979327, 2019.

2. Meeramani, Krishnamurthy, M.: Factors impacting the usage of digital library in higher education. ***International Conference on Future of Libraries***, Online Version: https://library. iimb.ac.in/conference2019/contributorspresentations, 2019.

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1. Krishnamurthy, M, Talawar V. and G. Jagirdar: Best Practices in Institutional Repositories in Indian Universities and Research Institute, *Building User Trust: Key to Special Libraries Renaissance in the Digital Era,* Debal C. Kar, Medha V.Joshi, Kusum Thapliyal, Tariq Ashraf and B.P. Prakash (eds.), Pragati Publications, Delhi, ISBN: 978-81-7307-159-1, 2018.

Electronics and Communication Sciences Unit (ECSU), Kolkata

Areas of Research

Faculty Name	Research topic(s)
B. Chanda	Crowd behavior analysis and anomaly detection, Image dehazing by patch comparison
D.P. Mukherjee	Generation of Ball Possession Statistics in Soccer, Reinforced Quasi-random Forest
K.S. Ray	Commonsense Reasoning, DNA Cryptography
N.R. Pal	Computational Intelligence
P.P. Mohanta	Event Recognition from unconstrained video, Cosmetic Product Recognition System, Activity Recognition and Captioning in Unconstrained Video
S. Das	Statistical Properties of Machine Learning Algorithms, Handling Data Irregularities in Machine Learning

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Estimation of Ball Possession Statistics in Soccer Video	D.P. Mukherjee
2.	Ensemble Memetic Algorithms for Multi-constrained Combinatorial in the Framework of the Travelling Thief Problem	S. Das
3.	Transfer Learning: Neuro and Fuzzy Approaches	N.R. Pal
4.	Multiple Activity Recognition and Captioning in Unconstrained Video	P.P. Mohanta

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Development of Coal Petrography using Machine Learning	D.P. Mukherjee & B. Uma Shankar	TCS
2.	National Post Doctoral Fellowship	J. Dasgupta	SERB
3.	Information Access from Document Images of Indian Languages	B. Chanda	MHRD
4.	Identification of Bainite and Martensite using Image Processing Technique–Phase II	P. Das & D.P. Mukherjee	Tata Steel
5.	Systems and Methods for Object Recognition Based Estimation of Plannogram Compliance	D.P. Mukherjee	TCS

Publications

Publication in Books

1. Chanda, B., Chaudhuri, S. and Chaudhury, S. (eds.): *Heritage Preservation: A Computational Approach,* Springer, 2018.

2. Ghorai, M., Santra, S., Samanta, S., Purkait, P. and Chanda, B.: An Image Dataset of Bishnupur Terracotta Temples for Digital Heritage Research, *Heritage Preservation,* Chanda, B., Chaudhuri, S. and Chaudhury, S. (eds.), 269-291, 2018.

3. Pal, N.R., Bansal, J. and Singh, P.: *Evolutionary and Swarm Intelligence Algorithms,* Springer Verlag, 2018.

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1. Dasgupta, J., Samanta, S. and Chanda, B.: An Ensemble Classifier based Off-line Handwritten Word Recognition System in Holistic Approach, *IET Image Processing,* **12(8)**, 1467-1474, 2018.

2. Shreevani, Murthy, C.A. and Chanda, B.: Generation of Compound Features based on feature Interaction for Classification, *Expert Systems With Applications,* **108**, 61-73, 2018.

3. Umer, S., Dhara, B.C. and Chanda, B.: NIR and VW Iris Image Recognition using Ensemble of Patch Statistics Features, *The Visual Computer Journal,* Online Version: DOI:10.1007/s00371-018-1544-4, 2018.

4. Santra, S., Mondal, R. and Chanda, B.: Learning a Patch Quality Comparator for Single Image Dehazing, *IEEE Transactions on Image Processing*, **27(9)**, 4598-4607, 2018.

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6. Roy, S.K., Chanda, B., Chaudhuri, B.B., Ghosh, D.K. and Dubey, S.R.: Local Jet Pattern: A Robust Descriptor for Texture Classification, *Multimedia Tools and Applications,* 1-27, Online Version: http://link.springer.com/article/10.1007/s11042-018-6559-3, 2018.

7. Zhang, H., Wang, J., Sun, Z., Zurada, J. M. and Pal, N.R.: Feature Selection for Neural Networks Using Group Lasso Regularization, *IEEE Transactions on Knowledge and Data Engineering,* Online Version: DOI:10.1109/TKDE.2019.2893266, 2019.

8. Zhang, H., Pal, N.R., Sheng, Y. and Zeng, Z.: Distributed Adaptive Tracking Synchronization for Coupled Reaction-Diffusion Neural Network, *IEEE Transactions on Neural Networks and Learning Systems,* Online Version: DOI:10.1109/TNNLS.2018.2869631, 2018.

9. Wang, J., Chang, Q., Chang, Qin, Liu, Y. and Pal, N.R.: Weight noise injection-based MLPs with group lasso penalty: Asymptotic Convergence and application to node pruning, *IEEE Transactions on Cybernetics,* Online Version: DOI: 10.1109/TCYB.2018. 2864142, 2018.

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2. Ray, A., Kumar, N. Shaw, A. and Mukherjee, D.P.: U-PC: Unsupervised Planogram Compliance, *ECCV 2018,* 586-600, Munich, Germany, 2018.

3. Paul, A., Majumder, A. and Mukherjee, D.P.: Discriminative Autoencoder, *ICIP 2018,* Athens, Greece, 2018.

4. Mondal, R., Santra, S. and Chanda, B.: Image Dehazing by Joint Estimation of Transmittance and Airlight using Bi-Directional Consistency Loss Minimized FCN, *CVPR Workshop,* Salt Lake City, 1033-1041, 2018.

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Machine Intelligence Unit (MIU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
A.Ghosh	Chakraborty, D.,Narayanan,V.	Deep learning
	R. Roy, S. Ghosh	Speckle De-Noising Technique
	D. Chakraborty and A. Law	Internet of Things
B. Uma Shankar	A. Bakshi, S. Neogi, R. Das, T. Chakraborty and K. Ghosh	Vision, Image Analysis and Perception
K. Ghosh	S. Chattopadhyay	Complex Network Analysis
M. Bhattacharyya		Big Data Analysis
		Crowdsourcing
P. Maji		Machine Learning
		MR Image, Histological Image Analysis
R.K. De		Incidence and prevalence of nonalcoholic fatty liver disease, Biochemical Systems, Significance of metabolic pathway prediction, Massively parallel sequencing technique, Genetic Algorithm
S. Bandyopadhyay		Pattern Recognition
		Identification of combinatorial markers from multiple data sources is a challenging task in bioinformatics, Identification of modules (groups of several tightly interconnected genes) in gene interaction network, microRNAs, Intra and inter-species study on brain tissue, Computational Framework
		Multi-objective Optimization and its application to Energy management in Smart Grids and Dwellings Neighbourhood-sensitive archived evolutionary many-objective optimization, Ensemble of single objective evolutionary algorithms, Zero cost human-based energy retrofit planning, Nash bargaining solutions
S. Mitra	S. Banerjee	Deep Convolutional Neural Networks
S. Mitra and B. Uma Shankar	S. Banerjee and B. Uma Shankar	Deep Learning Method
S.S. Ray		Integrated Similarity Score

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Machine learning for cancer management using radio images and gene expressions	S. Mitra
2.	Computational Methods to Integrate Microarray Data and Protein-Protein Interaction Networks for Disease Gene Identification	P. Maji
3.	Development of GPGPU base parallel algorithms for land cover classification of remotely sensed big data	B. Uma Shankar
4.	Distributed Deep Learning for Multi-label Classification	A. Ghosh
5.	Understanding the mechanisms of perceptual filling-in and attention in low-level vision.	K. Ghosh

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Computational Methods for Studying HIV-1 Pathogenicity in Humans: Analysis over Multiple Infection Stages, Mechanisms and Biomolecular Networks.	S. Bandyopadhyay.
2.	Analyzing the structure and dynamics of large-scale real world complex networks	Late C.A. Murthy (supervised by D.P. Mandal)
3.	Modeling Host-Pathogen Interactions	R.K. De
4.	Development of Algorithms for miRNA Expression Analysis in Cancer.	S.S. Ray

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Deep Learning for Handling Imbalance in Diabetic Retinopathy	S. Mitra	Intel, USA
2.	Copula Functions in Analysis of Single Cell Gene Expression Data	S. Bandyopadhyay	DST, Govt. of India (JC Bose Fellowship Project)
3.	Systems Medicine Cluster (SyMeC): Accelerating Systems Medicine using a Cluster Approach	S. Bandyopadhyay	Six Institute Cluster Project led by NIBMG
4.	Erasmus+ programme (A network project involving various Indian Institute and Universidad Politcnica De Madrid, Spain)	A. Ghosh	European Commission

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Recognition of Antinuclear Antibodies by Automated HEp-2 Cell IIF Image Analysis for Diagnosis of Connective Tissue Disease	P. Maji	DST, Govt. of India

Publications

Publication in Books

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11. Mandal, A. and Maji, P.: FaRoC: Fast and Robust Supervised Canonical Correlation Analysis for Multimodal Omics Data, *IEEE Transactions on Cybernetics,* **48(4)**, 1229-1241, 2018.

12. Mondal, A., Ghosh, S. and Ghosh A.: Object tracking using prototypes based discriminative appearance model and particle filter, *Applied Soft Computing,* **73**, 1081-1094, 2018.

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14. Mridha, S.K. and Bhattacharyya, M.: A Network Based Mechanism for Managing Decomposable Tasks via Crowdsourcing, *Electronic Commerce Research,* **18(4)**, 869-881, Online Version: DOI: 10.1007/s10660-018-9317-8 (Latest IF: 1.489), 2018.

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17. Nayak, L., A. Dasgupta, A., Das, R., Ghosh, K. and De, R.K.: Computational neuroscience and neuroinformatics: Recent progress and resources, *Journal of Biosciences,* **43(5)**, 1037-1054, 2018.

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29. Sen, S., Maulik, U., Mallik, S. and Bandyopadhyay,S.: Detecting TF-MiRNA-Gene Network Based Modules for 5hmC and 5mC Brain Samples: A Intra- and Inter-Species Case-Study Between Human and Rhesus, *BMC Genetics,* **19(9)**, Online Version: DOI: 10.1186/s12863-017-0574-7, 2018.

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Publication in Conference Proceedings

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2. Banerjee, S., Mitra, S. and Uma Shankar, B.: Multi-planar spatial-ConvNet for segmentation and survival prediction in brain cancer, *MICCAI BrainLes, BraTS Challenge* Crimi, A. and Bakas, S. (eds.), Lecture Notes in Computer Science, **11383,** Granada, Spain, 94-104, 2018 .

3. Chakraborty, D., Garg, D., Ghosh, A. and Chan, J.H.: Trigger detection system for American sign language using deep convolutional neural networks, *10th International Conference on Advances in Information Technology (IAIT2018),* Bangkok, Online Version: DOI: https://doi.org/10.1145 /3291280.3291783, 2018.

4. Mandal, A., Agarwal, M. and Bhattacharyya, M.: Collective Story Writing through Linking Images, *Sixth AAAI Conference on Human Computation and Crowdsourcing (HCOMP WiP)*, Zurich, Switzerland, Online Version: arXiv ID: 1806.04298, 2018.

5. Mukherjee, A., Pathak, N., Misra, S. and Mitra, S.: Predictive intra-edge packet-source mapping in agricultural Internet of Things, *EEE Globecom Workshops,* Online Version: *https://ieeexplore.ieee.org/abstract/document/8644296,* 2018.

6. Pal, M. and Bandyopadhyay, S.: Consensus of Subjective Preferences of Multiple Occupants for Building Energy Management, *Symposium Series on Computational Intelligence 2018 (SSCI 2018),* Bengaluru, IEEE, Online version: DOI: 10.1109/SSCI.2018.8628670.1815-1822, 2018.

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Systems Science and Informatics Unit (SSIU), Bangalore

Areas of Research

Faculty Name	Collaborators	Research tpoic(s)
B.S. Daya Sagar	Sravan Danda, Laurent Najman	Applications of Power Watershed Framework for Data Analysis
	Aditya Challa, Sravan Danda, Laurent Najman	Morphological Interpolation
	Aditya Challa, Sravan	Morphological Tools for Data Analysis
	S. Ashok Vardhan	Granulometric and Fractal Analyses for Feature (Shape-Size-Orientation) Based Classification of Planar and Grayscale Basins Hierarchically Decomposed from CARTOSAT-I DEMs
	Athira Surendran	Quantitative Morphologic and Scaling Analyses of Lunar Digital Elevation Models (LDEM) Derived from TMC Data of Chandrayaan-1 Mission via Mathematical Morphology and Fractal Geometry
	Sampriti Soor, Sanketa Gade	Quantitative Characterization of Complex Topologically Prominent Components of Porous Media derived from Rocks of Petrologic Significance via Mathematical Morphology and Fractal Geometry
	Sampriti Soor	Iterated Watershed to Obtain Connected Clusters
	Geetika Barman	Hyperspectral Image Classification via Mathematical Morphology
	K. Nagajothi	Granulometries in Digital Elevation Model Analyses
Kaushik Kumar Majumdar		A new nonlinear bivariate association measure: whenone random variable is increasing or decreasing with respect to theother
Saroj K Meher	D. Arun Kumar	Study and Development of Knowledge-Encoded Progressive Granular Neural Network
	Neeta Kothari	Deep Learning Neural Networks for Pattern Classification

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Synchronization and desynchronization in seizure networks	K.K. Majumdar

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Deep learning neural networks for pattern classification	S.K. Meher

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Analysis of Optical and Radar Remote Sensing Images for Dynamic Earth Process Monitoring	B.S. Daya Sagar	ITPAR-IV, Govt. of India
2.	Quantitative Morphologic and Scaling Analyses of Lunar Digital Elevation Models (LDEM) Derived from TMC Data of Chandrayaan-1 Mission via Mathematical Morphology and Fractal Geometry	B.S. Daya Sagar	ISRO-Chandrayaan, Govt. of India

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Land Cover Classification of Remote Sensing Images Using Granular Computing Methodologies	Saroj K. Meher	DST, Govt. of India
2.	Quantitative Characterization of Complex Topologically Prominent Components of Porous Media derived from Rocks of Petrologic Significance via Mathematical Morphology and Fractal Geometry	B.S. Daya Sagar	DST, Govt. of India

Publications

Publication, in Journals

1. Challa, A., Danda, S., Daya Sagar, B.S. and Najman, Laurent: Watersheds for Supervised Classification, *IEEE Signal Processing Letters,* **26(5)**, 720-724, 2019.
2. Danda, Sravan, Challa, Aditya, Daya Sagar, B.S., and Najman, Laurent: Revisiting the Isoperimetric Graph Partitioning Problem, *IEEE Access,* Online Version: DOI: 10.1109/ACCESS.2019 .2901094, 2019.
3. Danda, Sravan, Challa, Aditya, Daya Sagar, B.S and Najman, Laurent: Some Theoretical Links Between Shortest Path Filters and Minimum Spanning Tree Filters, *Journal of Mathematical Imaging and Vision,* Online Version: DOI: 10.1007/s10851-018-0866-1, 2019.
4. Kumar, D. Arun, Meher, Saroj K. and Kumari, K. Padma: Adaptive Granular Neural Networks for Remote Sensing Image Classification, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, **26(6)**, 1848-1857, 2018.
5. Soor, Sampriti, Challa, Aditya, Danda, Sravan, Daya Sagar, B.S., Najman, and Laurent: Iterated Watershed : Connected Variation of K-Means for Clustering GIS Data, *IEEE Transactions on Emerging Topics in Computing,* Online Version: DOI: 10.1109/TETC.2019.2910147, 2019.
6. Majumdar, K.K.: Shannon versus semantic information processing in the brain (advanced review article), *Data Mining and Knowledge Discovery*, Wiley Interdisciplinary Reviews, **9(3)**, e1284, 2019.
7. Raj, K., Rajagopalan, S.S., Bhardwaj, S., Panda, R.K., Reddam, V.R., Chaitanya, G., Raghavendra, K., Mundlamuri, R.C., Thennarasu, K., Majumdar, K.K., Satishchandra, P., Sinha, S. and Bharath, R.D.: Machine learning detects EEG microstate alterations in patients living with temporal lobe epilepsy, *Seizure*, **61**, 8-13, 2018.
8. Pathak, A., Ramesh, A., Mitra, A. and Majumdar, K.K.: Automatic seizure detection by modified line length and Mahalanobis distance function, *Biomedical Signal Processing and Control*, **44**, 279-287, 2018.

Publication in Books

1. Zafar, M., Narayan, R.L., Meher, Saroj K. and Behera, S.K.: Machine Learning: A Powerful Tool for Biologist, *Machine Learning and IoT: A Biological Perspective,* S. Sen, L. Dutta, and S. Mitra (eds.), **I**, CRC Press, Boca Raton, Taylor & Francis Group, 1-27, 2018.

PHYSICS AND EARTH SCIENCES DIVISION

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PHYSICS AND EARTH SCIENCES DIVISION (PESD)

Geological Studies Unit (GSU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research Topics
Amlan Banerjee		Regional and local scale fluid–flow and fluid–rock interaction using a combination of numerical modelling, petrographic analyses and geochemical studies
Dhurjati Prasad Sengupta	S. Sur Koley and P. Munshi	New techniques of using morphometry on fossil vertebrates developed with PET scan, Micro CT and SEM technology
Dilip Saha	A. Patra	Brittle structures and liquefaction features as possible seismogenic indicator, foothill Darjeeling Himalaya
Dilip Saha and R. Munshi	P. Bachhar and Munshi, R.	Brittle deformation of aplite-pegmatite dykes/veins in Singhbhum granite – tectonic implications
Dilip Saha, Amlan Banerjee, and S. Patranabis-Deb	Priyanka Bachhar, Amlan Banerjee, S. Patranabis-Deb and G. Deb	Geochemistry of Komatiites from eastern Singhbhum craton and Paleoarchean mantle Coupled MORB and Arc signatures from a Neoarchean greenstone belt, central India
Parthasarathi Ghosh	S. Goswami, A. Ganguly and S. Dasgupta (SRF, GSU)	Identification of the signatures of microbial activity in Triassic-Jurassic freshwater carbonate strata of the Indian Gondwana basins and to evaluate the environmental role of these microbes.
S.S. Das		Diversity, palaeobiogeography and palaeoecology of Miocene gastropods from India with special emphasis on Kutch, Gujarat
Saswati Bandyopadhyay	Walter Joyce and Rafaella Garbin	Taxonomic revision of Geoemydid turtles from Siwalik foreland basin of India and Pakistan
Tapan Chakrabarty		Sedimentology, petrography and paleodispersal pattern in the Siwalik rocks in the eastern Himalaya and its bearing on the evolution of the Bengal Basin and the Himalayan foreland basin

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Oxygenation of the Proterozoic ocean	A. Banerjee
2.	Diversity, palaeobiogeography and palaeoecology of Miocene gastropods from India with special emphasis on Kutch, Gujarat.	S.S. Das
3.	Archean greenstone belts in India – tectonics and sedimentation	D. Saha, S. Patranabis-Deb & A. Banerjee
4.	Sedimentological and geochemical characteristics of the Late Triassic – Middle Jurassic formations in a Gondwana succession of Pranhita-Godavari Valley Basin – clues for changes in depositional environment and palaeoclimate	P. Ghosh
5.	Morphospace driven shape prospecting of Mesozoic fossil vertebrates from Gondwanas of peninsular India	D. Sengupta & S. Bandyopadhyay
6.	Paleogeography of the Neogene foreland basin of Eastern Himalaya and its relationship with contemporaneous sediments of Mizoram	Tapan Chakraborty

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Systematics, Palaeobiogeography and change in diversity of Tertiary Gastropoda of Kutch, Gujarat	S.S. Das	SERB, DST, Govt. of India

Publications

Publication in Journals

1. *Banerjee, Amlan, Słowakiewicz,* Mirosław, Majumder, Tuasha, Khan, Sayani, Patranabis-Deb, Sarbani, Maurice E. Tucker, and Saha, Dilip: A Palaeoproterozoic dolomite (Vempalle Formation, Cuddapah Basin, India) showing Phanerozoic-type dolomitisation, ***Precambrian Research***, **328(9-26)**, Online Version: https://doi.org/10.1016/j.precamres.2019.04.013, 2019.

2. Banerjee A, Słowakiewicz M., Majumder T., Khan. S, Syczewski MD, Patranabis-Deb S, Tucker M.E. and Saha D: Geochemical clues to the enigma of Palaeoproterozoic Vempalle Formation dolomites, *Precambrian Research*, **328**, 9-26, 2019.

3. Chakravorti, C. and Sengupta, D.P.: Taxonomy, morphometry and morphospace of cranial bones of Panthasaurus gen. nov. maleriensis, *Late Triassic of India.*, **45(2)**, 317-340, 2019.

4. Dasgupta, S. and Ghosh, P.: Freshwater carbonates within a Late Triassic siliciclastic fluvial system in a Gondwana rift basin: The Maleri Formation, India, *Sedimentary Geology*, **373**, 254-271, 2018.

5. Ferreira, G.S., Bandyopadhyay, S. and Joyce, W.G.: A taxonomic reassessment of *Piramys auffenbergi,* a neglected turtle from the late Miocene of Piram Island, Gujarat, India, *Peer J.,* **6:e5938**, 1-14, Online Version: DOI 10.7717/peerj.5938, 2018.

6. Goswami, S., Gierlowski-Kordesch, E. and Ghosh, P.: Sedimentology of the Early Jurassic limestone beds of the Kota Formation: record of carbonate wetlands in a continental rift basin of India, *Journal of Paleolimnology,* **59**, 21-38, 2018.

7. Joy, Sojen, Patranabis-Deb, Sarbani, Saha, Dilip, Jelsma, Hielke, Maas, Roland, Soderlund, Ulf, Tappe, Sebastian, Gert van der Linde, *Banerjee, Amlan and* Krishnan, Unni: Depositional history and provenance of cratonic 'Purana' basins in southern India: A multipronged geochronology approach to the Proterozoic Kaladgi and Bhima basins, *Geological Journal*, Online Version: https://doi.org/10.1002/gj.3415, 2018.

8. Majumder, D. and Ghosh, P.: Characteristics of the drainage network of the Kosi Megafan, India and its interaction with the August 2008 flood flow, Ventra, D. & Clarke, L.E. (eds), *Geology and Geomorphology of Alluvial and Fluvial Fans: Terrestrial and Planetary Perspectives,* Geological Society, Special Publications, London, **440**, 307-326, 2018.

9. Mohamed Beraaouz, M., Abioui, M. and Patranabis-Deb, S.: Precambrian (Ediacaran) stromatolites in the Amane-n'Tourhart (Anti-Atlas, Morocco), *Int. Jour. Earth Sciences (GeolRundsch),* Online Version: DOI: 10.1007/s00531-019-01690-1, 2019.

10. Patra, A. and Saha, D.: Stress regime changes in the Main Boundary Thrust zone, Eastern Himalaya, decodedfrom fault-slip analysis, *Journal of Structural Geology,* Online Version: doi.org/10.1016/ j.jsg.2018.12.010, 2019.

11. Sain, A. and Saha, D.: Structure and tectonics of a Mesoproterozoic ophiolite– Insight from Kanigiri Ophiolite with a mélange zone, southern India, *Tectonophysics*, **744**, 177-204, 2018.

12. Saha, D. and Sain, A.: Multiple convergences along an Archean craton margin: Clues from Proterozoic ophiolite remnants, granites and granulite domains along the SE margin of India, *Journal of Geodynamics,* Online Version: doi.org/10.1016/j.jog.2018.04.004, 2018.

13. Taral, Suchana and Chakraborty, Tapan: Deltaic coastline of the Siwalik (Neogene) foreland basin evidences from the Gish River section, Darjeeling Himalaya, *Geological Journal,* **53(1)**, 203-229, Online Version: DOI:10.1002/gj.2886, 2018.

14. Taral, Suchana, Sarkar, Soumen and Chakraborty, Tapan: An ichnological model for a deltaic depositional system: New insights fromthe Neogene Siwalik Foreland Basin of Darjeeling-Sikkim Himalaya, *Palaeogeography, Palaeoclimatology, Palaeoecology,* Online Version: doi.org/ 10.1016/j.palaeo.2018.08.004, 2018.

Physics and Applied Mathematics Unit (PAMU), Kolkata

The main areas of research in Physics & Applied Mathematics Unit are Theoretical Physics and Applied Mathematics. Additionally, some experimental work is also being done in the Fluvial Mechanics Laboratory of this Unit.

In a nutshell, the Scientists of the Physics & Applied Mathematics Unit (PAMU) of the Institute have been working in the areas of Astrophysics & Data Analysis, Astro-Optics, Condensed Matter Physics, Cosmology, High Energy Physics, Mesoscopic Physics and Nano-electronics, Quantum Field Theory, Quantum Information Theory, Quantum Mechanics, Nonlinear Dynamical Systems, Sediment-fluid Interactions and Flow Visualization. There is an externally funded new project on Synchronization, clustering and death in Networks of Complex systems (Theory and Application to Biology and Neurophysiology).

A brief account of the specific research work done by the members of PAMU during the year 2018-19 is given below:

Areas of Research

Faculty Name	Collaborators	Research Topics
PHYSICS		
Ashim Kumar Roy	S.K.Sharma	Classical Optics
Banasri Basu	Satyaki Kar	Quantum entanglement in magnonic Floquet topological Insulator
	Anirudha Menon, Debashree Chowdhury	Thermoelectric transport in tilted Weyl Semimetal using Floquet theory
	Abhik Ghosh	Universal City-size distributions through rank ordering
Guruprasad Kar	S. Bandyopadhyay, Sibasish Ghosh, Manik Banik, Som Sankar Bhattacharya, Amit Mukherjee and Arup Roy	Study of Quantum Switch
Preeti Parashar	Tamal Guha and Mir Alimuddin	Ergotropic Gap in Quantum Thermodynamics
Santanu K. Maiti	S. Chakraborty, M. Dey and K. Wakabayashi	Quantum Mechanics:Thermoelectric study for efficient energy conversion
	S. Sarkar	Spintronics in magnetic helix structure
	S. Roy, M. Saha, M. Patra and S. Sil	Topological states and localization phenomena
	A.Koley	Transport properties in presence of irradiation
	A.Nitzan, M. Saha and A. Koley	Transport phenomena in interacting quantum systems
Subir Ghosh	Pralay Das and Supriyo Pan	QClassical time crystal and its application in cosmological context
	Pralay Das	High Energy Physics: Morita's conjecture regarding possibility of a minimum temperature in chaotic system has been extended in more complicated systems
	Souvik Pramanik and Kumar Das	General Theory of Relativity: Noncommutative effects on quasi-normal modes of black hole have been studied
	Santanu Maity and Joydeep	Construction of anyon beam in a plane has been proposed and its theory has been constructed

Faculty Name	Collaborators	Research Topics
Supratik Pal	Debabrata Chandra, Tony Pinhero, Abhishek Naskar, Ayan Mitra, Ujjaini Alam, Barun Kumar Pal, Archita Bhattacharyya, Subinoy Das, Kanhaiya Pandey, Lal, Arindam Chatterjee, Arnab Paul and Anish Ghoshal	Cosmology and Astroparticle Physics
APPLIED MATHEMATICS		
Barnana Roy	D. Nath and N. Saha	Nonlinear waves
Dibakar Ghosh	M. Perc, M. Lakshmanan, A. E. Hramov, P. Muruganandam, F.F. Ferreira, S.K. Dana, B.K Bera, S. Majhi, S. Rakshit and S. Kundu	Solitary state and spiral wave chimera state in coupled networks
	J. Kurths, S. Sinha, S. Majhi, S. Rakshit and B. K. Bera	Synchronization in time-varying and mobile networks
EXPERIMENTAL RESEARCH - Fluvial Mechanics Laboratory		
S. Sarkar	S. Dey	Some experiments have been conducted over beds with an isolated and continuous dune

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Quest for Dark Matter and Inflation	Arindam Chatterjee	DST
2.	Some Current Quantum Mechanical Problems in Linear and Nonlinear Quantum Systems	Anjana Sinha	DST
3.	Macroscopic dynamics in ensembles of dynamical systems: some challenging issues	Dibakar Ghosh	DST
4.	Quantum transport in meso-scale and nanoscale systems: Open problems and challenges	Santanu Kr. Maiti	DST, SERB
5.	Spatiotemporal propagation of signals in complex networks	Chittaranjan Hens	DST

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	New Statistical Techniques to Identify Modified Gravity as the Source of Cosmic Acceleration	Ujjaini Alam	DST

Publications

Publication in Journals

1. Alimuddin, Mir, Guha, Tamal and Parashar, Preeti: Bound on ergotropic gap for bipartite separable states, *Physical Review, **A99***, 052320 (1-17), 2019.
2. Banerjee, M., Mal, B. and Maiti, S.K.: Unconventional localization phenomena in a spatially non-uniform disordered material, *Physica E: Low-Dimensional Systems and Nanostructures* 106, 312-318, 2019.
3. Bhattacharyya, A., Alam, U., Pandey, K.L., Das, S. and Pal, S.: Are HO and σ8 tensions generic to present cosmological data? *The Astrophysical Journal,* 876, 143(1-12), 2019.
4. Chakraborty. S. and Maiti, S.K.: Possible routes for efficient thermo-electric energy conversion in a molecular junction*, Chem. Phys. Chem.* 20, 848-860, 2019.
5. Chatterjee D, Ghosh S, Mazumder B. S. and Sarkar K.: Development of bed forms due to waves blocked by counter-current, *Earth Surface Processes and Landform*, 44, 1330-1345, 2019.
6. Chowdhury, S.N. and Ghosh, D.: Synchronization in dynamic network using threshold control approach, *Europhysics Letters*, **125**, 10011 (7 pages), 2019.
7. Das, P., Pan, S. and Ghosh, S.: Thermodynamics and phase transition in Shapere–Wilczek fghfgh model: Cosmological time crystal in quadratic gravity, *Physics Letters,* B791, 66-72, 2019.
8. Das, Kumar, Pramanik, S. and Ghosh, S.: Quasinormal mode spectra for odd parity perturbations in space time with smeared matter sources, *Physical Review* D99, 024039, 2019.
9. Das, P. and Ghosh, S.: Back-reaction inhomogeneities in the cosmological parameter evolution via a noncommutative fluid, *Physical Review,* D98, 084047, 2018.
10. Das, P., Pan, S., Ghosh, S. and Pal, P.: Cosmological time crystal: Cyclic universe with a small cosmological constant in a toy model approach, *Physical Revie*w, **D98**, 024004, 2018.
11. Ganguly, S., Basu, S. and Maiti, S.K.: Unconventional charge and spin dependent transport properties of a graphene nanoribbon with line-disorder, *Europhysics Letters,* **124**, 57003(1 – 7), 2018.
12. Ganguly, S., Basu, S. and Maiti, S.K: Controlled engineering of spin polarized transport properties in a zigzag graphene nano-junction, *Europhysics Letters,* **124,** 17005(1 – 7), 2018.
13. Ganguly, S., Basu, S. and Maiti, S.K. : Interface sensitivity on spin transport through a three-terminal graphene nanoribbon, *Superlattices and Microstructures,* **120**, 650-658, 2018.
14. Khajanchi, S., Perc, M. and Ghosh, D.: The influence of time delay in a chaotic cancer model, *CHAOS,* 28, 103101(1-13), 2018.
15. Kundu, S., Majhi, S., Muruganandam, P. and Ghosh, D.: Diffusion induced spiral wave chimeras in ecological system, *European Physics Journal Special Topics,* 227, 983-993, 2018.
16. Kundu, S., Majhi, S., Karmakar, P., Ghosh, D. and Rakshit, B.: Augmentation of dynamical persistence in networks through asymmetric interaction, *Europhysics Letters,* **123**, 30001(7 pages), 2018.
17. Kundu, S., Majhi, S. and Ghosh, D.: Resumption of dynamism in damaged networks of coupled oscillators, *Physical Review, **E** **97***, 052313(1-10), 2018.
18. Kundu, S., Bera, B. K., Ghosh, D. and Lakshmanan, M.: Chimera patterns in three-dimensional locally coupled systems, *Physical Review, **E** **99***, 022204(1-10), 2019.
19. Kundu, P., Sharma, L., Nandan, M., Ghosh, D., Hens, C. and Pal, P.: Emergent dynamics in delayed attractive-repulsively coupled networks, *CHAOS*, **29**, 013112(1-10), 2019.
20. Kar, S. and Basu, B.: Photoinduced entanglement in a magnonic Floquet topological insulator, *Physical Review B,* **98**, 245119(1-9**)**, 2018.
21. Majhi, S., Ghosh, D. and Kurths, J.: Emergence of synchronization in multiplex networks of mobile Rössler oscillators, *Physical Review, **E** **99***, 012308(1-13), 2019.
22. Majhi, S., Bera, B. K., Ghosh, D., and Perc, M.: Chimera states in neuronal networks: A review, *Physics of Life Reviews*, Online Version: DOI: https://doi.org/10.1016/j.plrev.2018.09.003, 2018.
23. Majhi, S., Kapitaniak, T., and Ghosh, D.: Solitary states in multiplex networks owing to competing interactions, *CHAOS,* **29**, 013108(1-12), 2019.
24. Majhi, S. and Ghosh, D.: Alternating chimeras in networks of ephaptically coupled bursting neurons, *CHAOS,* **28**, 083113 (1-12), 2018.
25. Majhi, S., Muruganandam, P., Ferreira, F.F., Ghosh, Dibakar and Dana, S.K.: Asymmetry in initial cluster size favors symmetry in a network of oscillators, *CHAOS,* **28**, 081101(1-7), 2018.

26. Makarov, V.V. , Kundu, S., Kirsanov, D.V., Frolov, N.S., Maksimenko, V.A., Ghosh, D., Dana, S. K. and Hramov, A.E.: Multiscale interaction promotes chimera states in complex networks, *Communications in Nonlinear Science and Numerical Simulation,* **71**, 118–129, 2019.

27. Menon A., Chowdhury D. and Basu B.: Photoinduced tunable anomalous Hall and Nernst effects in tilted Weyl semimetals using Floquet Theory, *Physical Review B* , **98**, 205109 (1-6), 2018.

28. Mitra, A.K., Banerjee, R. and Ghosh, S.: Noncommutative fluid and Growing Modes of Inhomogeneity in (Newtonian) Cosmology, *JCAP* 1810, 10(057), Online Version: DOI: 10.1088/ 1475-7516/2018/10/057, 2018.

29. Naskar, A. and Pal, S.: Non-Gaussian features of primordial gravitational waves, *Physical Review **D*** 98, 083520(1-6), 2018.

30. Nath, D., Saha N. and Roy, B.: Stability of (1+1) dimensional coupled nonlinear Schrodinger equation with elliptic potentials, *European Physical Journal Plus,* **133,** 504 (1-15), 2018.

31. Patra, M. and Maiti, S.K.: Simultaneous spin-based Boolean logic operations with re-programmable functionality, *Europhysics Letters,* **123**, 58008(1-6), 2018.

32. Patra, M. and Maiti, S.K.: Charge-based re-programmable logic device with built-in memory: New era in molecular electronics, *Organic Electronics,* **62**, 454-458, 2018.

33. Roy, A.K. and Sharma, S.K.: Methods for constructing analytic phase function for spherical particle polydispersions, *Journal of Modern Optics,* 66, 448-454, 2019.

34. Rakshit, S., Ray, A., Bera, B.K. and Ghosh, D.: Synchronization and firing patterns of coupled Rulkov neuronal map, *Nonlinear Dynamics,* **94**, 785–805, 2018.

35. Rakshit, S., Bera, B.K., Ghosh, D. and Sinha, S.: Emergence of synchronization and regularity in firing patterns in time-varying neural hypernetworks, *Physical Review E,* **97**, 052304 (1-12), 2018.

36. Rakshit, S., Bera, B.K. and Ghosh, D.: Synchronization in a temporal multiplex neuronal hypernetwork, *Physical Review E*, **98**, 032305(1-15), 2018.

37. Wei, Z., Parastesh, F., Azarnoush H., Jafari, S., Ghosh, D., Perc, M. and Slavinec, M.: Nonstationary chimeras in a neuronal network, *Europhysics Letters,* **123**, 48003(1-5), 2018.

Publication in Conference Proceedings

1. Aman, Salma Farhana, Maiti, Santanu K. and Dey, Moumita: Quantum ring for ther- moelectric power generation: Interplay between Aharonov-Bohm flux and disorder, *AIP Conference Proceedings,* **2072**, 020005(1– 8), 2019.

2. Chakraborty, Suvendu and Maiti, Santanu K.: Study of thermopower in a 1D lattice: Role of aperiodicity, *AIP Conference Proceedings*, **2072**, 020018(1-5), 2019.

3. Ganguly, Sudin and Maiti, Santanu K.: A comparative study of spin polarization between square and triangular antidots in graphene nanoribbon, *AIP Conference Proceedings*, **2072**, 020006(1-5), 2019.

4. Roy, Souvik and Maiti, Santanu K.: Localization transitions and formation of mixed phase in a two-stranded ladder network modulated with incommensurate site potentials, *AIP Conference Proceedings*, **2072**, 020015(1-6), 2019.

Theoretical and Applied Sciences Unit (TASU), North-East Centre, Tezpur

The Unit is engaged in research in Atmospheric Sciences, Air Quality studies, Environmental Contamination and Assessment, and Environmental Exposure studies, Environmental Applications of Remote Sensing, Change Detection, Land Cover Classification, Image Interpretation and Analysis, Medical Image analysis.

Areas of Research

Faculty Name	Collaborators	Research Topics
Darpa Saurav Jyethi	Liaquat Husain and Dutkiewicz and Vincent	Retrieval of historic atmospheric Black Carbon concentration in the Finnish Arctic and North America
	P.S. Khillare	Profile analysis of polycyclic aromatic hydrocarbons (PAHs) in environmental matrices
		Morphological and chemical characterisation of particulate matter
Sanjit Maitra		Crop health monitoring around Tezpur using multimodal remote sensing information fusion
Sanjit Maitra and Kuntal Ghosh	Rahul Kumar Ojha and Rajdeep Das	Applications of Deep Learning in Medical Imaging.
Sanjit Maitra, Kuntal Ghosh and Tapan Chakravarty	Srutiparna Neogi	Change detection around Kaziranga National Park.
Sanjit Maitra, Kushal Banik Chowdhury and Darpa Saurav Jyethi		Analysis of atmospheric particulate matter removal using satellite imagery derived vegetative cover.

Publications

Publication in Journals

1. Bhakta, R., Khillare, P.S. and Jyethi, D.S.: Atmospheric particulate matter variations and comparison of two forecasting models for two Indian megacities, *Aerosol Science and Engineering,* Online Version: https://doi.org/ 10.1007/s41810-019-00041-6, 2019.

2. Khillare, P.S., Sattawan, V.K. and Jyethi, D.S.: Profile of Polycyclic Aromatic Hydrocarbons in digested sewage sludge, *Environmental Technology,* Online Version: https://doi.org/10.1080/ 09593330.2018.1512654, 2018.

Publication in Conference Proceedings

1. Maitra, S.: Analysis of crop condition during monsoon season using multispectral and polarimetric SAR images, *SPIE Remote Sensing 2018, 10783,* 1078324, 2018.

Publication in Books

1. Maitra, S., Ghosh, R. and Ghosh, K.: Applications of Deep Learning in Medical Imaging, *Handbook of Deep Learning Applications*, Book Series: Smart Innovation, Systems, and Technologies, B.E. Balas et al. (eds.), Springer, 111-127, Online Version: https://doi.org/10.1007/978-3-030-11479-4_6, 2019.

SOCIAL SCIENCES DIVISION

Professor In-Charge: Professor E. Somanathan, EPU Delhi
Office: 7, S.J.S. Sansanwal Marg, ISI, New Delhi- 110 016

Economic Analysis Unit, Bangalore
Office: 8th Mile, Mysore Road, ISI, Bangalore- 560 059

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Economics and Planning Unit, Delhi
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Office: Ground floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

Population Studies Unit, Kolkata
Office: 5th floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

Psychology Research Unit, Kolkata
Office: 7th floor, Platinum Jubilee Building, ISI, Kolkata-700 108

Sampling and Official Statistics Unit, Kolkata
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Socio-Economic Research Unit, North-East Centre, Tezpur
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Sociological Research Unit, Giridih
Office: New Barganda, ISI, Giridih, Jharkhand- 815 301

SOCIAL SCIENCES DIVISION (SSD)

The scientific workers of the units under the Social Sciences Division are extensively involved in research, teaching, consultancy, editorial work, externally and internally funded project works and academic administration. Research is carried out both at individual and collaborative/interdisciplinary levels. The faculty members are also providing guidance to the Research Fellows. Training programs/ workshops are organized on a regular basis for non-ISI research fellows, college teachers and ISS probationers at different centres and at universities in the Northeastern region of India.

Economic Analysis Unit (EAU), Bangalore

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Molly Chattopadhyay	S. Niyati and R. Vijayamba	Research on Official Statistics regarding Women's Labour in India
Madhura Swaminathan		Price volatility of perishable crops, Rural women workers and drudgery: evidence from time use surveys in Indian villages

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Workshop on Data Anamoly in Official Statistics regarding Women's Labour	Molly Chattopadhyay

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Workshop on Data Anamoly in Official Statistics regarding Women's Labour	Molly Chattopadhyay

Publications

Publication in Books

1. Swaminathan, Madhura (contributing author as member of Project Team): *Multi-stakeholder Partnerships to Finance and Improve Food Security and Nutrition in the Framework of the 2030 Agenda,* A Report by the High Level Panel of Experts on Food Security and Nutrition, Online Version: http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/ HLPE-Report-13_EN.pdf\, 2018.

Publication in Journals

1. Swaminathan, Madhura: *CSI Transactions on ICT (CSIT), ICT and Agriculture* (Special Issue), **6(3-4)**, 1-3, Online Version: https://doi.org/10.1007/s40012-018-0209-9, 2018.
2. Swaminathan, Madhura, Murari, Kamal, Mahato, Sandeep and Jayaraman, T.: Extreme temperatures and crop yields in Karnataka, India, *Review of Agrarian Studies,* **8**, 92-113, Online Version: http://www.ras.org.in/extreme_temperatures_and_crop_yields_in_ karnataka_india, 2018.

Economic Research Unit (ERU), Kolkata

During this year the scientific workers of the Unit were extensively involved in research, teaching, training, consultancy and academic administration. The research was carried out both at individual and collaborative/ interdisciplinary levels. These include theoretical as well as empirical research in economics and econometrics.

Areas of Research

The details of the applied and theoretical researches in Economic Research Unit are given below:

Faculty Name	Collaborators	Research topic(s)
Abhirup Sarkar		Land, Poverty and Displacement: The Indian Malady
	Abhinandan Sinha	Land Acquisition and Protest: the role of the Civil Society, Violence, Contagion and the Informal Sector, Industrialization and Democracy
	Souvik Dutta and Suraj Shekhar	Social Insurance in Self Help Groups: A Generalized Propensity Score Approach
	Souvik Dutta	Do Social Networks Facilitate the Spread of Ponzi Schemes? Evidence from a Primary Survey
	Sabyasachi Das and Souvik Dutta	Political Economy of Third Party Interventions
	Agnirup Sarkar	Do Stock Markets Signal Real Economic Performance? A Theoretical and Empirical Note, On the Lead-Lag Relationship between Market Capitalization Ratio and Per Capita Growth
Amita Majumder	Chayanika Mitra	Gender Bias in Education, Analysis of Dropout Rates, Inverse Engel Curves
	Ranjan Ray and Sattwik Santra	Spatial Price and Amenity Indices
Chaiti Sharma Biswas		Women Empowerment, Violence against Women and Gender Violence, Social Security of Women, Quality of Life of Women
Chandana Ghosh		The Incidence of Hunger and Malnutrition in India
Manipushpak Mitra	Parikshit De	Balanced Implementability of Sequencing Rules. Identification of Sequencing Rules that are Implementable with Balanced Transfers in a Sequencing Problem
	Debapriya Sen	Subsistence, saturation and irrelevance in preferences. Identifying key properties of subsistence and saturation and its link to irrelevances in preferences of a consumer
	Rupayan Pal, Arindam Paul and P.M. Sharada,	Equilibrium co-existence of public and private firms and the plausibility of price competition. Showing the equilibrium co-existence of fully public and fully private firms in a differentiated product duopoly framework with general demand conditions
	Mridu Prabal Goswami and Debapriya Sen	Naive lexicographic preferences over attributes. Characterizing lexicographic preferences when preferences may not be rational
	Manipushpak Mitra, Arghya Ghosh and Arindam Paul	Endogenous conjectural variations. Showing a strong equivalence result with price and quantity competition when conjectural variations are endogenous
	Indrajit Ray and Souvik Roy	Equilibria in Strategic Market Games. Identifying equilibrium conditions for Shapley-Shubik strategic market games, Testable restrictions of equilibrium outcomes in strategic market games. Identifying conditions on individual preferences under which any observation of trading decisions in the Shapley-Shubik strategic market game can be justified as an equilibrium outcome
	Sambuddha Ghosh and Yan Long	Dynamic VCG mechanisms in queueing. Identifying dynamic (or online) VCG mechanisms and addressing the budget balance issue
	Sreoshi Banerjee and Parikshit De	Identical costs lower bound for sequencing problems. Identifying mechanisms satisfying ICLB along with either feasibility or with strategyproofness and outcome efficiency
	Kalyan Chatterjee, and Conan Mukherjee	Bargaining for egalitarian allocation in indivisible goods problems. Proving how non-cooperative bargaining can lead to constrained egalitarian solution in allocation problems
Manipushpak Mitra and Satya R. Chakravarty	Satya R. Chakravarty, Suresh Mutuswami and Rupayan Pal	Measuring electoral competitiveness: A probability ratio index, Identifying an index to measure electoral competition both on ex-post vote shares of political parties
Nityananda Sarkar		Comparing the Economic Performances of China and India after 1991
	Debabrata Mukhopadhyay	Effects of Demonetisation on Financial Sectors of India: A VAR Approach
Priyadarshi Banerjee		Simultaneous Decisions Under Risk: An Experimental Investigation,The Impact of Past Outcomes on Choice in a Cognitively Demanding Financial Environment, Risky Decision Under Laboratory Deadline: An analysis of External Validity with Respect to Self-selection and Experience
Saswati Das		Effects of Seasonality on Child Intensity of Labour, Impact of MGNREGS on Child intensity of Labour, Impact of Seasonality and the MGNREGS on Human Capital Formation (Education)
Satya R. Chakravarty		Poverty, Social Exclusion and Stochastic Dominance An Axiomatic Analysis of Air Quality Assessment
	Bhargav Maharaj	Axiomatic Characterizations of Contest Success Functions and Exploration of Equilibrium
Satya R. Chakravarty and Palash Sarkar		Algorithmic Options, Algorithmic Trading and Block Chain
Souvik Roy	Gopakumar Achuthankutty	On Single-peaked Domains and Min-max Rules, Dictatorship on Top-circular Domains
Souvik Roy,and Debasis Mishra	Swaprava Nath	Separability and Decomposability in Mechanism Design with Transfers
Tarun Kabiraj		Fee vs. Royalty Licensing and Consumers Welfare
	Sarbajit Sengupta	A Theory of Joint Venture Instability under Inter-partner Learning
	Cao Jiyun	Technology Transfer in a Stackelberg Structure: Licensing Contracts and Welfare – Corrigendum
	Rittwik Chatterjee and Srobonti Chattopadhyay	Spillovers and R&D Incentive under Incomplete Information

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Lecture-cum-workshop series on advances in economic theory and applications	Indraneel Dasgupta, Soumyanetra Munshi & Souvik Roy.

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Pilot Survey of the Informal/ Unorganised Sector: Application of an Easily Implementable Sampling Strategy	Amita Majumder
2.	Bayesian Incentive Compatible Mechanism	Souvik Roy

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Children's World: International Survey on Children's Well-being	Saswati Das	Jacobs Foundation

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Updatation of District Human Development Report, Hooghly	Amita Majumder & Chiranjib Neogi	Office of the District Magistrate & the Collector, Hooghly, (Planning Section), Govt. of West Bengal
2.	Gender Violence in India: Its Roots, Nature and Extent.	Chaiti Sharma Biswas	ICSSR

Publications

Publication in Journals

1. Banerjee, P., Khare, S. and Srikant, P.: Learning to Set the Reserve Price Optimally in Laboratory First Price Auctions, *Games*, **9(4)**, a, 79, Online Version: https://www.mdpi.com/ 2073-4336/9/4/79, 2018.

2. Banerjee, S., Roy, S., Biswas, C.S., Pal, M., Bharati, S. and Bharati, P.: A Comparative Study of Food Consumption and Nutritional Status of Women in West Bengal, *Journal of Life Science*, **10(2)**, 132-141, Online Version: DOI: 10.31901/24566306.2018/10.02.229, 2018.

3. Cao, J. and Kabiraj, T.: Technology Transfer in a Stackelberg structure: Licensing Contracts and Welfare – Corrigendum, *The Manchester School,* **86(5)**, 695-697, 2018.

4. Chakrabarty, M., Majumder, A. and Ray, R.: A Framework for the Simultaneous Measurement of Spatial Variation and Temporal Movement in Prices in a Heterogeneous Country: The Dynamic Household Regional Product Dummy Model, *Review of Income and Wealth,* **64(3)**, 703-730, 2018.

5. Chakravarty, Satya R., Chttopadhyay, N. and Qingbin, L.: Inequality and Welfare: Some Axiomatic characterizations, *International Journal of Economic Theory,* Online Version: DOI: 10.1111/ijet.12169, 2018.

6. Chakravarty, Satya R., Chattopadhyay, N. and D'Ambrosio, C.: Pro-poorness Orderings, *Review of Income and Wealth,* Online Version: https://doi.org/10.1111/roiw.12381, 2018.

7. Chatterjee, R., Chattopadhyay, S. and Kabiraj, T.: Spillovers and R&D Incentive under Incomplete Information, *Studies in Microeconomics*, **6(1-2)**, 50-65, 2018.

8. Chowdhury, K.B., Kundu, S., and Sarkar, N.: Regime Dependent Effects of Uncertainty on Inflation and Output Growth: Evidence from the United Kingdom and the United States, *Scottish Journal of Political Economy,* **65(4)**, 390-413, 2018.

9. Chowdhury, K.B., and Sarkar, N.: Regime Dependent Effect of Output Growth on Output Growth Uncertainty: Evidence from OECD Countries, *Bulletin of Economic Research,* Online Version: https://onlinelibrary.wiley.com/doi/abs/10.1111/boer.12158, 2018.

10. Das, S. and Mukherjee, D.: The impact of MGNREGS on Child Labour and Child Education: An Empirical Analysis, *Development in Practice,* **29(3)**, 384-394, 2019.

11. Mitra, Manipushpak, Chun, Youngsub and Mutuswami, Suresh: Egalitarianism in the Queueing Problem, *Journal of Mathematical Economics,* **81**, 48-56, 2019.

12. Mitra, Manipushpak, Chun, Youngsub and Mutuswami, Suresh: Recent Developments in the Queueing Problem, *TOP,* **27(1)**, 1-23, 2019.

13. Kabiraj, T.: Fee vs. Royalty Licensing and Consumers Welfare, *Journal of Quantitative Economics,* **16(3)**, 749-767, 2018.

14. Kabiraj, T. and Sengupta, S.: A theory of Joint Venture Instability under Inter-Partner Learning, *Research in International Business and Finance,* **46**, 363-372, 2018.

15. Mitra, Manipushpak, Chun, Youngsub and Mutuswami, Suresh: Rejoinder on: Recent Developments in the Queueing Problem, *TOP,* **27(1)**, 34-36, 2019.

16. Roy, Souvik, Mishra, Debasis and Nath, Swaprava: Separability and Decomposability in Mechanism Design with Transfers, *Games and Economic Behavior,* **109**, 240-261, 2018.

17. Roy, Souvik and Achuthankutty, Gopakumar: On Single-peaked Domains and Min-max Rules, *Social Choice and Welfare,* **51(4)**, 753–772, 2018.

18. Roy, Souvik and Achuthankutty, Gopakumar: Dictatorship on Top-circular Domains, *Theory and Decision,* **85(3–4)**, 479–493, 2018.

19. Sarkar, A.: Clientelism, Contageous Voting and Governance, *Economica,* **85**, 518-531, 2018.

Publication in Books

1. Ghosh, C. and Ghosh, A.: Capitalism, Crisis and the Common Man, *Economics, Management and Sustainability,* P. Ray, R. Sarkar and A. Sen (eds), Springer, 67-86, 2018.

2. Roy, Souvik, Sadhukhan, Soumyarup and Sen, Arunava: Formation of Committees through Random Voting Rules, *Social Design: Essays in memory of Leonid Hurwicz*, Walter Trockel (ed.), Springer, 219- 231, 2018.

Economics and Planning Unit (EPU), Delhi

The Economics and Planning Unit faculty continues to work on the cutting edge of economic research, both in theory, as well as empirical analysis.

Recent research on economic theory has focused on auction design and mechanism design with specific emphasis on multi-object auction design, mechanism design in undominated strategies, matching and the aggregation of choice functions.Research in contract theory has involved rewarding talents in organisations, and lender competitionin the presence of collusion between borrowers and bank officers.In environment economics research has focused on several aspects of air pollution, social costs of power from coal and renewables, comparing contributions to pollution by diesel and petrol, forest carbon supply in Nepal, and nudging household towards adopting clean fuel. Research on education has looked at understanding issues of spatial inequality as well as the impact of school expansion on segregation of schools, impact of education loans on higher education, and gender peer effects in high schools.Research in caste has explored social connections and financial incentives to solve coordination failure,social networks and labour productivity, and understanding caste based practices in India. In health economics research has focused onprecision-weighted estimates of neonatal, post-neonatal and child mortality, and on the relationship between maternal history of neonatal death and the risk of subsequent neonatal mortality. Research in political economy has explored votebuying, the political economy of public goods provisions in India and the impact of electronic voting machines on electoral frauds, democracy and development. In labour economics researchers have worked on the explanations of women's labour supply in India and on understanding the changing structure of Indian labour Market from the point of view of job polarization and informalization. In theoretical macroeconomics researchers have worked on the annuity role of estate tax, social security (pension) and differential mortality, education-pension-fertility dependency, and optimal intergenerational transfers.Research in empirical macroeconomics has focused on monetary business cycle models, understanding the impact of terms of trade shocks on economy wide outcomes, estimating potential growth for India, and understanding public debt dynamics for India.

Areas of Research

Below is a more detailed breakdown of research pursued by the faculty members.

Faculty Name	Research topic(s)
Abhiroop Mukhopadhyay	Understanding issues of spatial inequality as well as the impact of school expansion on segregation of schools.
Arunava Sen	Areas in mechanism design in undominated strategies, matching and the aggregation of choice functions.
Chetan Ghate	Monetary business cycle models, A heterogeneous agent NK DSGE model to understand the impact of terms of trade shocks on economy wide outcomes, Estimating potential growth for India, and understanding public debt dynamics for India
Debasis Mishra	Auction design and mechanism design, with specific emphasis on multi-object auction design
E. Somanathan	The effect of electric induction stove use on air pollution, LPG in rural MP - How much does information about health effects of air pollution increase LPG use and reduce firewood use?, The social costs of power from coal and renewable, Field study of relation between paddy residue burning and severe air pollution – a potential solution to crop residue burning, Diesel vs petrol - How much will an increase in the diesel price relative to the petrol price reduce pollution?, Forest Carbon Supply in Nepal: Evidence from a Choice Experiment
Farzana Afridi	Using Social Connections and Financial Incentives to Solve Coordination Failure: A Quasi-field Experiment in India's Manufacturing Sector, Social Networks and Labour Productivity: Evidence from production Lines in Garment Factories, What explains women's labour supply in India? Market Productivity, Home productivity and Social Norms, The political economy of public good provision in India: Evidence from two nationwide programs, Nudging household towards adopting clean fuel: Experimental evidence from an information campaign, Vote buying
Monisankar Bishnu	Social Security (pension) and differential mortality, Female labour force participation in India
Mudit Kapoor	Maternal history of neonatal death and the risk of subsequent neonatal mortality: Analysis of 127,336 live births in India 2016, Precision-Weighted Estimates of Neonatal, Post-Neonatal and Child Mortality for 640 Districts in India, National Family Health Survey 2016, The Impact of Electronic Voting Machines on Electoral Frauds, Democracy, and Development
Prabal Roy Chowdhury	Organizational structure, in particular whether talent is rewarded in an organization or not, Examining the effect of lender competition in the presence of collusion between borrowers and bank officers, Examining the effect of productivity shocks on marriage market institutions
Tridip Ray	Education and Fertility: Pension System and its Phase Out, Intergenerational State Education and Pension with Endogenous Fertility, Optimal Intergenerational Transfers and the Rise and Fall of Pay-As-You-Go Pensions, Changing Structure of the Labour Market in India: Job Polarization and Informalization, Understanding Caste Based Practices in India, Gender Peer Effects in India

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Decomposition of India's Debt-GDP Ratio in the Post Liberalization Period	Chetan Ghate & Piyali Das (IIM, Indore)
2.	Estimating Potential Output and its Link with Capital Deepening in India	Chetan Ghate & Stephen Wright (Birkbeck College, University of London)
3.	Role Model Effects in Stream Choice	Tridip Ray, Arka Roy Chaudhuri & Komal Sahai
4.	Changing Structure of the Labour Market in India: Job Polarization and Informalization	Tridip Ray, Arka Roy Chaudhuri & Sujaya Sircar

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Fiscal Austerity in Emerging Market Economies	Chetan Ghate
2.	A Monetary Business Cycle for India	Chetan Ghate
3.	The Role of Estate Tax as Annuity: Does Universal Basic Income (UBI) matter	Bishnu Monishankar
4.	Using Social Connections and Financial Incentives to Solve Coordination Failure: A Quasi-field Experiment in India's Manufacturing Sector	Farzana Afridi,Amrita Dhillon,Xin Li Sherry & Swati Sharma
5.	Female Employment: Soil Endowment and Agricultural Technology	Farzana Afridi & Kanika Mahajan (Ashoka University)
6.	Conditional Aid as a Tools for Aid Selectivity	Prabal Roy Chowdhury, Parimal Bag (National University of Singapore) & Kaniska Dam(CIDE, Mexico)
7.	Fairness is Flexible	Priyanka Kothari, Subrato Banerjee (Queensland University of Technology and University of Melbourne) &Prabal Roy Chowdhury
8.	An economic analysis of alternative treatment methods of ovarian cancer in India: An appraisal of economic burden, quality of life and mortality risk	Prabal Roy Chowdhury, Asima Mukhopadhyay (Tata Medical Centre), Zakir Husain (IIT, Kgp), Mousumi Datta (Presidency University), Indrani Roy Chowdhury (JNU), Jaydip Bhaumik (Tata Medical Center), & Neeraj Bhatla (AIIMS)

Sl. No.	Name of the project	Principal Investigator(s)
9.	Public Goods Provision and Political Competition	Farzana Afridi, Amrita Dhillon (King's College, London), Arka Roy Chaudhuri & Eilon Solan (School of Mathematical Sciences, Tel Aviv University)
10.	Power Sharing Across Ethnic Groups In India	Farzana Afridi, Arka Roy Chaudhuri & Shampa Bhattacharjee (SNU)
11.	The Effect of leaded petrol on Crimes Rates in India	E. Somanathan & Abhiroop Mukhopadhyay

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	IWWAGE	Farzana Afridi	IWWAGE, IFMR
2.	Centre for research on the Economics of Climate, Food, Energy and Environment (CECFEE)	E. Somanathan	Environment for Development Initiatives, Gothenburg
3.	Centre for research on the Economics of Climate, Food, Energy and Environment (CECFEE)	E. Somanathan	The Nature Conservancy, USA

Publications

Publication in Journals

1. Afridi, Farzana, Dinkelman Taryn and Mahajan Kanika: Why Are Fewer Married Women Working in Rural India? A Decomposition Analysis over Two Decades, *Journal of Population Economics,* **31(3)**, 783-818, 2018.

2. Agarwal, Siddhant, Kayina, Athisii, Mukhopadhyay, Abhiroop, and Reddy, Anugula: Redistributing Teachers using Local Transfers, *World Development,* **110**, 333-344, 2018.

3. Batra, Akansha, Gupta, Indrani and Mukhopadhyay, Abhiroop: Gender Differences in Health Expenditure of Rural Cancer Patients: Evidence from a Public Tertiary Care Facility in India, *Journal of Quantitative Economics,* **16(3)**, 615-629, 2018.

4. Castello-Climent Amparo, Chaudhry, Latika and Mukhopadhyay, Abhiroop: Higher Education and Prosperity: From Catholic Missionaries to Luminosity in India, *The Economic Journal,* **128**, 3039-3075, 2018.

5. Kapoor, Mudit, Tandel, Vaidehi and Hiranandani, Komal: What's in a definition? A study on the suitability of the current urban definition in India through its employment guarantee programme, *Journal of Asian Economics,* 60, 69-84, Online Version: https://doi.org/ 10.1016/j.asieco.2018.11.001, 2019.

6. Kapoor, Mudit, Arun Jose, Awasthi, Ashish, Kondal, Dimple, Roy, Ambuj and Prabhakaran, Dorairaj: Impact of repeated blood pressure measurement on blood pressure categorization in a population-based study from India, *Journal of Human Hypertension,* 33, 594-601, Online Version: https://www.nature.com/articles/s41371-019-0200-4, 2019.

7. Roy Chowdhury, Prabal, and Saha, Debdatta: Coordination and Private Information Revelation: Failure of Information Unravelling, *Games,* **9(3)**, 64, 2018.

8. Sen, Arunava, Mukherjee, S., Muto, N., and Ramaekers E.: Implementation in Undominated Strategies by Bounded Mechanisms: The Pareto Correspondence and a Generalization, *Journal of Economic Theory*, **180**, 2019.

Publication in Books

1. Bhattarai, Ram Chandra, Somanathan, E. and Mukhopadhyay, Pranab: Transaction Costs in Irrigation Managment in Kathmandu Valley, Nepal, *Ecology, Economy, and Society: Essays in Honour of Kanchan Chopra,* Vikram Dayal, Anantha Duraiappah and Nandan Nawn (eds.), Springer, 165-183, 2018.

2. Das, Mausumi and Ray, Tridip: Student Mortgage Loans vis-à-vis Income Contingent Loans: Problems and Prospects, *India Higher Education Report 2018: Financing of Higher Education*, N. V. Varghese and Jinusha Panigrahi (eds.), **10**, Sage Publications, 2018.

3. Roy Chowdhury, Indrani and Roy Chowdhury, Prabal: Public-private partnerships, corruption and efficiency, *Economics, Management and Sustainability: Essays in Honour of Anup Sinha,* Partha Ray, Runa Sarkar and Anindya Sen (eds.), Springer, 53-64, 2018.

4. Somanathan, E. (with coauthors): Air Pollution in the Hindu Kush Himalaya, *The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People,* Philippus Wester, Arabinda Mishra, Aditi Mukherji, Arun Bhakta Shrestha (eds.), Springer Link, 339-387, 2018.

Linguistic Research Unit, Kolkata

The Linguistic Research Unit of the Institute is engaged in research activities in the areas of Cognitive Linguistics, Corpus Linguistics, Computational Linguistics, Language Technology, Sociolinguistics, Field Linguistics and Descriptive Linguistics. The specific topics are listed below.

Areas of Research

Faculty Name	Research topic(s)
Niladri Sekhar Dash	POS Tagged Bangla Text Corpus Generation, Corpus of Indian English used in Newspapers (From Newspapers), Corpus-Based English Language Teaching (C-BELT) System, Generation of a Lexical Database of Transliterated English Words in Bangla Corpus, Lexical Database of English-Bangla Translational Equivalents from TDIL Bangla Corpus, Generation of a Lexical Database of Pronominal Forms in Bangla Corpus

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	POS Tagged Bangla Text Corpus Generation	Niladri Sekhar Dash

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Bangla Pronunciation Dictionary	Niladri Sekhar Dash

Publications

Publication in Books

1. Dash, Niladri Sekhar and Ramamoorthy, L.: *Utility and Application of Language Corpora,* Singapore, ISBN 978-981-13-1800-9, Pages 320 (Hardback), 2019.

Publication in Journals

1. Dash, Niladri Sekhar: Linguistic and Extralinguistic Factors behind Spelling Variation of Bangla Words *Language Forum*, **44,** 75-93, 2018.
2. Dash, Niladri Sekhar: In Search of Identity of a Language Variety used Across Bengal-Odisha Border, *Janajati Darpan - An International Journal on Tribal Studies,* **3**, 72-84, 2019.
3. Dash, Niladri Sekhar and Kesavan, V.E.: Proposing a Customized Method for Extratextual Documentative Annotation on Written Text Corpus, *International Journal of English Linguistics,* **9**, 99-112, 2019.
4. Dhar, Ankita, Dash, Niladri Sekhar and Roy, Kaushik: A Fuzzy Logic-Based Bangla Text Classification for Web Text Documents, *Journal of Advanced Linguistic Studies*, **7**, 159-187, 2018.

Publication in Conference Proceedings

1. Bhattacharyya, Mahul and Dash and Niladri Sekhar: Identification of Text Domains and Register Variation through the Analysis of Lexical Distribution in a Bangla Mass Media Text Corpus, *International Conference on Corpus Linguistics and Methodology (ICCLM 2018),* Venice, Italy, Online Version: https://waset.org/abstracts/cognitive-and-language-sciences/82473, 2018.
2. Bhattacharyya, Mahul, Saha, Atanu and Dash, Niladri Sekhar: A Usage Based Analysis of Bangla Discourse Markers in Mass Media Texts, *4th Asia Pacific Corpus Linguistics Conference 2018 (APCLC 2018),* Takamatsu, Japan, 34-42, 2018.
3. Dhar, Ankita, Dash, Niladri Sekhar and Roy, Kaushik: An Innovative Method of Feature Extraction for Text Classification Using PART Classifier, *3rd International Conference Information, Communication and Computing Technology (ICICCT-2918)*, Information, Communication and Computing Technology, Sonajharia Minz, Sushanta Karmakar and Latika Kharb (eds.), Indian International Centre, New Delhi, 131-138, 2018.
4. Dhar, Ankita, Mukherjee, Himadri, Dash, Niladri Sekhar and Roy, Kaushik: Performance of Classifiers in Bangla Text Categorization, *2nd International International Conference on Innovations in Science, Engineering, and Technology (ICISET-2018),* International Islamic University-Chittagong (IIUC), Kumira, Chittagong, Bangladesh, 168-173, Online Version: **https://ieeexplore.ieee.org/xpl/conhome /8736112/proceeding,** 2018.
5. Vandana, Dash, Niladri Sekhar and Chakraborty, Jayshree: Corpus based Critical Discourse Analysis: A study of Political Ideology in Hindi Newspapers, *4th Asia Pacific Corpus Linguistics Conference 2018 (APCLC 2018),* Takamatsu, Japan, 307-311, 2018.

Population Studies Unit (PSU), Kolkata

The unit isextensively involved in various research, teaching and training activities. This unit is also participating in teaching in ISEC Courses in regular as well as specialization in Demography. The members of the unit during the year, published papers in journals and books, and alsoparticipated as a speaker or resource person in various national and international seminars, conferences and workshops.The following are the list of topics of major research being carried out by the unit during the year.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Partha De		Inequalities in Child Survival in Eight North eastern States of India, Revisit of statistical surveys during the British period and its importance to construct socioeconomic histories in India and Bangladesh, Encounter of childhood disability in India through Early Intervention in developmental delay - A pragmatic approach
Prasanta Pathak	Tapas Dey	Determinants and of Intensity of Coverage of Child Immunisation and its Spatial Variation in North-East India
	Swagata Mandal	Determinants of Employment in Jobs of Ever Married Women and Effect of Employment on Fertility Pattern in India
	Paritosh Roy	Improving Management of Diabetes: A Clinical Study
	Biswajit Nayak	Determinants of Perceived Competitive Advantage of a Health Insurance Organisaton in India
	Ishita Pal	Profile Analysis of Women Having Adverse Pregnancy Outcomes: Evidence from NFHS4
	Sampurna Kundu	Effect of RCH Programme on Pregnancy Outcome
	Debarghya Mandal	A Study on the Risk Factors Influencing Diabetes as a Lifestyle Disease in India among Male Population
Subhash Barman		Inequality in health status of population across the major states in India, Inequality in socioeconomic status of the children across the States in India during 1992-93 to 2015-16, Inequality in health care utilization among the under-5 children across the states in India during 1992-93 to 2015-16

Publications

Publication in Journals

1. Barman, Subhash and Pal, Prankrishna: Gender disparity in childhood immunization in India during 1992/93 – 2005/06: A causal analysis approach, *Rabindra Bharati University Journal of Economics,* **11**, 115-138, 2018.
2. De, Partha and Chattopadhyay, N.: Effects of malnutrition on child development: Evidence from a backward district of India, *Clinical Epidemiology and Global Heath,* Elsevier, Online Version: https://doi.org/10.1016/j.cegh.2019.01.014, 2019.
3. Nayak, Bishwajit, Krishnamoorthy, Bala, Bhattacharya, SomSekhar and Pathak, Prasanta: Customer preferences for health insurance product attributes, *Journal of Services Research,* **18**, 59-77, 2018.

Psychology Research Unit (PRU), Kolkata

Faculty members and research fellows of the Psychology Research Unit are engaged in teaching, research, trainingand consultancy. Unit faculty trains students of other universities and Engineering institutes on Exploratory data analysis, Data Discretization, Categorical data structuring through short term courses. The specific areas of research are listed below.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Sumona Datta (SRF)		A Study on Visuospatial reasoning abilities, Working Memory and Home Environment across pre-adolescents
Debdulal Dutta Roy	Shubhangi Sharma	Construction of safe school survey questionnaire, Construction of School violence survey questionnaire
Garga Chatterjee	Neloy Chakraborty and Saswati Nath	South Asian Face database
	Priyanka Ghosh, Ryota Kanai and Himadri Datta	Effect of Internet of brain structure
	Dhairyya Singh	Studying the phenomenon of disgust with reference to genetic contribution using twins
	Neloy Chakraborty and Saswati Nath	Human face and body skin tone and their relationship with various biological and social parameters
	Sabornee Karmokar	A study on Human Face Information Processing
Murshida Khatoon (SRF)		Study on metamemory and working memory among school-going adolescents

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Safe-school Survey	Debdulal Dutta Roy
2.	Development of Face Recognition Test for ethnicities in West Bengal using Real World Facial Images	G. Chatterjee

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	LIA Examination	Debdulal Dutta Roy	Asiatic Society
2.	The cognitive architecture of face-processing – understanding The separation of information streams	G. Chatterjee	DST, INSA

Publications

Publication in Journals

1. Datta, S. and Dutta Roy, D.: Shortening the home environment inventory: A Polytomous item response theory approach, *Psychological studies,* **63**, Online Version: DOI: 10.1007/ s12646-018-0466-6. 419-429, 2018.
2. Moitra, T., Mukherjee, D. and Chatterjee, G.: Object – Color Stroop task to assess selective attention in "True" and "Legally Considered" Juvenile Delinquents, *Journal of Police and Criminal Psychology,* **34,** 78-86, 2018.

Sampling and Official Statistics Unit (SOSU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Aloke Kar	A. Kulshrestha	Measuring Supply and Use of Knowledge Products in the SNA Framework
Asit Baran Chakraborty		Preparation of research project proposals on credit risk assessment in Indian banking system for collaboration with RBI and on survey research for collaboration with NSSO
Kajal Dihidar		Estimating sensitive population proportion by three stage randomized forced response model, Forecasting the production of total food grains, pulses and oil seeds in India using ARIMA and ARIMAX models
Kajal Dihidar and Mausumi Bose (ASU, Kolkata)		Study on the privacy protection measures in estimating sensitive quantitative population mean
Nachiketa Chattopadhyay		Development and application of a concurrent impact evaluation method of the Foreign Trade Policy of India (FTP) 2015-2020
	Asit Baran Chakraborty	GDKP - Paper "Conceptual Issues and Challenges for Development of GDKP - Literature Survey"
Sandip Mitra	Sujata Visaria, Dilip Mookherjee and Pushkar Maitra	Decentralized Targeting of Agricultural Credit Programs: Private versus Political Intermediaries
	Prasenjit Banerjee, Vegard Iversen, Antonio Nicolò and Kunal Sen	Politicians and their promises in an uncertain world: Evidence from a lab-in-the-field experiment in India
	Sujata Visaria, Dilip Mookherjee and Pushkar Maitra	Evaluating the Distributive Effects of a Developing intervention

Projects

Ongoing Projects:Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Algorithmic High-frequency Trading using Machine Learning Techniques	Diganta Mukherjee

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Evaluating the framework of various tests conducted	Nachiketa Chattopadhyay	Tata Consultancy Services Limited (TCS ion)
2.	Statistics and its applications for RBI Officers	Nachiketa Chattopadhyay	Reserve Bank of India
3.	Fraud Risk Analysis	Nachiketa Chattopadhyay	R S Software (India) Limited
4.	Formulation of a perspective plan for holistic and sustainable development in the low lying areas of Bilkanda I & II Gram Panchayats under Barrackpur – II Development Block in the District of North 24 Parganas	Nachiketa Chattopadhyay	Finance Department (Revenue), Govt. of West Bengal

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Estimation of demand for banknotes and coins	Nachiketa Chattopadhyay	Reserve Bank of India
2.	Political Economy	Sandip Mitra	ESRC Grant, Manchester
3.	Poverty and Aspiration	Sandip Mitra	ESRC grant through CAGE, Warwick University, UK
4.	ISI & LSE Collaboration	Sandip Mitra	London School of Economics, London

Publications

Publication in Journals

1. Bose, M. (ASU, Kolkata) and Dihidar, K.: Privacy protection measures for randomized response surveys on stigmatizing continuous variables, *Journal of Applied Statistics,* **45(15)**, 2670-2772, 2018.
2. Moitra, Tanusree, Mukherjee, D. and Chatterjee, Garga (PSU): Object–Color Stroop Task to Assess Selective Attention in "True" and "Legally Considered" Juvenile Delinquents, *Journal of Police and Criminal Psychology,* **34(1)**, 78-86, Online Veersion: https://doi.org/10.1007/s11896-018-9286-9, 2019.
3. Sarkar, Abhijit, Jha, Ajeya and Mukherjee, D.: Rise in Sales of Multi Axle Trucks in India: Governmental Initiatives, Industrial Development and Operator Preferences, *Indian Journal of Marketing,* **48(7)**, 7-22, 2018.

Publication in Books

1. Mukherjee, D., Gogoi, Loyimee and Borkotokey, Surajit: Multilateral Interactions and Isolation in Middlemen driven Network Games, *Social Network Analytics,* Nilanjan Dey, Samarjeet Borah, Amira S. Ashour and Rosalina Babo (eds.), Elsevier, 163–181, 2018.
2. Mukherjee, D., Ray, Abhishek and Ghatak, Anirban: The Interplay of Identity and Social Network: A Methodological and Empirical study, *Social Network Analytics,* Nilanjan Dey, Samarjeet Borah, Amira S. Ashour and Rosalina Babo (eds.), Elsevier, 183–201, 2018.

Socio-Economic Research Unit (SERU), North-East Centre, Tezpur

The Unit is engaged in research on(1) Understanding the ways to generalize the classic mechanism design problems in different directions, one dimensional as well as multi-dimensional generalization, and (2) Applications of insights from social choice theoryto understand the classic problem of bargaining over consumption of endowment in the presence of negative externalities;(3) Measuring macroeconomic uncertainty; (4) Studying asymmetric relationships between economic variablesand (5) Environmental related issues.

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Kushal Banik Chowdhury	Kaustav K. Sarkar and Srikanta Kundu	Nonlinear Relationships between Inflation, Output Growth and Uncertainty in India: New Evidence from a Bivariate Threshold Model
	B. Chowdhury	Defect Data Analysis of Refrigerator Liner: A Time Series Approach
	Sanjit Maitraand and Darpa Saurav Jyethi	Asymmetric Effects of Exchange rate Volatility on Export, Analysis of atmospheric particulate matter removal using satellite imagery derived vegetative cover
Mridu Prabal Goswami		Understanding the ways to generalize the classic mechanism design problems in different directions, one dimensional as well as multi-dimensional generalization, Applications of insights from social choice theory, i.e. without any side payment or taxation, to understand the classic problem of bargaining over consumption of endowment in the presence of negative externalities

Sociological Research Unit (SRU), Kolkata and Giridih

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Bhola Nath Ghosh	Notan Bhusan Kar	Agrarian Distress and Farmers' Suicide in India in the context of Globalization
		Rich Heritage of Khasi Society with Special Reference to Women
Hari Charan Behera		Strengthening livelihood opportunties for the forest dwellers in Jharkhand and Odisha, Contract farming: Participation, partnership and socioeconomic development in Eastern India
Rabindranath Jana, Bhola Nath Ghosh and Hari Charan Behera		Reciprocation among Jharkhand and its Adjacent States on Migration: An Indicative Illustration
Rabindranath Jana		Cohesiveness among Bangladesh and Neighbouring Countries on Trade Relation: An SNA Approach
Sonali Chakraborty		Female Employment in Meghalaya, Health Status of elderly population: An empirical evidence from India
Suparna Som		Women Autonomy and utilization of Mother, Child Health care in North-East India
Susmita Bharati		Growth and nutritional status of pre-school children in India, Association of Econozmic Inequality 3 with Health Inequality: Women in Northeast India, A micro-level study of impact of life-style and socio-economy on adolescent overweight or obesity in Kolkata city, West Bengal
Susmita Bharati, Manoranjan Pal, and Premnanda Bharati	Papiya Roy	Gender Differences in Morbidity Pattern among the Under-five Children in North-East India
Susmita Bharati, Manoranjan Pal, Premnanda Bharati and Suparna Shome	P. Roy, Md. Golam Hossain, Madhuparna Srivastava	Dual Burden of Malnutrition among the Pre-school Children in India

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Contract Farming Participation	Hari Charan Behera
2.	A micro-level study of impact of life-style and socio-economy on adolescent overweight or obesity in Kolkata city, West Bengal	Susmita Bharati

Publications

Publication in Journals

1. Banerjee, S., Roy, S., Biswas, C.S., Pal, M., Bharati, S. and Bharati, P.: A comparative study of food consumption and nutritional status of women in West Bengal, *Journal of Life Science,* **10**, 132-141, 2018.

2. Behera, Hari Charan, Pal, M. and and Sinha, Asish Aman: Contract farming among the potato growers in West Bengal: Opportunties and challenges, *Eastern Anthropologist,* **71(1&2)**, 161-182, 2018.

3. Bharati, Susmita, Pal, M., Sen, Soumendu and Bharati, Premananda: Malnutrition and anaemia among adult women in India, *Journal of Biosocial Science*, **51(5)**, 658–668, Online version: DOI:10.1017/S002193201800041X , 2019.

Publication in Books

1. Bharati, Susmita, Pal, M., Sen, Soumendu and Bharati, P.: Growth and nutritional status of pre-school children in India, *Advances in Growth Curve and Structural Equation Modeling,* Topic from the Indian Statistical Institute on the 125th Birth Anniversary of PC Mahalanobis, R. Dasgupta (ed.), Springer, Singapore, 113-126, 2018.

2. Bharati, Susmita: Association of Economic Inequality with Health Inequality: Women in Northeast India, *Issues on Health and Healthcare in India,* Utpal Dey, Manoranjan Pal and Premananda Bharati (eds.), Springer International Publishing, Switzerland, 163-175, 2018.

3. De, Utpal and Ghosh, Bhola Nath (eds.): *Deprivation, Development and Empowerment of Women: North-eastern perspectives,* Book Well, New Delhi, 2018.

4. Ghosh, Bhola Nath (Bengali Translation by Himansu Ghosh): *Tipurar Nari Sasan,* Pragatisil Prakasak, Kolkata, 2019

5. Ghosh, Bhola Nath and Jayaram, N.: Bibliograpy, *Understanding Social Dynamics in South Asia: Essays in memory of Ramkrishna Mukherjee,* Partha Nath Mukherji, N. Jayaram and Bhola Nath Ghosh (eds.), Springer, Germany, 277-280, 2019.

6. Ghosh, Bhola Nath and Samba, Siva Rao Pasupati: Women's Autonomy and Spousal Violence in India: An Analysis of NFHS-3 Data, *Understanding Social Dynamics in South Asia: Essays in memory of Ramkrishna Mukherjee,* Partha Nath Mukherji, N. Jayaram and Bhola Nath Ghosh (eds.), Springer, Germany, 1161-174, 2019

7. Ghosh, Bhola Nath: Rich Heritage of Khasi Society with Special Reference to Women, *Deprivation, Development and Empowerment of Women in India: North –East Perspectives*, Utpal Kumar De and Bhola Nath Ghosh (eds.), Book Well, New Delhi, 211-228, ISBN:978-93-86578-28-0, 211-228, 2018.

8. Kar, N.B. and Ghosh, Bhola Nath: Agrarian Distress and Farmer's Suicide in India in the context of Globalization, *Globalization and the concerns of Social Landscape in India,* Jayashri Dey (ed.), Renu Publishers, New Delhi, 159-178, ISBN: 978-81-937260-2-0, 2018.

9. Mukherji, Partha Nath, Jayaram, N. and Ghosh, Bhola Nath (eds.): *Understanding Social Dynamics in South Asia* (Essays in Memory of Ramkrishna Mukherjee), Springer, 2019.

10. Mukherji, Partha Nath, Jayaram, N. and Ghosh, Bhola Nath: Remembering Ramkrishna Mukherjee: A Scholar Extraordinarie, *Understanding Social Dynamics in South Asia: Essays in memory of Ramkrishna Mukherjee,* Partha Nath Mukherji, N. Jayaram and Bhola Nath Ghosh (eds.), 3-17, Springer, Germany, 2019.

11. Roy, Papiya, Bharati Susmita, Pal, M.and Bharati, P.: Gender Differences in Morbidity Pattern among the Under-five Children in North-East India, *Issues on Health and Healthcare in India,* Utpal Dey, Manoranjan Pal and Premananda Bharati (eds.), Springer International Publishing, Switzerland, 405-415, 2018.

12. Roy, Papiya, Hossain, Md. Golam, Bharati, Susmita, Pal, M., Shome, Suparna, Srivastava, Madhuparna and Bharati, P.: Dual Burden of Malnutrition among the Pre-school Children in India, *Malnutrition: A Double Burden,* Nitish Mondal, Koushik Bose and Jaydeep Sen (eds.), B.R. Publishing Corporation, Delhi, 201-216, 2018.

STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH DIVISION

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STATISTICAL QUALITY CONTROL AND OPERATIONS RESEARCH DIVISION (SQC & OR)

The Division comprises of eight SQC & OR Units located at Bangalore, Chennai, Coimbatore, Delhi, Hyderabad, Kolkata, Mumbai and Pune and the Central SQC (CSQC) Office located in the main campus at Baranagore which co-ordinates the activities of the Division.

The scientific workers of the Division are extensively involved in research, teaching, consultancy (with a special emphasis to enhance Quality and Productivity), editorial work, externally and internally funded project works and academic administration. The uniqueness of the Division is in carrying out research in application areas and disseminating Statistical Knowledge to a large section of the industry, and thus helping the country in enhancing Quality and Productivity of goods and services.

Research is carried out both at individual and collaborative/interdisciplinary levels. Training programs/ workshops are organized on a regular basis.

- The Division is instrumental in running the following Academic Programmes:
- M.Tech. (QROR) programme at Kolkata;
- M.S. (QMS) programme at Bangalore and Hyderabad;
- Part-Time Certificate Course in SQC at Bangalore and
- Part-Time Certificate Course in SQC at Hyderabad.

The faculty members of the division also teach in other academic programmes like B.Stat., M.Stat. (both Kolkata and Chennai), M.S. (LIS) (Bangalore). They also supervise Ph.D. theses and Dissertation and Project work of M.Tech. (QROR), M.S. (QMS) and M.Stat. students.

The Division also caters to the needs of some of the industries abroad.

SQC & OR Unit, Bangalore

Projects

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Training on Design of Experiment	E V Gijo A.Roy Chowdhury & Somnath Ray	Biocon Ltd, Bangalore
2.	Six Sigma Implementation	Sanjit Ray	Mother Dairy Fruits & Vegetables, Delhi
3.	Foundation Course on Predictive Modeling using Python	Boby John & K.K. Chowdhury	Caterpillar India
4.	Foundation Course on Business Analytics using R	Boby John	Hewlett Packard PPS India Pvt Ltd.
5.	Advanced Course on Business Analytics	Boby John & K.K. Chowdhury	Tata Steel, Jamshedpur
6.	Problem Solving Design of Experiments	Boby John	Syngene International
7.	Foundation Course on Business Analytics using R	Boby John & K.K. Chowdhury	Quest Global
8.	Certification Program on Six Sigma Green Belt	Boby John & K.K. Chowdhury	Ultratech Cements
9.	Foundation Course on Business Analytics	Boby John & K.K. Chowdhury	Ernst & Young
10.	Guidance & Training on Predictive Modeling	Boby John& K.K. Chowdhury	Hewlett Packard Inc., Chennai

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Six Sigma Green Belt Certification	P.K. Perumallu	BHEL WRI, Trichi
2.	Six Sigma Black Belt Certification	A. Roy Chowdhury & S. Ray	Jubilant Life Sciences
3.	Six Sigma Black Belt Certification	E.V. Gijo	RR Donnelly, Chennai
4.	SPC and FMEA	P.K. Perumallu & E.V. Gijo	AVTEC Ltd
5.	Reliability Engineering	P.K. Perumallu & E.V. Gijo	SEG Automotive India Private Limited
6.	Six Sigma Green Belt Certification	E.V. Gijo	HBL Power Systems Ltd

Publications

Publication in Journals

1. Antony, J. Gupta, S., Sunder, V.M. and Gijo, E.V.: Ten commandments of Lean Six Sigma: a practitioners' perspective", *International Journal of Productivity and Performance Management,* **67(6),** 1033-1044, 2018.
2. Gijo E.V., Antony, J. and Sunder, V.M.: "Application of Lean Six Sigma in IT support services - a case study", *The TQM Journal,* Online Version: https://doi.org/10.1108/TQM-11-2018-0168, 2019.
3. Gijo, E.V., Palod, R. and Antony, J.: Lean Six Sigma approach in an Indian auto ancillary conglomerate: a case study, *Production Planning & Control,* Online Version: DOI: 10.1080/09537287.2018.1469801, 2018.
4. John, Boby and Agarwal, V.: A regression spline control chart for monitoring characteristics exhibiting nonlinear profile over time, *The TQM Journal,* Online Version: https://doi.org/10.1108/ TQM-08-2018-0105, 2019.
5. John, Boby and Areshankar, A.: Reduction of rework in bearing end plate using six sigma methodology: A case study, *Journal of Applied Research on Industrial Engineering,* **5(1)**, 10-26, 2018.
6. John, Boby, Kadadevaramath, R.S. and Edinbarough, A.I.: A fuzzy optimization approach for software reliability estimation, *International Journal of Business and System Research,* **13(2),** 259-273, 2019.
7. John, Boby and Singhal, S.: An application of integrated EPC - SPC methodology for simultaneously monitoring multiple output characteristics, *International Journal of Quality and Reliability Management,* Online Version: https://doi.org/10.1108/IJQRM-04-2018-0104, 2019.
8. John, Boby and Subhani, S.M.: A modified control chart for monitoring non-normal characteristics, *International Journal of Productivity and Quality Management*, Online Version: DOI: 10.1504/IJPQM.2019.10019471, 2019.

Publication in Books

1. John, Boby and Chowdhury, K.K.: An application of dual-response surface optimization methodology to improve the yield of pulp cooking process, *Advanced Mathematical Techniques in Engineering Sciences,* Ram, M. and Davim, J.P. (eds.), CRC Press, Boca Raton, 91-110, 2018.

SQC & OR Unit, Chennai

Faculty Name	Research topic(s)
A.K. Biswas	Cooperative Games
D. Sampangiraman	Application of mixture Designs, Pattern recognition in time series data
G. Ravindran	Stochastic Games, Complementarity Problems, Application of Statistics in Finance
Surajit Pal	Process Capability Analysis for Categorical data

Publications

Publication in Journals

1. Biswas, Amit K., Krishnan, P. and others: Perception of Teaching Competencies by administrators, faculty and students of Indian Agricultural Universities: An assessment of faculty training needs, *Journal of Agricultural Education and Extension,* ISSN: 1389-224X (Print), 1750-8622 (online), 2019.

2. Biswas, Amit K., Krishnan, P. and others: Impact of long-term seaweed farming on water quality: a case study from Palk Bay, India. *Journal of Coastal Conservation*, **23(2)**, 485-499, 2019.

3. Biswas, Amit K, Krishnan, P. and others: Framework for mapping the drivers of coastal vulnerability and spatial decision making for climate-change adaption: A case study from Maharashtra, India, *Ambino,* The Royal Swidish Academy of Sciences, Online Version: http://doi.org/10.107/s13280-018-1061-8, 2018.

4. Biswas, Amit K., Koshy, Jinu Merlin and others: Prevalence of Postural Problems among the Nurses in Chennai, *Indian Journal of Public Health Reseach and Development*, **9(7)**, 48, 2018.

5. Pal, Surajit and Gauri, S.: Simultaneous Optimization of Quantitative and Ordinal Responses Using Taguchi Methods, *International Journal of Research in Industrial Engineering,* **7(2)**, 184-205, 2018.

SQC & OR Unit, Coimbatore

Areas of Research

Faculty Name	Research topic(s)
A. Rajagopal	Automobile Reliability based Design and Test optimization of Ø393 S-Cam Brake Assembly, Design Optimization of Drum Brake,Reduction in variation of version control of drawings through PLM, Caliper Brake Pad life prediction using DFSS techniques, Predication of Hose durability cycles using DFSS approach, Design of Integral Pedal Unit (IPU) using DFSS approach, Identification and Optimization of parameters influencing rotor temperature, DFSS approach for Design of Aluminium Concentric Slave Cylinder (CSC) development MSME:(Rubber Component Manufacture) Zero Defect in Rubber rusted casting DN 100 wedge Performance evaluation in Textile Mills (MYK Industries) The statistical Analytical techniques were demonstrated for manufacturing sector in a backward area at Telegana Road Accident Analysis at Coimbatore Coimbatore Accident Analysis for preventive Strategies of Poly Trauma accidents Hospital: (Gynaecology) Low Birth weight Study High Risk Pregnancy of Low birth weight of Neonatal and Maternal Care – study and better estimation from Non Invasive methods were arrived at, compared to conventional method of Diaries and Johnson formula Knowledge Process Outsourcing Reducing (Turn around Time) in Healthcare provider transactions, was taken up in a Multi-National company at Coimbatore

Projects

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Black Belt Six Sigma Quality Analytics Cluster	A. Rajagopal	Black Belt Six Sigma Quality Analytics Cluster
2.	Implementation of increasing turnover	A. Rajagopal	MYK, Hyderabad
3.	DFSS for Engineering R&D at TVS Brakes India	A. Rajagopal	Brakes India, Chennai
4.	Application of Statistical Techniques in Fashion Technology" one grade course	A. Rajagopal	Kumaraguru College of Technology, Coimbatore
5.	Training in Healthcare Research Analytics	A. Rajagopal	Ganga Hospital, Coimbatore
6.	Application of Statistical Techniques	A. Rajagopal	Mehendra Arts & Science College –Salem
7.	Reliability Engineering training and Development programme	A. Rajagopal	Lakshmi Machine works ltd, Coimbatore
8.	Lean Six Sigma project oriented training and Development programme	A. Rajagopal	Lakshmi Machine Works Ltd – Advance Technology centre, Coimbatore

Publications

Publication in Books

Rajagopal, A.: *Make it happening -The Make in India -in Defence Supply chain*, Industry 4.0 Digital Magazine, **Vol. 2018(V)**, Online Version: https://industry4o.com/2018/05/04/make-it-happening-the-make-in-india/, 2018.

Publication in Journals

Sastri, Rudresh M. and Rajagopal, A.: A study on gender determination through Vedic astrology, using data mining techniques, *International Journal of Jyotish Research*, **3(2)**, 9-14, 2018.

SQC & OR Unit, Delhi

Areas of Research

Faculty Name	Research topic(s)
Dipti Dubey	Mathematical Programming, Matrix classes in Linear Complementarity Problem, Game theory
Rina Chakravorty	Design of Experiments – Static Characteristics, Dynamic Characteristics and Categorical Characteristics in a multi response processes
S.K. Neogy	Mathematical Programming, Linear Complementarity Problem (LCP) and its generalizations, Optimization problem in graph theory Matrix Theory (Study of Matrix Classes useful in Complementarity, Optimization and Game Theory), Non-cooperative games, Algorithms for Stochastic Games

Publications

Publication in Journals

1. Dubey, Dipti and Neogy, S.K.: On generalizations of positive subdefinite matrices and the linear complementarity problem, *Linear and Multilinear Algebra*, **66**, 2024-2035, 2018.
2. Dubey, Dipti and Neogy, S.K.: Total dual integrality and integral solutions of linear complementarity problem, *Linear Algebra and its Applications*, **557**, 359-374, 2018.
3. Dubey, Dipti and Neogy, S.K.: On solving a quadratic programming problem involving resistance distances in a graph, *Annals of Operations Research,* Online Version: https://doi.org/10.1007/ s10479-018-3018-5, 2018.
4. Kumari, Veena, Kapur, Deeksha and Chakravorty, Rina: Interrelationship of Food Safety knowledge, Attitude and Practices of Food Handlers working in Delhi based catering Establishment: An exploratory Factor Analysis (EFA), *Journal of Agricultural engineering and Food Technology*, ISSN: 2350-0085; e-ISSN: 2350-0263, **6(1)**, 49-56, 2019.
5. Neogy, S.K., Mondal, P., Gupta, A. and Ghorui. D.: On Solving Mean Payoff Games Using Pivoting Algorithms, *Asia-Pacific Journal of Operational Research,* Online Version: https://doi.org/10.1142/ S0217595918 50035 5, 2018.

SQC & OR Unit, Hyderabad

Areas of Research

Faculty Name	Research topic(s)
G.S.R. Murthy	Linear Complementarity Problem, Statistical and Operations Research Modelling of Industrial Problems, Decision Support Systems
G.S.R. Murthy, A.L.N. Murthy, G.M. Rao and S.M. Subhani	Six Sigma, DOE, SPC
S.M. Subhani	Fuzzy Metric Spaces

Projects

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Statistical Methods for Data Analytics	G. Murali Rao ALN Murthy	Meritus Intelytics Pvt. Ltd. (Merilytics) Hyderabad

Publications

Publication in Journals

1. Subhani, S.M. and Vijaya Kumar, M.: Common Fixed Point Theorem in Menger Spaces under Expansive Mapping, *International Journal of Mathematical Archive,* **9(4)**, 202-206, 2018.
2. Subhani, S.M. and Vijaya Kumar, M.: Common Fixed Point Results in Fuzzy Metric Spaces and Occasionally Weakly Compatible Mappings, *IOSR Journal of Mathematics,* Version-II, e-ISSN: 2278-5728, p-ISSN: 2319-765X, **14(2),** 51-54, 2018.
3. Vijaya Kumar, M. and Subhani, S.M.: Fixed Point Theorem in Intutionistic Fuzzy Metric Space using Absorbing Maps, *International Research Journal of Pure Algebra,* **8(7)**, 35-42, 2018.

SQC & OR Unit, Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
A.K .Chakraborty	Arindam Panja	Reliability estimation of software at optimal stopping time
	Parna Chatterjee	Software Reliability Modelling
	Tanujit Chakraborty	Interface between Statistics and Machine learning
	Subrata Rath	Hardware Reliability and Availability
	Allena Chanda and Poulami Chakraborty	Software Reliability Modelling
A.K. Das	A. Dutta, R. Jana and K. G. Bakshi	A Bounded Homotopy Path Approach to the Solution of Linear Complementarity Problems, Finding Solution of Polystochastic Games: An Interior Point Approach
	R. Jana, A. Dutta and K. G. Bakshi	Linear complementarity problem; Lemke's algorithm, particle swarm optimization
	R. Jana and A. Dutta	More On Hidden Z-Matrices and Linear Complementarity Problem
	R. Jana and V.N. Mishra	Iterative Descent Method for Generalized Leontief Model
Amitava Bandyopadhyay		Understanding Trend of Road Accidents to Develop Preventive Measures at Delhi, Reduction of Judicial Delay
Biswabrata Pradhan	Siddhartha Chakraborty	Discriminating between the Generalized Rayleigh (GR) and Gamma distributions (GA)
	Annesha Purakayastha and Soumya Roy	Design and analysis progressive type-I interval censoring scheme
	Shuvashree Mondal, Debasis Kundu and Ritwik Bhattacharya	Optimum design of balanced joint progressive censoring scheme
	Shuvashree Mondal	Estimation of quality adjusted lifetime distribution (QAL) using copula model
M.Z. Anis	Amlan K. Mollah, Sounak Sadhukhan and P. Das	A cost optimization model and solutions for shelter allocation and relief distribution in flood scenario
	M. Ahsanullah	The Skew Raised-Cosine Distribution, Sine- Skewed von Mises Distribution
	P. Manna, P. Das and S. Banerjee	Probabilistic Modeling of Flood Hazard and Its Risk Assessment for Eastern Region of India
Nandini Das		Control chart for categorical data, Multivariate control chart for process dispersion

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Analysis of Road Accident Data for Delhi to Identify ways to reduce deaths due to road accidents	Amitava Bandyopadhyay

Completed Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Problems and Prospects of Tea Industry in India	Arup Ranjan Mukhopadhyay

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Development of Sampling Plan and Protocol	Ranjan Sett	ITD, ITC Limited
2.	Providing Support to Carry out Large Government Projects	Amitava Bandyopadhyay	Quality Council of India
3.	Training Programme on Analytics	Ranjan Sett	Tata Steel, Jamshedpur
4.	Training programme on ISO 5022:1979	Ashis Kumar Chakraborty	Dalmia Cement (Bharat) Limited, Refractory Unit, Rajgagpur, Sundergarh, Odisha

Publications

Publication in Journals

1. Banerjee, B. and Pradhan, B.: Kolmogorov-Smirnov test for life test data with hybrid censoring, *Communications in Statistics-Theory and Methods,* **47**, 2590-2604, 2018.
2. Budhiraja, S. and Pradhan, B.: Optimum reliability acceptance sampling plans under progressive type-I interval censoring with random removal using a cost model, *Journal of Applied Statistics*, **46**, 1492-1517, 2019.
3. Chakraborty, Tanujit, Chattopadhyay, Swarup and Chakraborty, Ashis Kumar: *A novel hybridization of classification trees and artificial neural networks for selection of students in a business school,* OPSEARCH, **55(2)**, 434-446, 2018.
4. Chakraborty, A.K., Basak, G.K. and Das, S.: Bayesian optimum stopping rule for software release, OPSEARCH, Online Version: DOI: 10.1007/s12597-018-00353-0, 2019.
5. Chakraborty, Tanujit, Chakraborty, Ashis Kumar and Murthy, C.A.: A nonparametric ensemble binary classifier and its statistical properties, *Statistics and Probability Letters,* Online Version: https://doi.org/10.1016/j.spl.2019.01.021, 2019.
6. Das, A.K., Jana, R. and Deepmala: Invex programming problems with equality and inequality constraints, *Transactions of A. Razmadze Mathematical Institute*, **172**, 361–371, 2018.
7. Jana, R, Das, A.K. and Sinha, S.: On processability of Lemke's Algorithm, *Applications & Applied Mathematics,* **13**, 1123-1131, 2018.
8. Mukhopadhyay, A.R. and Mitra, J.K.: Improving conformance to quality requirements in making hot metal, *International Journal of Productivity and Quality Management,* **24(4)**, 441-459, 2018.
9. Pal, S. and Gauri, S.K.: Simultaneous Optimization of Quantitative and Ordinal Responses Using Taguchi Method, *International Journal of Research in Industrial Engineering,* **7(2)**, 184–205, 2018.
10. Pradhan, B.: Discussion of "Birnbaum-Saunders distribution: A review of models, analysis, and applications", N. Balakrishnan and Debasis Kundu (eds.), *Applied Stochastic Models in Business and Industry,* **35**, 61-63, 2019.
11. Roy, S. and Pradhan, B.: Bayesian *C* -optimal life testing plans under progressive type-I interval censoring scheme, *Applied Mathematical Modelling,* **70**, 299-314, 2019.
12. Sen, T., Pradhan, B., Tripathi, Y.M. and Bhattacharya, R.: Fisher information in generalized progressive hybrid-censored data, *Statistics*, **52**, 1025-1039, 2018.
13. Sen, T., Bhattacharya, R. Tripathi, Y.M. and Pradhan, B.: Generalized hybrid censored reliability acceptance sampling plans for the Weibull Distribution, *American Journal of Mathematical and Management Sciences,* **37**, 324-343, 2018.
14. Mollah, A.K., Sadhukhan, S., Das, P. and Anis, M.Z.: A cost optimization model and solutions for shelter allocation and relief distribution in flood scenario, I*nternational Journal of Disaster Risk Reduction,* **31**, 1187-1198, 2018.
15. Manna, P., Anis, M.Z., Das, P. and Banerjee, S.: Probabilistic Modeling of Flood Hazard and its Risk Assessment for Eastern Region of India. Risk Analysis, **39(7)**, 1615-1633, Online Version: DOI: 10.1111/risa.133332019, 2019.

SQC & OR Unit, Mumbai

Areas of Research

Faculty Name	Research topic(s)
Ashok Sarkar and Sagar Sikder	Multivariate Statistical Process Control

Projects

Ongoing Projects: Internally funded

Sl. No.	Name of the project	Principal Investigator(s)
1.	Workshop on Statistical Techniques for Research Methodology	Ashok Sarkar

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Workshop on Advanced Statistical Techniques	Sagar Sikder	JSW Steel
2.	Statistics for Data Science	Ashok Sarkar	L&T
3.	Program on Data Visualization & Modeling using R	Ashok Sarkar & Boby John	Adani Power

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Green Belt	S. Sikder	NAI
2.	Six Sigma MBB	A. Sarkar	External Participants
3.	Business Analytics	A. Sarkar	External Participants
4.	Six Sigma Green Belt	S. Sikder	External Participants
5.	Statistical Techniques for Business Forecasting	A. Sarkar	External Participants
6.	Statistical Techniques for Business Forecasting	A. Sarkar	Reliance Corpotrate
7.	Predictive Modelling	A. Sarkar	External Participants
8.	Six Sigma Black Belt	S. Sikder	External Participants
9.	SPC	A. Sarkar	Grasim Industries Limited, Bharuch
10.	Statistics for Research and Development	A. Sarkar	Bajaj Corporation
11.	Six Sigma MBB	A. Sarkar	Six Sigma Management Institute, Colombo, Srilanka
12.	Six Sigma Green Belt	S. Sikder	External Participants, YWCA
13.	Six Sigma Black Belt	A. Sarkar	External Participants
14.	Measurement System Analysis	A. Sarkar	Hindalco Industries Limited, Nagpur
15.	DOE	A. Sarkar	Setco Automobiles, Vadodara
16.	Statistical Techniques for Research Methodology	A. Sarkar	External Participants
17.	FMEA	A. Sarkar	L&T, Powai
18.	SPC	A. Sarkar	Grasim Industries Limited, Kosamba
19.	Six Sigma Green Belt	S. Sikder	External Participants, YWCA
20.	Data Analytics	A. Sarkar	Adani Power
21.	SPC	A. Sarkar	Tata Aeronautics Limited, Nagpur
22.	DOE	A. Sarkar	External Participants
23.	Six Sigma Green Belt	A. Sarkar	Tata Institute of Social Science
24.	Business Analytics	A. Sarkar	External Participants

SQC & OR Unit, Pune

Areas of Research

Faculty Name	Research topic(s)
S. Rath	Six Sigma- Integration of approaches to synergies growth of an Organization, Design for Six Sigma, Reliability, Data Analytic

Projects

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Data Analytic	S. Rath	Eaton, Pune
2.	Data Analytic Overview	S. Rath	Man Truck, Pune
3.	Six Sigma Yellow Belt	S. Rath	Mahindra CIE, Pune
4.	Statistics Training	S. Rath	Carbon Check, Noida
5.	Six Sigma Trg. & Consulting	S. Rath	Tata Auto Comp. Systems, Pune
6.	Design for Six Sigma	S. Rath	Asian Paints, Mumbai
7.	Six Sigma Black-Belt	S. Rath	Participants
8.	Six Sigma Green-Belt	S. Rath	Participants
9.	Master Black Belt	S. Rath	Participants

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Data Analytic	S. Rath	HP, Bangaluru
2.	Six Sigma Green-Belt Program	S. Rath	NTPC, Noida
3.	Design of experiment	S. Rath	Philips Carbon Black, Baroda
4.	Six Sigma Black-Belt	S. Rath	Participants
5.	Six Sigma	S. Rath	Tata Auto Comp. Systems, Pune
6.	Master Black-Belt	S. Rath	Participants
7.	Six Sigma Green-Belt	S. Rath	Participants

Publications

Publication in Journals

1. Rath, Subrata, Biswas, Debabani, Kundu, Susmita, Bera, Arnab, Dey, Atin and Pal, Amltava: Comparative Study on Outcome of Non-invasive Ventilation in Patients with Acute Exacerbation of COPD Admitted in General Ward vs. High Dependency Unit, *Journal of Clinical and Diagnostic Research,* **12(5)**, OC (06-10), 2018.
2. Rath, Subrata and Chakraborty, Ashis K.: Improving Reliability of HTDC Compressor in a Petrochemical Industry using Six Sigma Methodologies, *IAPQR,* **43(2)**, Online Version: https://doi.org/10.32381/IAPQRT.2019.43.02.2, 2019.
3. Rath, Subrata, Karwande, Ravindra L., Bhosle, Santosh P. and Ambad, Prashant M.: Implementing Six Sigma for Manufacturing Sector in India- based on a Steel Industry, *Industrial Engineering Journal,* ISSN:0970-25555, **XI(8)**, 2018.

THEORETICAL STATISTICS AND MATHEMATICS DIVISION

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THEORETICAL STATISTICS AND MATHEMATICS DIVISION (TSMD)

Stat-Math Unit (SMU), Bangalore

Areas of Research

Faculty Name	Collaborators	Research topic(s)
B.V. Rajarama Bhat		Roots of Completely Positive maps C*-extreme points
C.R.E. Raja	Manoj Choudhary (NBHM post-doc)	Structure of locally compact groups
D. Yogeshwaran	Michael Andreas and Günter Last	Hyperuniform and rigid stable matchings
	Günter Last and Ryszard Szekli	Association of random measures
	Samir Shukla	Spectral bounds for vanishing of cohomology and the neighborhood complex of a randomgraph
G. Saranya Nair (NBHM Post-doc)		Algebraic properties of Generalised Laguerre Polynomials
Jaydeb Sarkar		Operator theory and function theory
Siva Athreya and D. Yogeshwaran		Central limit theorem for statistics of configuration model
T.S.S.R.K. Rao		Geometry of Banach spaces

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	First Order Calculus	B. Rajeev

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	J C Bose Fellowship project	B.V. Rajarama Bhat	Science and Engineering Research Board
2.	-tuples of commuting Isometries	Jayadeb Sarkar	DST
3.	Probabilistic and Statistical Aspects of Branching Random Walks	Parthanil Roy	DST
4.	Stochastic Analysis and Its Applications	Siva Athreya	DST
5.	Stochastic Partial Differential Equations	B. Rajeev	DST
6.	Geometric statistics of stationary point processes	D. Yogeshwaran	IFCAM

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	E_0-semigroups: classification and invariants	B.V. Rajarama Bhat & Daniel Markiewicz	UGC
2.	Uniqueness for Stochastic Partial Differential Equations	Siva Athreya & Leonid Mytnik	UGC
3.	Etale Fundamental groups	Manish Kumar & Lior Bary-Soroker	UGC

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
4.	Mathematical Examination of a Load Forecasting Model - Part II	Mohan Delampady B.V. Rajarama Bhat V.R. Padmawar & Soumen Dey (SRF)	Hitachi India Limited, Bangalore

Publications

Publication in Journals

1. Athreya, Siva and Ramachandran, Koushik: Harnack inequality for non-local Schrödinger operators, *Potential Anal.*, **48(4)**, 515–551, 2018.
2. Athreya, Siva and Röllin, Adrian: Respondent-driven sampling and sparse graph convergence, *Electron. Commun. Probab,* **23(3)**, 1-12, 2018.
3. Bagchi, Sunanda: Inter-class orthogonal main effect plans for asymmetrical experiments, *Sankya B,* Online Version: DOI: https://doi.org/10.1007/s13571-018-0175-0, 2019.
4. Barik, S., Das, B.K., Haria, K. and Sarkar, Jaydeb: Isometric dilations and von Neumann inequality for a class of tuples in the polydisc, *Transactions of the American Math Society,* **372**, 1429-1450, 2019.
5. Bhar, Suprio, Rajeev, B. and Sarkar, Barun: Solutions of SPDE's Associated with a Stochastic Flow, *Potential Analysis*, Online Version: https://doilorg/10.1007/s11118-019-09764-0, 2019.
6. Bhattacharya, Ayan and Roy, Parthanil: A large sample test for the length of memory of stationary symmetric stable random fields via nonsingular -actions, *J. Appl. Probab.*, **55(1)**, 179–195, 2018.
7. Blaszczyszyn, B., Yogeshwaran, D. and Yukich, J.E.: Limit theory for geometric statistics of point processes having fast decay of correlations, *Ann. Prob.*, **47(2),** 835-895, 2019.
8. Botelho, F. and Rao, T.S.S.R.K.: Bi-contractive projections on spaces of vector-valued continuous functions, *Concrete Operators,* **5**, 42-4, 2018.
9. Chattopadhyay, Pratyusha: Equality of orthogonal transvection group and elementary orthogonal transvection group, *Journal of Pure and Applied Algebra*, **223**, 2831-2844, 2019.
10. Chim, K.C., Nair, S.G. and Shorey, T.N.: Explicit abc-conjecture and its applications, *Hardy Ramanujan Journal,* **41**, 143-156, 2018.
11. Kumar, Manish and Majumder, S.: Parabolic bundles in positive characteristic, *J. Ramanujan Math. Soc.,* **33(1)**, 1–36, 2018.
12. Kumar, Santhosh P.: A note on convexity of sections of quaternionic numerical range, *Linear Algebra and its Applications*, **572,** 92-116. Online Version: DOI: 10.1016/j.laa.2019.03.005, 2019.
13. Maji, A., Sarkar, S. and Sarkar, Jaydeb: Toeplitz and Asymptotic Toeplitz operators on , *Bulletin des Sciences Mathematiques,* **146**, 33-49, 2018.
14. Morgan, Aleksander V., Rapinchuk, Andrei S. and Sury, B: Bounded generation of over rings of -integers with infinitely many units, *Algebra Number Theory*, **12(8)**, 1949–1974, 2018.
15. Nair, S.G. and Shorey, T.N.: Irreducibility of Generalised Laguerre Polynomial with, *Acta Arithmetica,* **184**, 363-383, 2018.
16. Naolekar, Aniruddha C. and Thakur, Ajay Singh: Euler classes of vector bundles over iterated suspensions of real projective spaces, *Math. Slovaca,* **68(3)**, 677–684, 2018.
17. Pandey, Vaibhav, Shrivastava, Sagar and Sury, B.: A Dedekind domain with nontrivial class group, *Amer. Math. Monthly,* **125(4)**, 356–359, 2018.
18. Rajeev, B.: On martingale chaoses. Séminaire de Probabilités XLIX, *Lecture Notes in Math.,* **2215**, Springer, Cham, 475–494, 2018.
19. Rao, T.S.S.R.K.: Simultaneous proximinality in spaces of Bochner integrable functions, *Numerical Functional Analysis and Optimization, 3***9**, 1221-1227, 2018.
20. Rao, T.S.S.R.K.: Points of strong subdifferentiability in dual spaces, *Houston Journal of Mathematics,* **41**, 1221-1226, 2018.
21. Rao, T.S.S.R.K.: Adjoints of operators as smooth points in spaces of compactoperators, *Linear and Multilinear Algebra*, **66**, 668-670, 2018.
22. Rao, T.S.S.R.K. and Roy, A.K.: Operators on separable -predual space, *Journal of Mathematical Analysis and applications,* **469**, 252-259, 2019.
23. Reddy, A. Tulasi Ram; Vadlamani, S. and Yogeshwaran, D.: Central limit theorem for quasi-local statistics of spin models on Cayley graphs, *J. Stat. Phys.*, **173(3–4)**, 941–984, 2018.
24. Sarkar, Sourav and Roy, Parthanil: Stable random fields indexed by finitely generated free groups, *Ann. Probab.,* **46(5)**, 2680–2714, 2018.
25. Sury, B.: A ring-theoretic approach to bound the totient function, *Amer. Math. Monthly,* **126(2)**, 167, 2019.
26. Sury, B.: Variants of Carmichael numbers and Cunningham chains, *Math. Gaz.*, **102(555)**, 498–501, 2018.
27. Yogeshwaran, D.: Geometry and topology of the boolean model on a stationary point processes: A brief survey, Proceedings of Indian National Academy of Sciences, **84(3),** 549-558, 2018.

Publication in Conference Proceedings

1. Gorai, S. and Sarkar, Jaydeb: Contractively embedded invariant subspaces, Interpolation and Realization Theory with Applications to Control Theory, *Operator Theory Advances and Applications* (Special issue dedicated to Joe Ball), Springer, **272**, 117-131, 2019.

Stat-Math Unit (SMU), Delhi

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Antar Bandyopadhyay	Partha Pratim Ghosh	Modified Branching Random Walk
Antar Bandyopadhyay	Svante Jonson and Debleena Thacker	Strong Convergence of Infinite Color Balanced Urns under Uniform Ergodicity
Arindam Chatterjee		GMM estimation using incomplete covariates, Group testing, Pseudo-likelihood theory, High-dimensional estimation
Shanta Laishram	F. Luca and M. Sias	Irreducibility and Galois Groups of Polynomials, Diophantine Equations
Swagata Nandi	Debasis Kundu	Writing a book on statistical Signal Processing, Working on chirp signal model when variance may not exist and error random variables is from a symmetric stable distribution, Working on random amplitude chirp signal model. Studying the thereotical properties of an estimator, Working on multichannel sinusoidal signal
Swagata Nandi		Working on chirp signal model when a linear trend is present
Tanvi Jain	Rajendra Bhatia and Yongdo Lim	Bures-Wasserstein distance on positive definite matrices and Wasserstein mean
Tanvi Jain	Rajendra Bhatia and Yongdo Lim	Strong convexity of Sandwiched entropies and related optimization problems
Tanvi Jain	Rajendra Bhatia and Stephane Gaubert	Divergences on the space of positive definite matrices
Tanvi Jain	Hemant K Mishra	Different problems on symplectic eigenvalues of positive definite matrices
Tanvi Jain		Hadamard powers of doubly nonnegative matrices

Projects

Ongoing Projects: Internally funded

Sl. no.	Name of the project	Principal Investigator(s)
1.	Ashok Maitra Memorial Lectures on Probability	A. Bandyopadhyay & K. Maulik

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Sums of integers Fourier, combinatorics, computation	R. Balasubramanian & Shanta Laishram	CEFIPRA
2.	Statistical methods of high –dimensional binary regression models in Presence of response misclassification	Arindam Chatterjee	SERB, DST, Govt. Of India
3.	Project on Irreducibility and Galois Groups of Polynomials	Shanta Laishram	SERB MATRICS
4.	Structure and representations of the CM algebra of continuous functions on type A_{n}quantum groups	Arup K. Pal	SERB
5.	Confett percolation and covered area fraction	Rahul Roy	SERB, DST, Govt. Of India
6.	Scaling limits in directed random trees-applications in models of drainage	Anish Sarkar	SERB, DST, Govt. Of India

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Implementation of the Attacks on Elliptic Curve Discrete Log Problem.	Laishram, Shanta	Ministry of Defence, Govt. of India.
2.	J.C. Bose Fellowship	R.B. Bapat	Department of Science and Technology, Govt. of India.

Publications

Publication in Journals

1. Alsadat Sajadi, Farkhondeh and Roy, Rahul: On Rumour Propagation Among Sceptics, *Journal of Statistical Physics*, **174**, 935-952, 2019.
2. Anjana, S., Dewan, Isha and Sudheesh, K.K.: Test for independence between time to failure and cause of failure in competing risks with k causes, *Journal of Nonparametric Statistics,* **31**, 322-339, 2019.
3. Anjana, S. and Dewan, Isha: Modelling and analysis of recall based competing risks data, *Journal of Applied Statistics,* **46(9)**, 1621-1635, 2019.
4. Ali, Azimi and Bapat, R.B.: Moore-Penrose inverse of the incidence matrix of a distance regular graph, *Linear Algebra and Its Applications*, **551,** 92-103, 2018.
5. Ali, Azimi, Bapat, R.B., Estaji, E.: Moore-Penrose inverse of incidence matrix of graphs with complete and cyclic blocks, *Discrete Mathematics,* **342,** 10-17, 2019.
6. Bapat, Ravindra B. and Kurata, Hiroshi: On Cartesian product of Euclidean distance matrices, *Linear Algebra and Its Applications,* **562,** 135-153, 2019.
7. Bapat, R.B. and Sivasubramanian, S.: The arithmetic Tutte polynomial of two matrices associated to trees, *Special Matrices,* **6**, 310-322, 2018.
8. Bapat, Ravindra and Panda, Swarup Kumar: The spectral radius of the reciprocal distance Laplacian matrix of a graph, *Bulletin of the Iranian Mathematical Society,* **44(5)**, 1211-1216, 2018.
9. Bandyopadhyay, Antar and Kaur, Gursharn: Linear de-preferential urn models, *Advances in Applied Probability,* 50(4), 1176-1192, 2018.
10. Bhatia, R., Jain, Tanvi and Lim, Y.: Strong convexity of sandwiched entropies and related optimization problems, *Rev. Math. Phys,* **30, 1850014**, 18, 2018.
11. Das, P., Laishram, S. and Saradha, N.: Cubes in products of terms from an arithmetic progression, *Acta Arithmetica,* **184(2)**, 117-126, 2018.
12. Deshpande, J.V., Dewan, Isha, Lam, K. and Naik-Nimbalkar, U.: Tests for specific nonparametric relations between two distribution functions with applications, *Applied Stochastic Models in Business and Industry,* **35**, 247-259, 2019.
13. Dewan, Isha and Nandi Swagata: Discussion of Birnbaum-Saunders Distribution: A Review of Models, Analysis and Applications, *Applied Stochastic Models in Business and Industry,* **35(1)**, 77-81, 2019.
14. Nandi, Swagata, and Kundu, D.: Estimating the fundamental frequency using modified Newton-Raphson algorithm, *Statistics,* **53(2)**, 440-458, 2019.
15. Sankaran, P.G., Dewan, Isha and Dileep, K.M.: The cause specific hazard quantile function, *Austrian Journal of Statistics,* **48,** 56-69, 2019.
16. Singh, Ranveer and Bapat, Ravindra B.: $\mathcal{B}$-partitions, determinant and permanent of graphs, *Transactions on Combinatorics,* **7(3)**, 37-54, 2018.

Publication in Conference Proceedings

1. Bapat, Ravindra B., Neogy, S.K. and Dubey, Dipti: Maximizing the spectral radius and number of spanning trees in bipartite graphs, *Mathematical Programming and Game Theory,* Springer, 33-48, 2018.

Stat-Math Unit (SMU), Kolkata

Areas of Research

Faculty Name	Collaborators	Research topic(s)
Arup Bose		Random Matrices
Debashish Goswami	Sk Asfaq Hussain	Quantum isometry groups
	Indranil Biswas and Suvrajit Bhattacherjee	Quantum Algebra
	A. Chirvasitu	Quantum group and metric spaces
Debashish Goswami and J. Bhwomick	Sugato Mukhopadhyay	Noncommutative Geometry: metric aspects
J. Bhwomick	, Sugato Mukhopadhyay, Debashish Goswami and G. Landi	Noncommutative Geometry
Kingshook Biswas	Rudra P. Sarkar	Dynamics of Lp multipliers on harmonic manifolds
	Gerhard Knieper and Norbert Peyerimhoff	Fourier transform on harmonic manifolds of purely exponential volume growth
		Moebius rigidity for compact deformations of negatively curved manifolds, Moebius rigidity for simply connected, negatively curved surfaces
	Ricardo Perez-Marco	The Ramificant Determinant
Neena Gupta	Sourav Sen	Double Danielewski **Surfaces and the Cancellation Problem, Tame Degree Functions in Arbitrary Characteristic**
	Nikhilesh Sagnik Dasgupta	Retracts of Polynomial Rings
Partha Sarathi Chakraborty		Noncommutative Geometry and Operator Algebras, Quantum Groups, Differential Graded Algebras
Pradipta Bandyopadhyay	Aryaman Sensarma	Geometry of Banach spaces
Satadal Ganguly	Ramdin Mawia and C.S. Rajan	Number Theory
Swagato K. Ray	Mithun Bhowmik and Sanjoy Pusti	Unceryainty principles in Harmoni Analysis
	Muna Naik, Jayanta Sarkar and Rudra P. Sarkar	Study of eigenfunctions of Laplace-Beltrami operator
Utsav Choudhury		Algebraic Geometry, Motivic homotopy theory

Projects

Projects, Externally funded: Ongoing

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	Ring Structure on Thom Spectra (Awarded the SERB MATRICS	Samik Basu	SERB, Govt. of India
2.	J.C. Bose Fellowship	Arup Bose	DST
3.	J.C. Bose Fellowship	D. Goswami	DST
4.	Optimizing Cluster count in the Presence of Noisy Data	A. Ghosh	Keysigh Technologies
5.	Swarnajaynti Fellowship	Neena Gupta	DST

Publications

Publication in Books

1. Bose, Arup: *Patterned Random Matrices,* Pages xxi+267, Chapman & Hall, 2018.
2. Bose, Arup and Chatterjee, Snigdhansu: *U-Statistics, M_m-Estimators and Resampling,* Hindustan Book Agency, **Vol. 75**, Pages xiv+171, Indian Edition (Texts and Readings in Mathematics), 2018, Springer, International Edition, 2018.
3. Bose, Arup and Bhattacharjee, Monika: *Large Covariance and Autocovariance Matrices,* Pages xxiii+272, Chapman & Hall, 2018.
4. Bose, Arup and Saha, Koushik: *Random Circulant Matrices*, Pages xv+186, Chapman & Hall, 2018.

Publication in Journals

1. Asanuma, Teruo and Gupta, Neena: On 2-stably isomorphic four-dimensional affine domains, *J. Commut. Algebra,* **10(2)**, 153–162, 2018.
2. Adhikari, Kartick and Bose, Arup: Brown measure and asymptotic freeness of elliptic and related matrices, *Random Matrices: Theory and Applications,* Online Version: DOI: 10.1142/ S2010326319500072, 2018.
3. Basu, S. and Kasilingam, R.: Inertia groups of high dimensional complex projective spaces, *Algebra. Geom. Topol,* **18**, 387–408, 2018.
4. Basu, S. and Basu S.: Homotopy groups of highly connected manifolds, *Adv. Math,* **338**, 363–416, 2018.
5. Basu, S., Basu, S., Das, A. and Mukherjee, G.: Nambu Structures and Associated Bialgebroids, *Proc. Indian Acad. Sci. Math. Sci,* **129, Article 12**, 36, 2019.
6. Basu, S. and Basu, S.: Homotopy groups of certain highly connected manifolds via loop space homology, *Osaka J. Math*, **56**, 417–430, 2019
7. Bhowmik, Mithun, Sen, Suparna and Ray, K. Swagato: Around uncertainty principles of Ingham-type on Rn, Tn and two step Nilpotent Lie groups, *Bulletin Des Sciences Mathematiques*, **155**, 33-73, 2019.
8. Bhowmik, J., Ghosh, Shamindra, Rakshit, Narayan, and Yamashita, Makoto: Tube representations and twisting of graded categories, *Theory and application of categories,* **33(31)**, 964-987, 2018.
9. Bhowmik, J, Mandal, Arnab, Roy, Sutanu and Skalski, Adam: Quantum symmetries of the twisted tensor products of C*-algebras, *Commun. Math. Phys,* **368(3)**, 1051-1085, 2019.
10. Bose, Arup; Dey, Apratim, and Ejsmont, Wiktor: Characterization of non-commutative free Gaussian variables, *Latin American Journal of Probability and Mathematical Statistics,* **15(2)**, 1241-1255, 2018.
11. Chakraborty, Partha Sarathi and Saurabh, Bipul: Local index formula for quantum double suspension, *Integral Equations Operator Theory,* **90(2)**, **Article 21**, 29, 2018.
12. Chakraborty, Partha Sarathi and Saurabh, Bipul: Gelfand-Kirillov dimension of some simple unitarizable modules, *J. Algebra,* **514**, 199–218, 2018.
13. Chakraborty, Partha Sarathi and Guin, Satyajit: Comparison between two differential graded algebras in noncommutative geometry, *Proc. Indian Acad. Sci. Math. Sci,* **129(2)**, **Article 29**, 2019.
14. Choudhury, Utsav, Gallauer Martin, De Souza Alves: Homotopy theory of dg sheaves, *Communications in Algebra,* **47(8)**, 2019.
15. Das, M.K.: On a conjecture of Murthy, *Advances in Mathematics,* **331**, 326- 338, 2018.
16. Das, M.K., Tikader, Soumi and Ali, Md. Zinna: P^1-gluing for local complete intersections, *Math. Zeitschrift,* Online Version: DOI: https://doi.org/10.1007/s00209-019-02299-5, 2019.
17. Dasgupta, Nikhilesh and Gupta, Neena: Nice derivations over principal ideal domains, *J. Pure Appl. Algebr,* **222(12)**, 4161-4172, 2018.
18. Datta, Mahuya: Smooth maps into quaternionic Grassmannians inducing a prescribed 4-form, *Geom Dedicata,* Online Version: https://doi.org/10.1007/s10711-018-0363-0, 2018.
19. Dutta, A.K., Gupta, N. and Lahiri, A.: On Separable A^2 and A^3-forms, *Nagoya Mathematical Journal,* Online Version: DOI: https://doi.org/10.1017/nmj.2018.45, 2018.
20. Sarkar, Rudra P.: Eigenfunction of the Laplacian as a degenerate case of a function with its Fourier transform supported in an annulus, *Publ. Res. Inst. Math. Sci,* **54(2)**, 351–378, 2018.

Publication in Conference Proceedingss

1. Basu, S.: The homotopy type of the loops on (n−1)-connected (2n+1)-manifolds, *AlgebraicTopology and Related Topics,* Birkhäuser, Singapore, 1–25, 2019.

SERVICES DIVISION

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Library, Documentation And Information Sciences Division

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Library, Delhi

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Library, Kolkata

Head: Dr. Kishor Chandra Satpathy
Office: 1st floor, S.N. Bose Bhawan, ISI, Kolkata-700 108

Library, North-East Centre Tezpur

In-Charge: Ms. Kakoli Gogoi
Office: Punioni, Solmara Tezpur, Assam- 784 501

PCM Memorial Muswum and Archives, Kolkata

Head: Dr. Kishor Chandra Satpathy
Office: Amrapali, ISI, Kolkata-700 108

COMPUTER AND STATISTICAL SERVICES CENTRE (CSSC), KOLKATA

The Computer and Statistical Service Centre (CSSC) is responsible for managing/ maintaining the IT infrastructures of the Institute. The IT infrastructures of the Institute consist of server's virtualization (cloud), softwares [VMware (esxi and VCenter), Matlab, Mathematica, ArcGis, R etc], Network (wired and wi-fi), Network and Internet security, IP Telephones, Video conferencing facility, e-library and internet facilities (NKN - 1 Gbps). CSSC have been maintaining the connection (using Site-to-Site Virtual Private Network (VPN)) with outlying Centres (Delhi, Chennai, Tezpur and Bengaluru) and the Giridih Unit of the Institute.

The IT infrastructures have been utilized by all the Centers /Branches of the Institute by VPN connectivity. Various academic and administrative meetings including Academic Council meetings among the Institute's Centers (Delhi, Bengaluru, Chennai and Tezpur) and Giridih Unit through Video Conferencing facilities were being arranged/ managed successfully.The cloud infrastructure with virtualization software, Cisco UCS servers (408 cores/608 threads and 6000 GPU cores) and the EMC 260 Tb storage were managed by CSSC, providing the computing facility to the users of the Institute. Lab facilities to all the Students of Kolkata campus are provided. Laboratory classes of regular courses like B.Stat.,M.Tech. (CS), M.Tech (QR), M.S. (QE), M.Stat. are being held in the computer laboratories of CSSC throughout the year.

Some classes (especially M.Tech. (CS) and PGDA courses of Tezpur Centre) through video conferencing facilities are being organized by the CSSC throughout the year. Online tests of our students for placement purpose are being conducted in CSSC laboratories.The access of accounting package FACT (installed in the server of ISI Kolkata) have been maintaining by CSSC and these have been facilitated to all outlying Centers and Branches through the VPN connections. The LAN (wired) connections with 10 Gb backbone between hostel rooms (excluding ISEC) in Kolkata campus and CSSC have been maintained efficiently. The wi-fi facility covering the ISEC hostel is maintained by the Center.

Members of CSSC take part in teaching different courses of the Institute and also supervised project work of non-ISI students studying MCA, B.Tech. etc. The CSSC have been providing Laptops and Desktops to faculty, scientific staff and research scholars in Kolkata and Giridihcampus.The CSSC have been providing required training to computer trainees who are in turn providing technical support to the Institute.

LIBRARY, DOCUMENTATION AND INFORMATION SCIENCES DIVISION

The Library, Documentation and Information Science Division is perhaps the most important central facility of the Institute & comprises with:

- ISI Bangalore Centre Library, Bangalore
- ISI Chennai Centre Library, Chennai
- ISI Delhi Centre Library, Delhi
- Central Library, Kolkata
- ISI North-East Centre Library, Tezpur
- Prasanta Chandra Mahalanobis Memorial Museum and Archives, Kolkata

Library, Bangalore

Indian Statistical Institute Bangalore Centre Library is aiming to be identified as a model library in the Indian academic scenario. The Library is providing many modern library services using internet and they are popularly known as web based information services. ISI Bangalore Centre Library has also initiated interactive applications for its users. The library has developed a very distinguished collection in different knowledge domains such as Mathematics, Statistics, Systems Science, Information Science, Economics, Quality Management & Operations Research, Library & Information Science, Computation & Artificial Intelligence and so on. Various services are designed to meet the information needs of the faculty members, students, research scholars and visiting scientists. Walk-in users from the other institutions are also permitted to use the library.

The following activities were undertaken by the library during the period April 2018 – March 2019.

Collection Development

The library purchased 67 Books, received 108 Books as gift during this period. The library subscribed to 70 Journal titles, 6 Journal titles were subscribed from NBHM grants. Additionally library has subscribed to IEL ONLINE, giving access to journal and technical reports published by IEEE. The Library has 39 E-Books from world scientific publishing.

Library Collection

Total no of Books are 30,781 and Bound Volumes are 20335.

Membership

More than 170 registered users enjoyed the library facilities and the services during the year. In addition, facilities were extended to around 384 walk-in users during this period.

Current Content Service

Content pages of around 1,850 journals have been scanned.

Circulation Service

Around 8613 books and 770 journals were circulated during this period. 360 loose issues of journals were issued to users overnight.

Library, Chennai

Academic Library for Indian Statistical Institute Chennai Centre (ISIC) was started in 2011 to cater to the information needs, adding to the existing library of SQC & OR unit, at Taramani. This evolving library aims to a vibrant collection in the fields of Statistics, Applied Statistics, Mathematics, Computer Science, Statistical Quality Control and Operation Research making it prototypical in functioning, administration and unique in collection. Various services are provided for an efficient usage of library facilities by the students, faculty members, visiting scientists and research scholars. Researchers from other institutions are offered reference service.

Collection Development

The Library maintains an excellent collection of books, journals, magazines, question papers, multimedia resources etc. From April 2018to March 2019, 25 books were added raising the collection to 3660 books. Library at SETS office was shifted and merged with ISI SQC & OR Unit library and the collected has increased above 5800.

Technical Processing:

Around 15 books were classified from April 2018 till date. Database entry in KOHA Library Automation software was updated in Z39.50 Standard bibliographic format for all the books. Web OPAC with accessibility and users' details were updated in the library database. Other services like Inter-Library Loan, content service, reprography service and document delivery service are initiated.

Around 526 books were donated by Professor Sethuraman, cataloguing in process.

Web based library services:

It has remote access to more than 2000 e-journals accessible through ISI Kolkata Library procured under ISI Consortia.

Membership

ISIC library has restricted access to postgraduate students, research scholars, faculty members and visiting scientists totaling to around 17. Interlibrary Loan with other ISI Centers and Units were activated.

Library Services:

Lending and document delivery service: Around 200 documents were delivered showing the active participation of the users. Renovation of library is in planning.

Recognition to ISI Scientists:

Kalpana. T.M: Completed Ph.D. in Library and information Science from Bharathiar University Degree yet to be awarded.

Library, Delhi

The Indian Statistical Institute, Delhi Centre, maintains an academic library, which aims to be a leading library in the fields of Economics, Mathematics, Statistics, 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 neighboring regions.

It is one of the modern Library with an extensive collection of books, journals, CDs, reports, government publications and other documents in print and electronic formats. The ISI Delhi Centre library also act as one of the NBHM regional library of northern India and provides information resources to support academic and research activities in the areas of Mathematics, and allied subject areas. Some of the main activities of the library during the period under review were as under:

Collection Development

Books:

The library accessioned 56 new books and 392 bound volumes during the year under report from the ISI and NBHM funds. The library also received 70 books as gift from different sources. Thus raising the current library stock both books and bound journals to 53000 volumes.

Journals:

During the period under review 87 journals, both foreign as well as Indian have been renewed. 10 journals on gratis and 7 journals in exchange are being received in the library from various sources.

Online Resources:

The library also participated consortia based subscription to electronic resources and provided users more than 700 full text electronic journals access including EconLit, SIAM e-journals, Current Index to Statistics, MathSciNet, Science@Direct, SpringerLink, J-STOR, Wiley Journals, Cambridge Journals, Oxford Journals, Taylor & Francis, IEEE, INFORMS, AMS, IMS, Sankhya and many others.

E-Books:

Under the ISI consortia arrangement Springer e-books package a total of 2237 e-books access has been provided to users on statistics and mathematics subject.

CDs:

The library has more than 600 CDs of different reference books and journals including databases.

Exchange Programme:

Exchange program established with seven scientific institutions in the regions of China, Korea, Netherlands, Poland, Spain and Vietnam for getting their publications in exchange to our journal 'Sankhya'- Indian Journal of Statistics and "Texts and Readings in Mathematics" (book series).

Library Services:

1. **Circulation services:** During the period April 1 2018 to March 31, 2019, total 160 members, availed the lending facilities as permanent members of the library, whereas more than 211 users availed reference facilities of the library. More than 2900 publications have been circulated among the members.

2. **Reprographic services:** During the period under review more than 1700 pages have been Xeroxed and made available to users of the library and outsiders. Xerox facilities were also provided to research scholars of neighboring institutes under NBHM programme.

3. **Electronic document delivery service:**
   In addition to Xerox facilities, more than 2000 full text articles (PDF files) were provided to the users.

4. **Current awareness service:**
   The following lists were brought out regularly from the library:
   a)Monthly list of current periodicals
   b)New additions of books

5. **Web-OPAC Facility:**
   The users have been given LibSys Web OPAC access facilitates on the Internet.

6. **Web Enable Library Services**
   The library proving web enables library service to users. The library web site contains information about the library its collection, services, rules, list of electronic journals, Catalogues, databases, telephone directories, and online requisition forms etc. The contents of library web pages are regularly updated to serve the internal and external needs of users.

7. **Migration from LibSys to Koha**
   During the financial year 2018-2019 Data Migration from LibSys to Koha taken place by Informatics Publishing Ltd, Bangalore. Koha automation is on full operational since 24 February 2019 on Library local server.

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 5 floors (60000sq.ft) of a ten-storied building at Kolkata. 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, and 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 375 printed books and 3200+ electronics book on statistics and mathematics of Springer and AMS (accessible across the centers through IP ranges were purchased from ISI budget. The Library also accessioned more than 1200 bound volumes of journals and subscribed to 85 scholarly journal titles in print. More than 30 journal titles were received as complimentary and 85 titles in exchange with Sankhya. The library received and processed more than 250 loose issues of journals. Library also acquired online resources (IP &/or Password based) for providing data services to the potential users (mostly valued researchers) namely – Economic Outlook (CMIE), States of India (CMIE), IndiaState.com (Socio-economic Statistical Information & facts on India), DistrictofIndia.com (only West Bengal Districts) , CEIC Databases (Global DB + Daily DB + Indian Premium DB). However, the library renders electronic document delivery services bases on online /offline databases on payment basis in India and abroad. Instead of aforesaid activities we are providing data download services with high-end computing facilities as well as photo-copying, data-copying, and printing etc.

Beside this, the library has added a collection of 34 English books and 14 Bengali books on literature, humanities, travel, health and recreation and 22 Daily Newspapers & Magazines in its Workers' Circulating Library.

E-Resources:

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 approximately 3200 e-books, few CDs on statistical data. The library has provided the online access to about 22000+ full-text journals. It has renewed the online database like MathSciNet, Econlit with full text, Science Direct, Springer Link, T & F Journal online, Willy Inter Science, Oxford University Press Journals, CUP Journals, JSTOR and SCOPUS database through consortia. It has also subscribed to the IEL online of the IEEE/IEE publications, ACM Digital Library and Current Index to Statistics (CIS) on Web. The library has also subscribed to Census data, online database (CEIC data base) and statistical data sources (CMIE and India Stat. com) available through IP's and/or password based to provide data services to its potential users.

Publication Exchange Programme:

The library maintains the publication exchange programme of 'Sankhya'-the Indian Journal of Statistics' with 52 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 the Library has received 85 titles during the reporting period.

Membership:

Membership of the ISI-Library is restricted to persons with post-graduate or equivalent academic qualification and interest 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 925 readers to use the library for a short period. Currently the total number of library member is 3499 including staff, students and research scholars of the Institute.

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 15301 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. It provided document delivery services of 700 pages in soft copy from different full text database / journals. It provided email-based reminder services like 7-day advance alert, long overdue notice and check-in information.

Inter-library loan:

02 Books were borrowed from other libraries, while 10 books were lent to other libraries.

Current Awareness Service:

6 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 606 pages were photocopied from the journals and 35 nos. of books were sent for photocopying.

Electronic Document Delivery Service:

Full-text articles and/or bibliographical data were provided through email from online resources. Besides electronic document delivery, 500 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 22000+ online journals and major databases like MathSciNet, Econlit with full text, Science Direct, Springer Link, T & F Journal online, Willy Inter Science, Oxford university Press Journals, CUP Journals, JSTOR, IEEE/IEE publications, ACM Digital Library and Current Index to Statistics (CIS) on Web through consortia. The online access is available through campus-wide network.

Reprographic & Photographic Service:

During the period April 2018 – March 2019 the Reprography & Photography Unit, Library Division has carried out its regular works of Photocopying more than 2,88,373 copies (approx.), Graphic Designing more than 25 Scientific Projects and other works like Colour print out 8,360 copies (approx.), Lamination 15, Spiral binding 350, Photo Coverage (Convocation, 125th Birth Anniversary of Professor P.C. Mahalanobis, Workshops / Seminar) 88 (approx. 11,789 snaps). Besides these, the Unit has also take photograph of Geological Rock Thin Section of Geological Studies Unit.

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:

Assistance has been extended to 280 external visitors including participants of the Winter School, NBHM Nurture Programme, Summer Research School and visiting students of different institutions.

Special Initiatives:

Consortia arrangements:

During the reporting year, the Library has further strengthened the consortia initiative by enhancing the electronic collection and online access to scholarly resources to cope up with the increasing subscription cost and diminishing budget.

Preservation and conservation:

It has completed binding of more than 1200 physical volumes of journals. Lamination and de-acidification of 25 rare books of 3750(approx) pages were completed. 114 books were fumigated and 2 rare and out-of-print books were scanned and photocopied.

Institutional Repository (IR):

A prototype of IR of ISI has been created. Currently it covers scientific writings of Professor P. C. Mahalanobis, full-text of 3000+ ISI research papers, full text of all convocation addresses, ISI Annual Report from 1933 to 2008 and 100 PhD theses.

Digitization:

2 Monographs (books & reports) were digitized which will be made available on the Web after the completion of the work.

RemoteXs-Off Campus Access to ISI E-Resources:

As a part of re-engineering of the library activities, library has extended the off campus access to its' users i.e. faculty, students and other staff members of the HQ and its branches/ centres by providing the access of subscribed e-resources through off campus mechanism with the help of RemoteXs.

Plagiarism Software:

Library has subscribed to iThenticate - an anti plagiarism software which has been extended to the faculty, researches of the HQ and its branches/centres.

Projects

Projects, Internally funded: Ongoing

Sl. no.	Name of the project	Principal Investigator(s)
1.	Development of Digital libraries: Shewhart collections, Haldane collections, Dissertations, working papers and others	Ashis Kumar Pal

Publications

Publication: Books

1. Satpathy, Kishor Chandra (ed.): *Knowledge Management in Higher Education*, Shankar's Book Agency Pvt. Ltd., New Delhi, ISBN: 978-93-81893-12-8, 2018.
2. Satpathy, Kishor Chandra: *What Next in Libraries? - Trends, Space & Partnerships,* Ahuja Book Company Pvt Ltd., ISBN: 978-93-80316-10-9, 2019.
3. Ghosh, N.C., Mukhopadhyay, Parthasarathy, Mukherjee, Bhaskar and Pal, Jiban K. (eds.): *Open Access: The Road to Freedom,* Prova Prakashani, Kolkata, (© Society for Information Science, New Delhi), Pages 350, ISBN: 978-93-83658-20-6, 2018.

Paper Publisher in Journals

1. Mandal, Tapan Kumar and Chakrabarti, Biplab: Indian Management Literature: a bibliometric analysis, *Calcutta University Journal of Information Studies,* **XX**, 23-37, 2018.

Publication in Conference Proceedings

1. Paladhi, Monali Mitra: Information Literacy and its Potential applicability for Academic Libraries, I*nternational Conference on Exploring the Horizons of Library and Information Sciences,* From Libraries to Knowledge Hub, DRTC, ISI Bangalore, 56-65, ISBN 9789353117269, 2018.
2. Pal, Jiban K., Ghosh, N.C. and Kar, S.: Mapping the global registry of open access repositories: status and future prospects, *33rd Annual Conference of the Society for Information Science,* Open Access: The Road to Freedom, N.C. Ghosh, P. Mukhopadhyay, B. Mukherjee and J.K. Pal (eds.), Prova Prakashani, Kolkata, 131-146, 2018.

Paper Published in Books

1. Paladhi, Monali Mitra: Skill requirement of Library Professionals to meet the ever changing users' need in the modern library setting, *Proceedings of the Modern Technology: Its Effects on Reading Habit,* Lambert Academic Publishing, 5-14, ISBN 9786139904662, 2018.

Library, North-East Centre, Tezpur

ISI N-E Centre Library started functioning from July 2011. The Library aims to provide value services to its users by developing quality documents in the field of Statistics, Mathematics, Quantitative Economics and other allied subjects. The Library has good collection on the three main subjects. Further, it has limited collection in the fields of Computer Science, Soil Science, Library Science and Environmental Science etc. The ISI N-E Centre Library always tries to fulfill to the needs of user community.

The ISI N-E Centre Library installed the software KOHA in the year 2013 and then onwards all the circulation works are done through this software.

Collection Development:

ISI N-E Centre Library has an excellent collection of books, journals etc. In order to cater to the requirements of the user, the Library has procured 121 new books in different fields during the 2018-19 sessions. Total number of books accessioned till March 2018 is 2866.

All the purchased books are technically processed. The ISI N-E Centre Library has subscribed to 20 Indian and Foreign Journals and 5 Newspapers and 4 magazines during this period.

Membership:

The main users of this Library are the students, faculty members, visiting scientists and staffs of the Institute.

Library Services:

Circulation Service:

Around 1020 books were circulated in the period.

Web OPAC:

Library members use this facility to browse and search the bibliographic database of the library and check the status of documents including their own transactions. The Library web page contains information about the Library, its collection, services, catalogue and list of Journals.

Current Awareness Service:

A new search option is installed in the ISI N-E Library page to check the new arrival of Books.

Web Based Service:

Library has access to different e-resources i.e., full-text and bibliographic databases from ISI Kolkata Library website.

ISI Kolkata Library has also extended the off campus access of e-resources to the students and faculty members of ISI N-E Centre through RemoteX.

Electronic Document Delivery Service:

Under this service Full-Text articles and e-books in pdf format were downloaded and e-mailed to the students as per their requirement.

PCM Memorial Muswum and Archives, Kolkata

The Museum and Archives carried out regular up keeping programme for 921 exhibits through 101 panels and a collection of artifacts related to P.C. Mahalanobis displayed in the ground floor, chatal and Professor's residence. Regular maintenance work completed at the museum like the previous year. During this period (2018-1019) 3397 sheets including books (2) and archival files (34) were treated. 602 nos. of files of untreated documents and 227 books have been listed.

P.C.Mahalanobis Memorial Museum & Archives curated an online exhibition on "Prasanta Chandra Mahalanobis's life and contribution" in collaboration with Google Art & Culture on the occasion of 125th Birth Anniversary of Prasanta Chandra Mahalanobis. Details can be found at https://artsandculture.google.com /partner/ indian-statistical-institute.

P.C.Mahalanobis Memorial Museum and Archives participated in the International Science Literature & Film Festival, 2018 in collaboration with Library division, curated an exhibition on Prasanta Chandra Mahalanobis's Life and Work which took place in the book fair at Atal Bihari Vajpayee Scientific Convention Centre as part of India International Science Festival, 2018.

Museum organized a National seminar on 'Recent Advances in Museum Management' on 26th March, 2019. Which death with current issues of Museum Management.

Original records, artifacts and books of P.C.M's study room have been accessioned and this is still continuing. However, the arrangement of administrative files has been completed. Some photographs were scanned and referential work that was needed for Publication of album on the occasion of Prasanta Chandra Mahalanobis's 125th Birth Anniversary was completed.

Besides general visitors, eminent persons, scientists (like Michael Benton, University of Bristol; Jeffroy Racine, McMaster U.Canada; Pravin Srivastava, Secretary & Chief Statistician, MoSPI; Carl Malamud of Public resource. Org; Dr. Peter Chesson, University of Arizona; David Mount, University of Maryland; Terence Paul Speed, Walter and Eliza Hall Institute of Medical Research, University of California, Berkeley etc.) and students from schools, colleges, Universities visited the museum (total no. 650 approx.). Scholars and researchers (like Anton Harder from Nottingham University; Jahnavi Phalkey, Director, Science Gallery, Bengaluru etc.) from different field consulted the archival collection for reference purpose (15 nos.).

Projects

Projects, Internally funded: Ongoing

Sl. no.	Name of the project	Principal Investigator(s)
1.	PCM Museum and Archives curated a virtual exhibition on Prof Prasanta Chandra Mahalanobis with the storytelling tools of Google Arts & Culture showcasing the early life and contribution of Prasanta Chandra Mahalanobis to field of Statistics	KIshor Chandra Satpathy

CENTRES

Centre for Soft Computing Research: A National Facility (CSCR)

In-Charge: Professor Ashish Ghosh
Office : 1st Floor, R. A. Fisher Bhavan, ISI, Kolkata-700 108

R. C. Bose Centre for Cryptology and Security

Centre Head: Professor Bimal Roy
Office : 3rd Floor, Deshmukh Bhavan, ISI, Kolkata 700 108

CENTRE FOR SOFT COMPUTING RESEARCH: A NATIONAL FACILITY (CSCR)

The Centre was established in 2005 by the Department of Science and Technology, Govt. of India under its IRH-PA (Intensification of Research in High Priority areas) scheme in ISI because of its outstanding contribution and achievements in the area of soft computing and machine intelligence. The Center has been declared an :Associate Institution" of ISI in 2010

Areas of Research

Faculty Name	Collaborators	Research topic(s)
A. Ghosh	A. Datta	Remote Sensing Image Analysis
	B. N. Subudhi	Moving Object Detection from Video
K. Ghosh	A. Mukherjee, K.S Chandran and S. Ghosh	Cognitive Science
	S. Roy, B. Bhattacharyya,B. Bal and A. Dewanji	Cybernetics
	A. Chowdhury and A. Khatua	Complex Network Analysis and Mining
	S. Roy and A. K. Maiti	Information Technology for Accessibility and Healthcare Applications
S. Das	C. Chatterjee	Recent trend of Indian precipitation in climate change context by data science approach
	S. Datta	Prediction of extreme weather events from Indian navigation satellite system
S. K. Pal	R. Banerjee	Computing With Words (CWW) and Artificial General Intelligence (AGI)
	D. Chakraborty and D. Bhoumik	Rough Sets and Granular Computing in Video Analytics
	S. Das,A. Garg and J. Maiti	Z-numbers in Safety Analytics
	A. Mondal and S. Misra	Dynamic Distributive Energy Request in Smart Grid Applications for IoT
	S. Kundu	Social Network Mining
S.S. Ray	S.S. Ray and J. Singh	Staging of Cancer, neurocomputing
S.S. Ray and S. K. Pal	J. K. Pal	Micro RNA Analysis, fuzzy-rough computing

Projects

Ongoing Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	INSA Distinguished Professor	Sankar Kumar Pal	Indian National Science Academy, New Delhi
2.	Networking on Data Science and Machine Learning	Ashish Ghosh	DST, Govt. of India
3.	Cluster Project under Data Science Research	Ashish Ghosh	DST,Govt. of India
4.	Retrieval of Atmospheric water vapour from NAVIC/GAGAN data & prediction of extreme weather events based on machine learning techniques	Saurabh Das	Space Applications Centre, Department of Space, Govt. of India
5.	Understanding vision from filling in and visual illusion perspectives with the help of computational modeling	Kuntal Ghosh	Cognitive Science Research Initiative, DST, Govt. of India
6.	Development of computer vision based 3D Indian sign languages recognition to assist differently abled	Sandipa Roy	Women Scientist Scheme-B, DST, Govt. of India
7.	Influence of socio-economic status in the relationship between central obesity and cognitive development of school children of Kolkata, India and the changes in serum leptin and insulin resistance in different grades of central obesity	Satabdi Ghosh	Women Scientist Scheme-B, DST, Govt. of India

Completed Projects: Externally funded

Sl. no.	Name of the project	Principal Investigator(s)	Funded by
1.	DAE Raja Ramanna Fellowship	Sankar Kumar Pal	Dept. of Atomic Energy, Govt. of India
2.	DST INSPIRE Faculty Award	Saurabh Das	DST, Government of India

Publications

Paper Published in Books

1. Bhattacharyya, S., Pal, S.K. and Das, A. (eds.): *Recent trends in signal and image processing,* Proceedings of ISSIP 2018, Series: Advances in Intelligent Systems and Computing, India, **922**, Springer, Singapore, 2019.

Publications in Journals

1. Bakshi, A. and Ghosh, K.: A parsimonious model of brightness induction, *Biological Cybernetics,* **112(3)**, 237-251, 2018.
2. Bhunia Chakraborty, D. and Pal S.K.: Neighborhood rough filter and intuitionistic entropy in unsupervised tracking, *IEEE Trans. Fuzzy Systems*, **26(4),** 2188-2200, 2018.
3. Dey, B. and Kundu, M.K.: Turning video into traffic data – an application to urban intersection analysis using transfer learning, *IET Image Processing*, Online Version: DOI: 10.1049/iet-ipr.2018.5985, 2019.
4. Kundu S. and Pal, S.K.: Double Bounded Rough Set, Tension Measure and Social Link Prediction, *IEEE Transactions on Computational Social Systems*, **5(3)**, 841-853, 2018.
5. Misra, S., Bera, S., Achuthananda, M.P., Pal S.K., and Obaidat, M.S.: Situation-aware protocol switching in software-defined wireless sensor network systems, *IEEE System Journal,* **12(3)**, 2353-2360, 2018.
6. Mitra, S., Mazumdar, D., Ghosh, K. and. Bhaumik. K.: An adaptive scale Gaussian filter to explain White's illusion from the viewpoint of lightness assimilation for a large range of variation in spatial frequency of the grating and aspect ratio of the targets, *PeerJ*, **6:e5626**, Online Version: https://doi.org/10.7717/peerj.5626, 2018.
7. Pal, J.K., Ray, S.S., Chow S.B. and Pal, S.K.: Fuzzy-Rough Entropy Measure and Histogram Based Patient Selection for miRNA Ranking in Cancer, *IEEE/ ACM Trans. Computational Biology and Bioinformatics,* **15**, 659-672, 2018.
8. Pal, S.K.: Granular Mining and Big Data Analytics: Rough Models and Challenges, *Proceedings of the National Academy of Sciences, India Section A: Physical Sciences,* 1-16, Online Version: https://doi.org/10.1007/s40010-018-0578-3, 2019.
9. Roy, A., Maiti, A.K. and Ghosh, K.: An HVS inspired robust non-blind watermarking scheme in YCbCr color space, *International Journal of Image and Graphics,* **18(3)**, 18500-15, 2018.

Publication in Conference Proceedings

1. Khatua, A., Cambria, E., Ghosh, K., Chaki, N. and Khatua, A.: Tweeting in Support of LGBT?: A Deep Learning Approach, *ACM India Joint International Conference on Data Science and Management of Data* (COMAD/CODS 2019), 342-345, 2019.
2. Mukherjee, A., Paul, A. Roy, R., Roy, S. and Ghosh K.: Perceptual Filling-in of Blind-Spot for Surrounding Color Gradient Stimuli, *Tenth International Conference on Intelligent Human Computer Interaction (IHCI 2018),* Lecture Notes in Computer Science, **11278**, Springer, 194-204, 2018.

R. C. BOSE CENTRE FOR CRYPTOLOGY AND SECURITY

The Centre aims at the promotion of interdisciplinary research in Mathematics, Computer Science and Statistics towards furtherance of teaching, research as well as training and development in Cryptology and Cyber Security. It acts as a national hub for cryptographic requirements, cutting-edge research activities and indigenous capacity building in all relevant fields of study.

Major activities of the Centre include teaching, training and research in Cryptology and Security. The Centre promotes sustained collaboration in focused research areas, and serves as a meeting point for eminent scholars. It also conducts training programs targeted to produce a critical mass of experts to cater to the national and international requirements in this niche area.

Research

The faculty members affiliated with the Centre work on various research topics in the domain of Cryptology and Security. The members of the Centre are also actively involved in sponsored research projects, funded by Government organizations as well as the Industry, in niche domains of the subject. The research programs focus on the theoretical as well as the applied aspect of Cryptology and Security research. The themes of the groups include, but are not restricted to, the following areas of specialization in Cryptology and Cyber Security.

- Computational Algebra and Number Theory
- Discrete Mathematics and Coding Theory
- Foundations of Cryptology
- Symmetric Key Cryptology
- Public Key Cryptology
- Hash Codes and Authentication
- Cryptographic Protocols
- Cryptographic Hardware
- Network Security
- Cyber Security of Critical Infrastructure
- Cryptography for Clouds and Grids
- Cryptography for Cyber Physical Systems
- Fault Tolerance of Complex Networks
- Quantum Computation and Cryptology
- Digital Rights Management
- Financial Cryptology

Academics

The Centre offers a short-term (one semester) certificate course on the basics of Cryptology, Security and allied disciplines for Government officials and scientists. The Centre also offers short-term intensive workshops or lecture series on specialized topics related to Cryptology and Security.

The faculty members of the Centre can supervise Masters students of any discipline of the Institute in the domain of Cryptology and Security, and can also offer guidance to full-time PhD candidates in Cryptology and Security selected through the usual JRF exam and interview process of the Institute. Cryptology and Security Research Unit (CSRU) is the only unit of R. C. Bose Centre for Cryptology and Security which belongs to Computer and Communications Sciences Division (CCSD). Detailed academic activities of CSRU have been reported under CCSD.

AWARDS AND RECOGNITION

AWARDS AND RECOGNITION

This institute has distinguished faculty in statistics, mathematics, computer science, economics and other disciplines of natural and social sciences. Members of the Faculty have been recognized, both nationally and internationally, for their contributions to research and other activities. Some of them are recipients of prestigious awards like S.S. Bhatnagar Prize, Homi Bhaba Award etc. Many of them are Fellows of the Indian National Science Academy, Indian Academy of Sciences, Indian National Academy of Engineering, National Academy of Sciences India, Institute of Electrical & Electronics Engineers (IEEE) and many other distinguished scientific bodies.

SWARNAJAYANTI FELLOWSHIP

NEENA GUPTA, SMU Kolkata	2014-15 to 2019-20
PARTHANIL ROY, SMU Bangalore	2017-18 to 2022-23

J C BOSE NATIONAL FELLOWSHIP

ARUP BOSE, SMU Kolkata	2014-2018 & 2019-2023
B V RAJARAMA BHAT, SMU Bangalore	2017-2022
DEBASHISH GOSWAMI, SMU Kolkata	2016-2021
R B BAPAT, SMU Delhi	2009 -2013 & 2014-2018
SANGHAMITRA BANDOPADHYAY, MIU Kolkata	2017-2022

ACADEMY FELLOWSHIPS

Indian National Academy of Engineering (INAE)

BHARGAB B BHATTACHARYA, ACMU Kolkata	Chair Professor, 2016-2018
SUSHMITA MITRA, MIU Kolkata	Chair Professor, 2018-2020

Indian National Science Academy (INSA)

SANKAR K PAL, CSCR Kolkata	Distinguished Professor Chair, 2018
PRADIPTA MAJI, MIU Kolkata	Fellow, 2018
SUSHMITA MITRA, MIU Kolkata	Fellow, 2018

The National Academy of Sciences (NASI)

T S S R K RAO, SMU Bangalore	Fellow, 2018

OTHER FELLOWSHIPS

Ramanujan Fellowship

SHALINI DATTA, HGU Kolkata	2016-2021

Ramalingaswami Fellowship

NILABJA SIKDAR, HGU Kolkata	2018-2020

Senior Visiting Fellow (Honorary), Centre for Policy Research Delhi

E. SOMANATHAN, EPU Delhi	Fellow 2018

Visiting Fellow- British Academy & Visiting Researcher Fellow

NILADRI SEKHAR DASH, LRU Kolkata	Fellow 2018

AWARDS

ABHIK GHOSH, ISRU Kolkata
MS New Researcher Travel Award, Institute of Mathematical Statistics, 2018
IBS Travel Award, International Biometric Society, 2018.

ASHISH GHOSH, MIU Kolkata
IEEE-GRSS Regional Leader Award, Institute of Electrical and Electronics Engineers, 2019.

ARUNAVA SEN, EPU Delhi
TWAS Siwei Cheng Prize in Economic Sciences, The World Academy of Sciences, awarded in 2018.

AMARTYA KUMAR DUTTA, SMU Kolkata
The first "Professor Satish C. Bhatnagar Award" of the Indian Mathematical Society, for the best publication in History of Mathematics.
INSA Teachers Award 2018of the Indian National Science Academy.

DEBDULAL DUTTA ROY, PRU Kolkata
DTNBWE&D Award for research on Workers Education, Ministry of Labour & Employment, Government of India, 2018

FARZANA AFRIDI, EPU Delhi
IWWAGE-IFMR Sub-Award for conducting research on Identifying and Alleviating Constraints to Women's Economic Empowerment, Bill Melinda Gates Foundation 2018-2020.

MALAY BHATTACHARYYA, MIU Kolkata
Young Engineer Award from INAE in Computer Science, 2018

MUDIT KAPOOR, EPU Delhi
UNICEF Award for Proposal for engagement of Indian Statistical Institute to support in analysis of data, modeling, data visualization, writing manuscripts and policy papers, Comprehensive National Nutrition Survey.

SANGHAMITRA BANDYOPADHYAY, MIU Kolkata
2018 TWAS Prize in Engineering Sciences, Plaque and Cash Award at the 28th General Meeting, The World Academy of Sciences, 2018.

SUSHMITA MITRA, MIU Kolkata
Flex Award, Fulbright-Nehru Academic and Professional Excellence Fellowship, 2018-2019

TARUN KABIRAJ, ERU Kolkata
Emerald Outstanding Paper Award, 2018, 19th Asia-Pacific Conference, Singapore.

MEMBERSHIPS

A RAJAGOPAL, SQC & OR Coimbatore
Member, Board of Studies of Karpagam University, Avinashilingam Deemed University and Bharathiyar University (Statistics department) for developing a model for employable skills in the syllabus.

CHETAN GHATE, EPU Delhi
Member, Editorial Advisory Board, Reserve Bank of India.

ARUP BOSE, SMU Kolkata
Member of the International Statistical Institute
Member of the Bernoulli Society Council (2015-2019)

MADHURA SWAMINATHAN, EAU Bangalore
Member, Appeals Committee, National Assessment and Accreditation Council, 2018 Onwards;
Member, Governing Body, Institute for Social and Economic Change, Bengaluru, 2019-2021
Member, Executive Committee of the Indian Society of Agricultural Economics, 2018-2019

PARTHANIL ROY, SMU Bangalore
Member of the Committee for Conferences on Stochastic Processes, 2018-2021

PRADIPTA MAJI, MIU Kolkata
Senior Member, International Rough Set Society (IRSS), 2018.

RECOGNITION

B S DAYA SAGAR, SSIU Bangalore
IAMG Certificate of Appreciation for Outstanding Service, 2018.

MALAY BHATTACHARYYA, MIU Kolkata
Young Associate, 2018

NIKHIL RANJAN PAL, ECSU Kolkata
President, IEEE Computational Intelligence Society, 2018-2019.

PARTHANIL ROY, SMU Bangalore
Bernoulli Society Youth Representative, 2017-2020

PARTHA PRATIM HALDER, Library Division Kolkata
Certificate of Merit, 1st FIP Grand International Print Salon, 2018.

SIVA ATHREYA, SMU Bangalore
Chair, Program Committee, IMS/BPS World Conference in Probability, till 2020.

SUSHMITA MITRA, MIU Kolkata
IEEE CIS Distinguished Speaker, 2019-2020;
Chair, IEEE Kolkata Section, 2019-2020.

TAPAS BASU, Library Division Kolkata
PESGCPC Grand Progress Award, GPA.PESGSPC, for distinguished service towards the promotion of art photography, love, peace and friendship.

EDITORIAL ASSIGNMENTS

ABHIK GHOSH, ISRU Kolkata
Technical Editor, *Sankhya Series A & B,* since January, 2019;

AFRIDI FARZANA, EPU Delhi
Academic Editor, *PLOS one*, since 2018.

ANTAR BANDYOPADHYAY, SMU Delhi
Associate Editor, *Journal of Statistical Planning and Inference (JSPI),* Elsevier and *Sankhya Series A*, Springer and Indian Statistical Institute.

ANUP DEWANJI, ASU, Kolkata
Associate Editor, *Journal of Statistical Planning and Inference,* Elsevier.

ASHISH GHOSH, MIU Kolkata
Associate Editor, *Journal on Banking and Financial Technology (JBFT)*, Springer Nature; *Sadhana*, Computer and Data Sciences, Springer Nature; *IET Journal of Computer Vision,* Indian Statistical Institute Series, Springer Nature;
Series Editor, *Communications in Computer and Information Science (CCIS),* Springer Nature.

AYANENDRANATH BASU, ISRU Kolkata
Associate Editor, *Computational Statistics*, Springer.

B.S. DAYA SAGAR, SSIU, Bangalore
Editorial Advisory Board Member, *Computers & Geosciences;*
Review Editor *Frontiers: Environmental Informatics; Mathematical Geosciences;*
Lead Editor, *Handbook of Mathematical Geosciences: Fifty Years of IAMG,* Springer; *Encyclopedia of Mathematical Geosciences,* Springer,
Associate Editor, *Springer, I*ndian Statistical Institute Series.

B.V. RAJARAMA BHAT, SMU Bangalore
Chief Editor, *Proceedings of the Indian Academy of Sciences,* Mathematics, until Dec, 2018.

Bhabatosh Chanda, ECSU Kolkata
Associate Editor, *Pattern Recognition*, Elsevier,
Editorial Advisory Board *Mathematical Morphology - Theory and Applications,* De Gruyter.

BHARGAVA B BHATTACHARYA, ACMU Kolkata
Editor, *Journal of Electronic Testing: Theory and Applications,* Springer and *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, Taylor & Francis.

DEBASIS MISHRA, EPU Delhi
Associate Editor, *Social Choice and Welfare,* since November 2016; *Mathematical Social Sciences,* since January 2014; *Journal of Mechanism and Institution Design,* since 2016.

DEBDULAL DUTTA ROY, PRU Kolkata
Review Editor, *Psychological Studies,* Springer; *Journal of Organisations and Human Behaviour,* Publishing India Group; *Journal of Psychometry,* Indian Institute of Psychometry, Kolkata; *Journal of the Indian Academy of Applied Psychology,* Indian Academy of Applied Psychology.

DILIP SAHA, GSU Kolkata
Editor, *Indian Journal of Geology*; **Section Editor**, *Current Science*.

DIPTI PRASAD MUKHERJEE, ECSU Kolkata
Associate Editor, *IEEE Transactions on Image Processing,* since November 2014; *IET Image Processing*, since February 2016; *SADHANA,* Academy Proceedings in Engineering Sciences, Springer, since June 2014.

E. SOMANATHAN, EPU Delhi
Editor, *Environment and Development Economics,* Cambridge University Press Journal, since January 2015.

E.V. GIJO, SQCOR Bangalore
Editorial Advisory Board Member, International Journal of Lean Six Sigma, Emerald; Internal Journal of Quality and Reliability Management, Emerald,
Editorial Advisory Board Member, Journal of Applied Statistics.

GARGA CHATTERJEE, PRU Kolkata
Review Editor, *Frontiers in Psychology,* Cognition.

NIKHIL RANJAN PAL, ECSU Kolkata
Associate Editor, IEEE Transactions on Cybernetics, since 2018, IEEE; *International Journal of Approximate Reasoning,* Elsevier, since 2018; ***Journal of Neuroscience and Neuroengineering***, American Scientific Publishers, since 2018.

NILADRI SEKAR DASH,LRU Kolkata
Editor-in-Chief, *Journal of Advanced Linguistic Studies.*

NITYANANDA SARKAR, ERU Kolkata
Associate Editor, *Indian Growth and Development Review*, Emerald Group Publishing Limited, since 2008.

PABITRA BANIK, AERU Kolkata
Editor-in-Chief, *NASS Journal of Agricultural Sciences*, Nanyang Academy of Science, Singapore.

PRABAL ROY CHOWDHURY, EPU Delhi
Editor, *Indian Growth and Development Review.*

RAJAT KUMAR DE, MIU Kolkata
Associate Editor, *Sadhana.*
Reviewer, *Mathematical Reviews (MathSciNet),* American Mathematical Society, since May, 2016.

RITA SAHA RAY, ISRU Kolkata
Associate Editor, *Sankhya A,* Springer; and *Journal of Indian Society of Agricultural Statistics*.

RITUPARNA SEN, ASU Chennai
Associate Editor, *Applied Stochastic Models in Business and Industry*, Wiley and *Sankhya B,* Springer;*Indian Statistical Institute Book Series,* Springer.

SANKAR KUMAR PAL, CSCR Kolkata
Associate Editor *Information Sciences,* Elsevier; *Fuzzy Sets and Systems,* Elsevier; *Fundamenta Informaticae* ,IOS Press; *Int. J. Pattern Recognition and Artificial Intelligence,* World Scientific; *Int. J. Computational Intelligence and Applications*, World Scientific; *IET Image Processing,* IEE Press; *LNCS Trans. on Rough Sets*, Springer;
Editor-in-Chief, *International Journal of Signal Processing; Image Processing and Pattern Recognition,* SERSC, Korea;
Executive Advisory Editor, *International Journal of Approximate Reasoning; International Journal of Computational Science and Engineering; International Journal of Image and Graphics; International Journal of Business Intelligence and Data Mining; International Journal of Machine Intelligence and Sensory Signal Processing;*
Guest Editor, *Pattern Recognition Letters; IET Image Processing; Natural Computing,* Springer;
Book Series Editor, *Frontiers in Artificial Intelligence and Applications (FAIA),* IOS Press, The Netherlands; *Statistical Science and Interdisciplinary Research,* World Scientific, Singapore;
Book Editor, Pattern Recognition and Big Data, World Scientific Press; Soft Computing Applications in Sensor Networks, CRC, Taylor & Francis Press.

SARBANI PATRANABIS-DEB, GSU Kolkata
Editor, *Geological Magazine,* Cambridge University Press, UK.

SATYA RANJAN CHAKRAVARTY, ERU Kolkata
Associate Editor, *Social Choice and Welfare,* Springer Verlag.

SUSHMITA MITRA, MIU Kolkata
Associate Editor, *IEEE/ACM Trans. On Computational Biology and Bioinformatics (IEEE); Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery; Information Sciences; Neurocomputing; INAE Letters; Fundamenta Informaticae.*

SUSMITA SUR-KOLAY, ACMU Kolkata
Associate Editor *ACM Transactions on Embedded Computing Systems.*

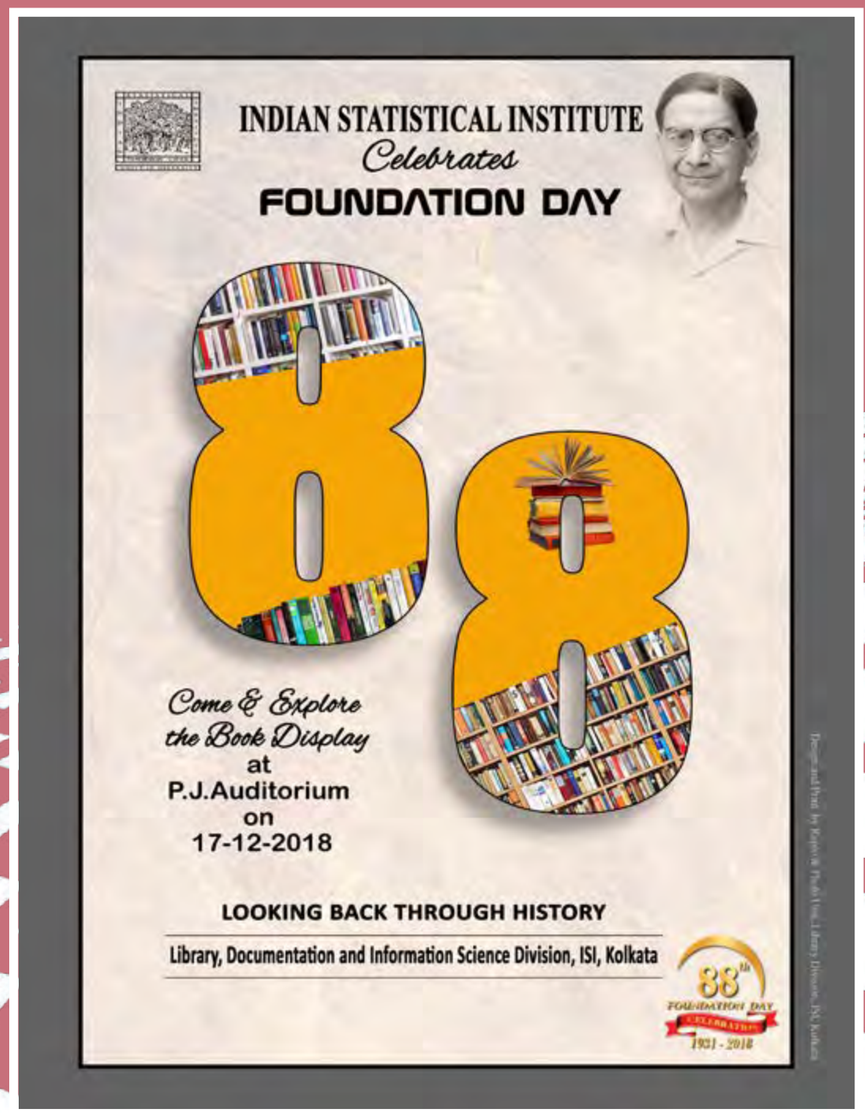
SWAGATAM DAS, ECSU Kolkata
Co Editor-in-Chief, *Swarm and Evolutionary Computing,* Elsevier Journal, since 2011;
Associate Editor, *Array,* Elsevier, since 2019; *Pattern Recognition,* Elsevier, since 2017; *Information Sciences,* Elsevier, since 2010; *Neurocomputing,* Elsevier, since 2013,
Section Editor, *Springer Nature Computer Science,* since 2019,
Editor, *Engineering Applications of Artificial Intelligence,* Elsevier, since 2013.

TAPAN CHAKRABARTY, GSU Kolkata
Associate Editor, *Indian Journal of Geosciences,* Geological Survey of India.

UMAPADA PAL, CVPR Kolkata
Associate Editor, Pattern Recognition, Elsevier, since 2016; Pattern Recognition Letters, Elsevier, since 2014; *ACM Transactions on Asian and Low-Resource Language Information Processing (TALLIP),* ACM, since 2012; *IET Biometrics, IET, since 2016; International Journal of Document Analysis and Recognition*, Springer, since 2015.

UTPAL GARAIN, CVPR Kolkata
Associate Editor *International Journal of Document Analysis and Recognition,* Springer, since 2011.

EVENTS



Celebration of 125th Birth Anniversary of Professor Prasanta Chandra Mahalanobis

Many Seminars, Lectures and Conferences were held at the Head Quarters at Kolkata and at various Centres, Branches, Outlying Units of Indian Statistical Institute during 2018-19, as part of the 125th Birth Anniversary Celebration of Professor P.C. Mahalanobis. Which commenced on June 29, 2017. The year long celebrations culminated with the closing ceremony held at the Platinum Jubilee Auditorium of the Institute in Kolkata on June 29, 2018.

Closing Ceremony

Shri Pranab Mukherjee, the then Hon'ble President of India had inaugurated the programme. Shri M. Venkaiah Naidu, Hon'ble Vice President of India, Shri Keshari Nath Tripathi, Hon'ble Governor of West Bengal; Shri D.V. Sadananda Gowda, the then Hon'ble Minister of Statistics & Programme Implementation; Shri M.V.S. Ranganadham, Director General (ES), MoSPI; Dr. Vijay Kelkar, President of the Institute and Professor Goverdhan Mehta, Chairman of the ISI Council were the dignitaries who graced the occasion.

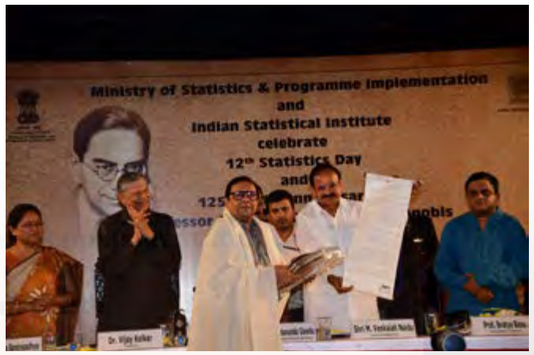
On this occasion, a Commemorative Coin, a Pictorial Album on the past glimpses of Professor P.C. Mahalanobis, an Audio album on Professor P.C. Mahalanobis and Gurudev Rabindranath Tagore were released on this occasion.

Google launched a Google doodle to commemorate the day.

Source: https://www.google.com/doodles/prasanta-chandra-mahalanobis-125th-birthday

The dignitaries at the dias

The National Statistics Day was also celebrated in the Institute as a joint programme with Ministry of Statistics & Programme Implementation (MoSPI), Government of India, New Delhi. On this occasion, awards for contributions in the field of Statistics were announced by MoSPI. Professor Rahul Mukerjee, IIM Calcutta was honoured with the prestigious P.V. Sukhatme National Award in Statistics while Professor Anil K. Ghosh, SMU Kolkata received the C.R. Rao National Award in Statistics for Young Statisticians.



Professor Rahul Mukerjee receiving the award

Professor Anil K. Ghosh receiving the award

CONFERENCES, SYMPOSIA, WORKSHOPS AND TRAINING PROGRAMME

1. Instructional School *"IST Topology* (For Teachers)": SMU, Bangalore May 14-26, 2018.
2. Symposia on "*ISI-Networks"*: SMU, Delhi, held at Leiden, Netherlands, June 09, 2018.
3. 40th Conference on "*Stochastic Processes and their Applications – SPA 2018*", SMU, Delhi, held at Gothenburg, Sweden, June 11–15, 2018.
4. International Conference on "Exploring the Horizons of Library and Information Sciences: From Libraries to Knowledge Hubs": DRTC, Bangalore, August 07-09, 2018.
5. 2nd Annual Research Symposium on "Farmers Training Programme": AERU, Giridih, September 26–27, 2018.
6. Symposium on "Financial Inclusion and Digital Payment System in Jharkhand": SRU, Giridih, in collaboration with NABARD, Jharkhand, October 03-04 2018.
7. International Conferences on "Complex Dynamical Networks": PAMU, Kolkata, October 04–05, 2018.
8. International Conference on "Countries in Socioeconomic Transition: Evidences from Auxology and Allied Disciplines": BAU, Kolkata, November 21-24, 2018.
9. Symposium on "*Linear Analysis"*: SMU, Bangalore, in collaboration with Indian Academy of Sciences, Bangalore, held at Evolve Back, Coorg, Karnataka, December 07-09, 2018.
10. Symposium on "*Lectures in Probability and Stochastic Processes XIII (LPS XIII)*": SMU, Bangalore, December 07–11, 2018.
11. Symposium on "*Operator Theory and Operator Algebras – 2018 (OTOA-2018)*": SMU, Bangalore, December 13-19, 2018.
12. 14th Annual Conference on "Economic Growth and Development": EPU, Delhi, December 19-21, 2018.
13. Symposium on "*ISI Mathematics Day*": SMU, Bangalore, January 19, 2019.
14. International Library Conference on "Future of Libraries": Library Division in collaboration with IIM, Bangalore, held at Bangalore, January 26-28, 2019
15. Symposium on "*Celebration of Bhaskar Bagchi's career*": SMU, Bangalore, January 29, 2019.
16. Symposium on "Six Sigma Case Study Presentation Contest": SQC & OR Unit, Bangalore, February 07-08, 2019.
17. International Conference on "India Biodiversity Meet – 2019": AERU, Kolkata, February 14-16, 2019.
18. Symposium on "*Python Application s to Cosmology and Nonlinear Dynamics*": PAMU Kolkata, March 18–22, 2019.

Workshops and Training Programmes

1. Winter school on *"Mathematics"*: Stat-Math Unit, Kolkata, held at North East Centre, Tezpur, Assam, January 15-19, 2019.
2. Workshop on *"Summer school for Women in Mathematics and Statistics"*: Stat-Math Unit, Bangalore, held at ICTS Campus, Bangalore, May 07-18, 2018.
3. Summer Training Programme on "*Statistics*": ASU, Chennai, May 07–June 15, 2018.
4. National Workshop on "*Statistical Design of Experiments"*: ASU, Chennai, held at BCMC College, Kottayam, December 06-08, 2018.
5. Workshop on "*Statistical Methods in Finance*": ASU, Chennai, in collaboration with Chennai Mathematical Institute, Chennai, December 17-20, 2018.
6. Workshop on "*Data Analytics*": ISRU, Kolkata, March 10–15, 2019.
7. Winter School on "*Algorithms, Optimization and Learning organized*": ACMU, Kolkata, January 01-04, 2019.
8. 4th International Workshop on "*Pattern Analysis and Applications*": CVPRU, Kolkata, February 26-28, 2019.
9. 5th Summer School on "*Computer Vision, Graphics and Image Processing"*: ECSU, Kolkata, May 31-July 13, 2018.
10. Annual Workshop on "*Machine Intelligence and Application*": MIU, Kolkata, March 29, 2019.
11. Workshop on "*Algorithms Based on Advanced Spatial Statistics in GeoSpatial Data Sciences*": SSIU, Bangalore, held at IEEE India Office, World Trade Centre, Bangalore, November 15, 2018.
12. Summer Internship on "*Cryptology*": CSRU, Kolkata, May 14-July 06, 2018.
13. Training Programme on "*Depositional sedimentary environment and sequence stratigraphy*" (for ONGC & GSI Officers): GSU, Kolkata, held at GSI Training Institute, Kuju, Jharkhand, April 27-29 and December 09-10, 2018.
14. Workshop on "*Species Distribution Modelling with MaxEnt and R*": AERU, Kolkata, December 03-09, 2018.
15. Workshop on "*Growth Curve Analysis and R – Programming*": AERU, Kolkata, February 12-13, 2019.
16. Summer School on "*Use and Application of SPSS"*: BAU, Kolkata, August 27-31, 2018 (Phase I) and September 10-14, 2018 (Phase II).
17. Winter School on "*Research Methods in Biology/ Social Science and application of Statistics*": BAU, Kolkata, January 14-18, 2019.
18. Workshop on "*Advanced Tools and Techniques for Analysis of Demographic and Health Statistics and Application of Computer Software*": PSU, Kolkata, March 18-20, 2019.
19. Workshop on "*Strategic Management for Growth of Jute Industry*": PRU, Kolkata, May 31, 2018.
20. Workshop on "*Perceptual Organization and Rorschach Inkblot Test*": PRU, Kolkata, June 21, 2018.
21. Orientation Training on "*Data Visualization*": PRU, Kolkata, March 25-27, 2019.
22. Workshop on "*War, Ethics and Neuroscience*": PRU, Kolkata, March 28, 2019.
23. Training Programme on "*Recent Developments in Survey Methodology*" (Domestic Learning Component, for ISS Officers): SOSU, Kolkata, May 14-18, 2018.
24. Training Programme on "*Recent Developments in International Statistical Systems*" (Overseas Learning Component, for ISS Officers): SOSU, Kolkata, held at Statistics Netherlands, Hague, May 14-18, 2018.
25. Workshop on "*Data Analytics and Business Research Dimensions"*: SOSU, Kolkata, in collaboration with Department of Management, NEHU, TURA, held at Meghalaya, India, August 03–11, 2018.
26. National Workshop on "*Mathematical and Statistical Software"*: SOSU, Kolkata, in collaboration with Department of Mathematics, held at Sikkim Government College, September 22-28, 2018.
27. Workshop on "*Gross Domestic Knowledge Product*": SOSU, Kolkata, October 23, 2018.
28. Workshop on "*Gross Domestic Knowledge Product*": SOSU, Kolkata in collaboration with Ministry of Statistics and Programme Implementation, held at New Delhi, February 13, 2019.

29. Training Programme on "*Recent Developments in Survey Methodology*" Batch I (Domestic Learning Component, for ISS Officers): SOSU, Kolkata, March 04-08, 2019.

30. Training Programme on "*Recent Developments in Survey Methodology*" Batch II (Domestic Learning Component, for ISS Officers): SOSU, Kolkata, March 04-08, 2019.

31. Training Programme on "*Recent Developments in International Statistical Systems*" Batch I (Overseas Learning Component, for ISS Officers): SOSU, Kolkata, held at Statistics Netherlands, Hague, March 10-16, 2019.

32. Training Programme on "*Recent Developments in International Statistical Systems"* Batch II (Overseas Learning Component, for ISS Officers): SOSU, Kolkata, held at Statistics Netherlands, Hague, March 17-23, 2019.

33. Training Programme on "*Survey Methodology and Data Analytics*" (for ISS Probationers 40th Batch): SOSU, Kolkata, March 04 - April 26, 2019.

34. Workshop on "*CASI-ISI Agricultural Markets*": EPU, Delhi, July 09-14, 2018.

35. 7th Workshop on "*Delhi Macroeconomics*": EPU, Delhi, October 25-26, 2018.

36. 4th Workshop on "*CECFEE"*: EPU, Delhi, held at Goa, November 16-17, 2018.

37. Workshop "*Women in the Economy*": EPU, Delhi, March 28-29, 2019.

38. Workshop on "*Data Anomaly in Official Statistics regarding Women's Labour in India*": EAU, Bangalore, January 25-26, 2019.

39. Workshop on "*Six Sigma Green Belt*": SQC & OR Unit, Kolkata, held at ISI, Giridih, October 29-November 02, 2018.

40. Workshop on "*Design and Analysis of Experiments for R&D Scientists and Research Scholars*" SQC & OR, Kolkata, January 28-February 02, 2019.

41. Workshop on "*Six Sigma Green Belt*": SQC & OR, Kolkata, March 11-15 2019.

42. Workshop on "*Programme on Environmental Data Interpretation, Compilation and Reporting*": SQC & OR, Delhi, in collaboration with Central Pollution Control Board, Government of India, February 04-06, 2019.

43. Training Programme on "*Six Sigma Green Belt"*: SQC & OR, New Delhi, April 25-27, 2018.

44. Training Programme on "*Six Sigma Green Belt"*: SQC & OR, New Delhi, May 23-25, 2018 .

45. Training Programme on "*Six Sigma Green Belt"*: SQC & OR, New Delhi, July 25-27, 2018.

46. Training Programme on "*Six Sigma Green Belt":* SQC & OR, New Delhi, September 10-12, 2018.

47. Training Programme on "*Six Sigma Black Belt*": SQC & OR, New Delhi, **August 27 - 29, 2018 (**1st Module), September 17- 20, 2018 (2nd Module), October 09-12, 2018 (3rd Module) and November 28-30, 2018 (4th Module).

48. Training Programme on "Six Sigma Green Belt": SQC & OR, New Delhi, December 05-07, 2018.

49. Training programme on "*Six Sigma Master Black Belt*": SQC & OR, New Delhi, February 11-15, 2019 and March 11-16, 2019.

50. Certification Programme on "*Business Analytics, Data Mining and Operations Research*": SQC & OR, New Delhi, November 12-15, 2018, (Module 1), December 10-13, 2018 (Module 2), January 21-24, 2019 (Module 3) and February 18-21, 2019 (Module 4).

51. Training Programme on "*Six Sigma Green Belt*": SQC & OR, New Delhi, March 27-29, 2019.

52. Certification Programme on "*Six Sigma Master Black Belt (MBB-29)*": SQC & OR Unit, Bangalore, June 11–24, 2018.

53. Workshop on "*Reliability Theory and Survival Analysis*": SQC & OR Unit, Bangalore, November 28–30, 2018.

54. Foundation Course on "*Business Analytics using R (BA-06)*": SQC & OR Unit, Bangalore, May 24–26, 2018 and June 06–09, 2018.

55. Training Programme on "*Reliability Engineering & Life Testing (RE-02)*": SQC & OR Unit, Bangalore, June 25–28, 2018.

56. Certification Programme on "*Six Sigma Green Belt (GB-47)*": SQC & OR Unit, Bangalore, June 28–July 02, 2018.

57. Training Programme on "*Problem Solving using Design of Experiments (DoE-05)*": SQC & OR Unit, Bangalore, July 18–21, 2018.

58. Certification Programme on "*Six Sigma Black Belt (BB-28)*": SQC & OR Unit, Bangalore, July 02–07, 2018 (Phase-1) and July 30–August 04, 2018 (Phase-2).

59. Certification Programme on "*Six Sigma Green Belt (GB-48)*": SQC & OR Unit, Bangalore, August 20–25, 2018.

60. Foundation Course on "*Business Forecasting using R (BF-05)*": SQC & OR Unit, Bangalore, August 29–September 01, 2018.

61. Certification Programme on "*Six Sigma Black Belt (BB-29)*": SQC & OR Unit, Bangalore, September 24 – 29, 2018 (Phase-1) and October 22 – 27, 2018 (Phase-2).

62. Foundation Course on "*Predictive Modeling using Python (PM-03)*": SQC & OR Unit, Bangalore, November 14–17, 2018.

63. Certification Programme on "*Six Sigma Green Belt (GB-49)*": SQC & OR Unit, Bangalore, November 19–24, 2018.

64. Training Programme on "*Multivariate Data Analysis (MA-02)*": SQC & OR Unit, Bangalore, December 05-09, 2018.

65. Certification Programme on "*Six Sigma Master Black Belt (MBB-30)*": SQC & OR Unit, Bangalore, January 07–20, 2019.

66. Programme on "*Reliability Engineering & Life Testing (RE-03)*": SQC & OR Unit Bangalore, January 29– February 01, 2019.

67. Foundation Course on "*Predictive Modeling using Python (PM-04)*": SQC & OR Unit, Bangalore, February 20–23, 2019.

68. Certification Programme on "*Six Sigma Green Belt (GB-50)*": SQC & OR Unit, Bangalore, February 25–March 02, 2019.

69. Workshop on "*Data Science in Quality Analytics in current Digital System*": SQC & OR Unit, Coimbatore, in collaboration with Kumaraguru College of Technology, Saravanampatti, Coimbatore, June 29, 2018.

70. National Workshop on "*New Trends on SQC, Reliability with R-Programming*": SQC & OR Unit, Coimbatore, held at Acharya Nagarjuna University, Vijayawada, February 01, 2019.

71. Training Programme on "*Business Analytics*": SQC & OR Unit, Hyderabad, February 11, 18 & 25; March 04, 11 & 25; April 01, 08, 15 & 29; May 06, 13, 20 & 27; June 03, 10 & 24, 2018.

72. Training Programme on "*Six Sigma Green Belt*": SQC & OR Unit, Hyderabad, April 23-27, 2018 (Phase-I).

73. Training Programme on "*Foundation Course on Data Analytics using R*": SQC & OR Unit, Hyderabad, May 14-19, 2018.

74. Training Programme on "*Foundation Course on Business Analytics using R*": SQC & OR Unit, Hyderabad, October 08-13, 2018.

75. Training Programme on "*Optimization tools for Business Analytics – Optimal Decision making through Intelligent Modelling*": SQC & OR Unit, Hyderabad, February 24; March 03, 10, 17, 24 & 31, 2019.

76. Training Programme on "*Business Analytics with a focus of Data Science, Machine Learning and Artificial Intelligence*": SQC & OR Unit, Hyderabad, February 23 & 24; March 02, 03, 09, 16, 23 & 30; April 07, 13, 21 & 27; May 05, 11, 19 & 26, 2019.

77. Training Programme on *"Six Sigma Green Belt"*: SQC & OR Unit, Mumbai, held at NIA Karanja, April 03-05, 2018.

78. Training Programme on *"Certification program on Business Analytics and data Mining":* SQC & OR Unit, Mumbai, held at Mahindra, Kandivali, April 14-15 and April 28-29, 2018.

79. Training Programme on *"Six Sigma MBB":* SQC & OR Unit, Mumbai, held April 16-21 and May 21-26, 2018.

80. Training Programme on *"Six Sigma Green Belt*": SQC & OR Unit, Mumbai, held at YWCA, Mumbai, May 05-06 and May 11-13, 2018.

81. Training Programme on *"Statistical Techniques for Business Forecasting"*: SQC & OR Unit, Mumbai, May 16-18, 2018.

82. Training Programme on *"Six Sigma MBB"*: SQC & OR Unit, Mumbai, April 16-21 and May 21-26, 2018.

83. Training Programme on *"Statistical Techniques for Predictive Analytics"*: SQC & OR Unit, Mumbai, June 05-08, 2018.

84. Training Programme on *"Statistical Process Control"*: SQC & OR Unit, Mumbai, held at Grasim Industries, Bharuch, June 29-30, 2018.

85. Training Programme on *"Statistics for Research and Development"*: SQC & OR Unit, Mumbai, held Bajaj Corporation, Andheri, July 04, 2018.

86. Training Programme on *"Six Sigma MBB"*: SQC & OR Unit, Mumbai, held at Six Sigma Management Institute, Colombo, Sri Lanka, July 24-29, 2018.

87. Training Programme on *"Statistical Techniques for Business Forecasting"*: SQC & OR Unit, Mumbai, held at Reliance Corporate, Ghansoli, May 28-29 and August 20-21, 2018.

88. Training Programme on *"Six Sigma Black Belt"*: SQC & OR Unit, Mumbai, June 25-29, July 23-27 and August 28-31, 2018.

89. Training Programme on *"Six Sigma Green Belt"*: SQC & OR Unit, Mumbai, held at YWCA, Mumbai, August 04-05 and 10-12, 2018.

90. Training Programme on *"Statistical Process Control"*: SQC & OR Unit, Mumbai, held at Grasim Industries, Kosamba, November 21-22, 2018.

91. Training Programme on *"Mesurement System Analysis"*: SQC & OR Unit, Mumbai, held at Hindalco Industries, Nagpur, September 24-25, 2018.

92. Certification Programme on "*Business Analytics and Data Mining*": SQC & OR Unit, Mumbai, September 07-09, September 21-23, October 05-07, November 23-25 and December 07-09, 2018.

93. Training Programme on *"Design of Experiments"*: SQC & OR Unit, Mumbai, held at SETCO Industries, Vadodara, October 03-04, October 31 and November 01, 2018.

94. Training Programme on *"Statistical Techniques for Research Methodology"*: SQC & OR Unit, Mumbai, October 22-26, 2018.

95. Training Programme on *"Failure Mode and Effect Analysis"*: SQC & OR Unit, Mumbai, held at L&T, Powai, November 19-20, 2018.

96. Training Programme on *"Six Sigma Green Belt"*: SQC & OR Unit, Mumbai, held at YWCA, Mumbai, December 15-16 and 21-23, 2018.

97. Training Programme on *"Data Analytics"*: SQC & OR Unit, Mumbai, held at L&T, Chennai, January 24-25, 2019.

98. Training Programme on *"Statistical Techniques for Business Forecasting"*: SQC & OR Unit, Mumbai, January 21-23, 2019.

99. Training Programme on *"Statistical Process Control"*: SQC & OR Unit, Mumbai, held at TAL, Nagpur, February 14-15, 2019.

100. Training Programme on *"Design of Experiments"*: SQC & OR Unit, Mumbai, February 19-22, 2019.

101. Training Programme on *"Six Sigma Black Belt"*: SQC & OR Unit, Mumbai, January 28-February 01, Feburary 25-March01 and March 25-28, 2019.

102. Training Programme on *"Data Analytics"*: SQC & OR Unit, Mumbai, held at Adani Power, January 17-18, February 06-07, March 14-15 and March 22-23, 2019.

103. Training Programme on *"Six Sigma Green Belt"*: SQC & OR Unit, Mumbai, held at TISS, March 10-13, 2019.

104. Exhibition on "*Contribution of Prasanta Chandra Mahalanobis to The National Development"* (4th Indian International Science Festival-2018): Library Unit, Kolkata in collaboration with Ministry of Science & Technology and Ministry of Earth Sciences held at Vijnana Bharati at Indira Gandhi Pratisthan (Atal Bihari Vajpayee Scientific Convention Center, KGMU), Lucknow, Uttar Pradesh, October 05-08, 2018.

105. 4th Training Programmeme on "*Multimedia*" (for School Student): Reprography and Photography Unit, Kolkata, January 15-31, 2019.

106. 9th Workshop on "*Digital Pictorial Photography and a Photography Exhibition*": Reprography and Photography Unit, Kolkata, March 14-20, 2019.

107. Workshop on "*International School on Deep Learning in SAR and Hyperspectral Remote Sensing (DL-SHyRS)*": CSCR, Kolkata, in collaboration with Geosensing and Remote Sensing Society, Kolkata Chapter, October 29-November 02, 2018.

Lectures

Applied Statistics Division	
Applied Statistic Unit, Chennai	
6-Apr-18	Understanding Sea Ice Melting via Functional Data Analysis by *Purba Das,*Chennai Mathematical Institute, Chennai
Applied Statistics Unit, Kolkata	
14-Aug-18	On Nonparametric Density and Ridge Estimation for Multivariate Time Series by *Jan Beran,* University of Konstantz, Germany
21-Aug-18	Convergence of Known Distributions to Normality or Non-normality and a Few Counter Examples in CLT by *Subhash Bagui,* University of West Florida, USA
5-Mar-19	Non-Inferiority Deign in Comparative Effectiveness Research: Should we be Bayesian for a While? by *Samiran Ghosh,* Wayne State University, USA
8-Mar-19	PosteriorContraction and Credible Sets for Filaments of Regression Functions by *Subhasis Ghoshal,* North Carolina State University, USA
Interdisciplinary Statistical Research Unit, Kolkata	
21-Jun-18	Location estimation for symmetric log-concave densities by *Nilanjana Laha*, Department of Statistics, University of Washington, Seattle, USA
13-Aug-18	Selected problems in inference for distribution functions by *Sucharita Ghosh,* Swiss Federal Research Institute WSL
23-Aug-18	Building complex models for precision medicine using summary-level information from multiple datasets by *Nilanjan Chatterjee,* Johns Hopkins Bloomberg School of Public Health, MD, USA
20-Dec-18	Semiparametric Bayesian regression for skewed multivariate and tensor data by Debajyoti Sinha, Hobbs Distinguished Professor of Statistics, Florida State University
27-Dec-18	Building complex models for precision medicine using summary-level from multiple datasets by Priyam Das, University of Tesas, MD Anderson Cancer Centre, USA
31-Dec-18	Frequentist and Bayesian Approaches to Monotone Single-Index Models by Kumaresh Dhara, Post-Doctoral Associate, Department of Statistics, University of Florida, USA
1-Jan-19	Hierarchical community by recursive bi-partitioning by Sharmodeep Bhattacharyya, Oregon State University, USA
3-Jan-19	Bayesian regularized calibration of verbal autopsy algorithms by Abhirup Datta, Department of Biostatistics, Bloomberg School of Public Health, Johns Hopkins University, USA
9-Jan-19	Density Modelling through Geometric Exploration by Sutanoy Dasgupta, Florida State University, USA
10-Jan-19	Mean Field for the Stochastic Blockmodel: Optimization Landscape and Convergence Issues by Purnamrita Sarkar, USA
7-Mar-19	On posterior contraction of parameters and interpretability in Bayesian mixture by Arita Guha, Graduate Student, University of Michigan, USA
Biological Sciences Division	
Biological Anthropology Unit, Kolkata	
29-Jan-19	Successful, healthy aging: ideologies and practices in the US with some comparative material from West Bengal, India by Sarah Lamb, Department of Anthropology, Brandeis University, Waltham, Massachusetts, USA
Computer and Communication Sciences Division	
Advance Computing & Microelectronics Unit, Kolkata	
8-Jan-18	Four Flavours of Combinatorics by *Kunal Dutta*, INRIA, France
20-Jun-18	Birthday Paradox, Monochromatic Subgraphs and Their Statistical Applications by *Bhaswar B. Bhattacharya,* Assistant Professor, Department of Statistics, Wharton School University of Pennsylvania
12-Jul-18	On Connectivity and Realizability of Triangle Cover Contact Graphs by *Md. Saidur Rahman,* BUET, Bangladesh
26-Jul-18	Incremental and Parallel Algorithms for Mining Dense Subgraphs by *Apurba Das*, Department of ECE, Lowa State University, USA.
27-Jul-18	Bloom Filter and Count-Min Sketch by *Anil Maheshwari,* School of Computer Science, Carleton, Ottawa, Canada
7-Sep-18	Sequence based computational methods for protein attribute prediction by *M. Sohel Rahman,* Department of CSE, BUET
28-Sep-18	Sequential Decision Algorithms for Measurement-Based impromptu Deployment of a Wireless Relay Network along with a line by *Arpan Chattopadhyay*, Electrical Engineering of IIT Delhi
7-Nov-18	The Maximum Distance Independent Set Problem on Unit Disk Graphs by *Gautam K. Das,* Dept of Mathematics, IIT Guwahati
20-Nov-18	Formal Approaches for Trusted Autonomy by *Sayan Mitra*, (UIUC), Department of ECE at University of Illinois at Urbana-Champaign
26-Dec-18	A Hitchhiker's Guide to Network Science by *Arunabha Sen* , Arizona State University, USA
27-Dec-18	A Paradigm for Mining of Large Data - from Analyzing Data Contents to Relation Graphs by *Goutam Chakraborty*, Iwate Prefectural University, Japan
8-Jan-19	Computing Persistent Homology of Flag Complexe, Via Strong Collapses by *Sidharth Pritam*, INRIA, Sophia, France
30-Jan-19	Separators for Subexponential Algorithms In Euclidean Geometry by *Sudeshna Kolay,* TU Eindhoven, The Netherlands
31-Jan-19	Homomorphism bounds for K4-minor-free graphs by *Foucaud Florent,* at the LIMOS, in Clermont-Ferrand, France
6-Feb-19	Sequential Metric Dimension (in trees) by *Julein Bensmail*, Université Côte d'Azur, France
18-Feb-19	New Bounds on the Growth constant of polyiamonds by *Barequet Gill,* Israel Institute of Technology
18-Feb-19	Computing Approximate Euclidean Minimum Spanning Trees by *Mount David,* UMIACS University of Maryland
20-Feb-19	Triangles and butterflies by *Pach Janos,* Research Professor, Ecole Polytechnique Fédérale de Lausanne, Switzerland
27-Feb-19	Beyond NP Revolution by *Kuldeep Meel,* National University of Singapore, Singapore,
20-Mar-19	Demand-Aware Network Designs of Bounded Degree by *Kaushik Mondal*,Visiting Scientist, ACMU
Cryptology and Security Research Unit, Kolkata	
8-Jan-19	Uniform Scattering and Dispersion of Mobile Robots on Graphs by *Gokarna Sharma*, Kent State University, USA
11-Jan-19	Limitations on Information Dissemination via Noisy Communication and Implications to Animal Group Behavior by *Amos Korman*, CNRS, Paris, France

Electronics and Communication Sciences Unit, Kolkata	
20-Sep-18	Synthetic View Generation for Absolute Pose Regression and Image Synthesis by *P Pukait,* Toshiba Research Europe Ltd.,Cambridge, UK
3-Jan-19	Information processing in the post Moore's Law era by *A Ghosh*, University of Virginia, USA
4-Jan-19	Predictive Algorithms & Cyberinfrastructures for Precision Medicine by *S Chaterji*, Purdue University
14-Jan-19	Beyond Text Detection and Recognition: Emerging Opportunities in Scene Understanding by *C. V Jawahar,* IIIT Hyderabad
24-Jan-19	Machine Learning at the Edge of IoT using the Parallel Computing Framework of FPGAs and GPUs by *A Roy,* Arizona State University, USA
11-Mar-19	Deep Learning, Recent Interests in Theory and Practice by *S. Basu*, IBM India Research Laboratory, New Delhi
Machine Intelligence Unit, Kolkata	
28-Aug-18	MATLAB Seminar on Deep Learning by *Rishu Gupta*, Senior Application Engineer, Computer Vision, Mathworks Inc., India
16-Nov-18	Decomposable Graphical Models: On Learning, Fusion, and Revision. (IEEE-CIS-Distinguished-Lecture) by *Rudolf Kruse*, Professor,Faculty of Computer Science, Otto-von-Guericke University, Magdeburg, Germany
29-Mar-19	Genomes to Hit Molecules In Silico: Bioinformatics for a better tomorrow by *B. Jayaram*, Indian Institute of Technology, Delhi
29-Mar-19	Designing of a underwater surveillance system for complex environment conditions by *B. N. Subudhi,* Indian Institute of Technology, Jammu
29-Mar-19	Language dynamics in social media by *Animesh Mukherjee*, Indian Institute of Technology, Kharagpur
Systems Science and Informatics Unit, Kolkata	
1-Jun-18	Data Expansion Using Analogues to Improve Remote Sensing and Climate Datasets by Distinguished Lecture Talk by *Professor Gregoire Mariethoz,* Institute of Earth Surface Dynamics (IDYST)
Physics and Earth Sciences Division	
Geological Studies Unit , Kolkata	
14-May-18	How to tell the colour of dinosaurs; Recovery of life from the greatest mass extinction of all time by *Michael James Benton*, FRS, School of Biological Sciences, University of Bristol, UK
21-May-18	Cycles in Stratigraphy- Is the carbonate record random or ordered? Microbialites-Modern and ancient oil source rocks and the role of viruses by *Maurice E. Tucker*, School of Earth Sciences, University of Bristol, UK
15-Jun-18	The colonial legacy in the flood management practices of Bengal by *Kalyan Rudra*, Chairman of W. B. Government Pollution Control board
20-Jan-19	Sedimentology of coarse grained mass flow deposits in the Central-Carpethian Paleogene basin by *Janocko Juraj,* Institute of Geosciences, Faculty of Mining, Ecology, Process control and Geotechnologies Technical University of KošiceDuration
20-Jan-19	Paeogene sandy depositional system in Slovakian outer Carpenthians by *Prekopova Marta*, Institute of Geosciences,Faculty of Mining, Ecology, Process control and Geotechnologies Technical University of Košice
23-Apr-19	Evolution of Dinosaur gigantis by *Diego Pol,* Head of science Department Museo Paleontologico Egidio Feruglio, Trelew
Physics and Applied Mathematics Unit, Kolkata	
19-Apr-18	Predicting the patterns of spatio-temporal signal propagation in complex networks by *Chittaranjan Hens,* Bar Ilan University, Ramat Gan, Israel
23-Apr-18	Integral equation techniques for wave-structure interaction problems by *Chittaranjan Koley,* Santanu Department of Mathematics, DAIICT, Gandhinagar, Gujrat
8-Jun-18	Non-classical space-time in (loop) quantum gravity by *Suddhasattwa Brahma,* APCTP, Korea
8-Jul-18	Astrophysical neutrinos, PeV events at Ice Cube, and the Direct Detection of Dark Matter by *Aritra Gupta*, Department of Theoretical Physics, TIFR
9-Jul-18	Bounds on sum of neutrino masses in various cosmological scenarios by *Shouvik Roychoudhury*, Harish-Chandra Research Institute, Allahabad
13-Jul-18	Hegelian Contradictions in Classical Mathenatics by *S. K Venkatesan,* Scientist, TNQ, Chennai
17-Aug-18	Effects of adiabatic index on transonic solution of low angular momentum accretion flow by *Ishika Palit,* Center for Theoretical Physics PAS, Poland
21-Aug-18	Genuinely entangled subspace made of all-partition distillable bipartite entanglement by *Sristy Agrawal,* IISER, Kolkata
25-Sep-18	Warm inflation: a better realization of the accelerated expansion of the nascent universe? by *Mayukh Raj Gangopadhyay*, SINP, Kolkata
26-Sep-18	Exclusivity principle and un-physicality of the Garg-Mermin correlation by *Aravinda*, IIMSc, Chennai
26-Sep-18	Fluctuation-dissipation in de sitter universe by *Ashmita Das,* IIT, Guwahati
26-Sep-18	Exploring new vistas in cosmology by *Satardu Bag,* IUCAA, Pune
27-Sep-18	Extreme events: dynamical origins and predictability by *Arindam Mishra,* Jadavpur University
23-Oct-18	Magntotransport propertiers of 2D material with titled Dirac cones by *Firoz Islam,* Institute of Physics, Bhubaneswar
9-Nov-18	Black hole entropy from the first principles revisited by *Abhishek Majhi,* UNAM, Mexico
22-Nov-18	Dynamical synchronization transition in interacting electron systems by *Tanay Nag,* MPIPKS, Dresden Germany
17-Dec-18	Non Gaussian yet Brownian diffusion in Soft Matter by *Suman Dutta,* Institute of Mathematical Sciences,Chennai
24-Dec-18	Computational Methods to Identify Driver and Druggable Mutations in Cancer by *Sohini Sengupta,* Washington University School of Medicine
14-Jan-19	The operator theoretic approach to dynamical systems by *Suddhasattwa Das,* Courant Institute of Mathematical Science,New York University
26-Mar-19	Geometry of the quantum set on no-signaling faces by *Ashutosh Rai,* International Institute of Physics, Federal University of Rio Grande do Norte Brazil
SOCIAL SCIENCES DIVISION	
Economic Analysis Unit, Bangalore	
24-Apr-18	Impact of Energy Crisis on Irrigation and Farm Income in Tamilnadu by *R. Paramasivam,* Kumaraguru: Kumaraguru Institute of Agriculture, Tamilnadu Agricultural University
12-May-18	Benefits of Integrated Child Development Services: Later Life Evidence by *Gaurav Dhamija,* Shiv Nadar University, Uttar Pradesh
18-May-18	Supply Side School Interventions for Girls in India, Effectiveness and Labour Market Outcomes by *Chandan Jain*, Shiv Nadar University, Uttar Pradesh
21-Aug-18	No Time for Crime? The Effect of Compulsory Engagement on Crime by *Nikhil Jha,* University of Melbourne, Australia
31-Oct-18	A Special Lecture on The Importance of Law Reform by *Bibek Debroy*, Member, Niti Aayog, Government of India, New Delhi
18-Dec-18	Employment Transitions of Women in India: A Panel Analysis by *Sudipa Sarkar,* University of Warwick, UK
12-Feb-19	The Political Economy on India's Growth an Development by *Alex: M Thomas,* Azim Premji University, Karnataka
3-Apr-19	A Special Lecture on 125th PCM Anniversary Celebration, Gender and Class: The Search for Wider Solidarities by *Supriya Roychowdhury*, Institute for Social and Economic Change
Economic Research Unit , Kolkata	
19-Apr-18	Agency Cost of Debt Overhang with Optimal Investment Timing and Size by *Sudipto Sarkar,* Department of Economics, McMaster University, 1280 Main St W, Hamilton, ON L8S 4L8, Canada
28-Jun-18	Terms of Trade and Counterterrorism Externalities by *Subhayu Bandyopadhyay*, Federal Reserve Bank of St. Louis, USA
5-Jul-18	Environmental Justice for Seniors? Evidence from the Superfund Program? by *Sayahnika Basu*, Department of Economics, Arozpma State University
19-Jul-18	Egalitarian Representation under Uniform Improvement Pareto: A Characterization of Infinite Utility Domains by *Ram Sewak Dubey,* Department of Economics, Montclair State University, USA

2-Aug-18	Demand and Welfare Analysis in Discrete Choice Models under Social Interactions by *Debopam Bhattacharya,* Department of Economics, University of Cambridge, United Kingdom
10-Aug-18	Bootstrap Model Averaging Unit Root Inference by *Jeffrey Racine,* Department of Economics, McMaster University, 1280 Main St W, Hamilton, ON L8S 4L8, Canada
16-Aug-18	Trade Liberalization and Female Labor Force Participation in India: Distress Driven Labor Supply? by *Ashim Gupta,* Department of Economics, Wageningen University, Netherlands
11-Sep-18	The Housing Wealth Effect: Identification after a Tragedy by *Niloy Bose*, Virginia Tech, USA
13-Dec-18	Efficient Estimation in sub and full Populations with Monotonically Missing at Random Data by *Saraswata Chaudhuri*, Department of Economics, McGill University, Canada
27-Dec-18	Density Forecast Evaluation for Dependent Financial Data: Theory and Applications by *Aurobindo Ghosh*, Department of Economics, Southern Methodist University
11-Jan-19	An informal talk on Spatial Econometrics by *K. Anil Bera,* Department of Economics, University of Illinois, Urbana Champaign, USA
24-Jan-19	Who Wants to be a Politician? Running for Office in Rural West Bengal by *Ananish Chaudhuri*, Department of Economics, University of Auckland, New Zealand
14-Feb-19	Are Optimal Policies under Cost Channel Implementable? by *Siddhartha Chattopadhyay*, Indian Institute of Technology, Kharagpur, West Bengal
14-Mar-19	FDI and International Collusion by *Bhanu Uday Sinha*, Department of Economics, Delhi School of Economics, Delhi
Economics and Planning Unit, Delhi	
5-Apr-18	A Geometric Approach to Inference in Set Identified Entry Games by *Rohit Kumar,* Toulouse School of Economics, France
27-Jul-18	Anonymous Representation under Uniform Improvement Pareto: A Characterization of Infinite Utility Domains by *Ram Sewak Dubey*, Montclair State University, USA
25-Jan-19	Benefits of Integrated Child Development Services: Later Life Evidence by *Gaurav Dhamija,* Shiv Nadar University, Uttar Pradesh
10-Dec-18	Choice via Social Influence by *Abhinash Borah,* Ashoka University, Haryana
17-Aug-18	Condoning Corruption: Who Votes for Corrupt Political Parties? by *Chandan Kumar Jha,* Le Moyne College, USA
20-Apr-18	Delegation as a Signal to Sustain Coordination: An Experimental Study by *Swagata Bhattacharjee*, Ashoka University, Haryana
20-Jul-18	Encouraging urban households to segregate the waste they generate: insights from a field experiment in Delhi, India by *Shivani Wadehra,* TERI School of Advanced Studies, New Delhi
7-Oct-18	Equilibrium in Stochastic Games in Extended Markov Strategies by *Subir K. Chakrabarti,* Indiana University - Purdue University Indianapolis, USA
22-Feb-19	Equilibrium Selection in Repeated games with Patient Players by *Dilip Abreu,* New York University, USA
27-Apr-18	Executive Overreach by Minority Governments in India by *Madhav S. Aney,* Singapore Management University, Singapore
25-May-18	Fair Competition Design by *Dinko Dimitrov*, Saarland University, Germany
4-Apr-18	General Equilibrium effects of (Improving) Public Employment Programs: Experimental Evidence from India by *Karthik Muralidharan*, University of California San Diego, USA
18-Oct-18	Incentives for Corporate Social Responsibility in India: Mandate, Peer Pressure or a Crowding-Out Effect by *Madhu Khanna*, University of Illinois, Urbana-Champaign, USA
16-Nov-18	Intuitive Solutions in Game Representations: The Shapley Value Revisited by *Pradeep Dubey*, SUNY Stony Brook and Yale, USA
15-Mar-19	Measuring the Dynamics of the Achievement Gap Between Public and Private School Students in India by *Punarjit Roychowdhury*, IIM, Indore
21-Jan-19	Multidimensional and Selective Learning A case study of Bt cotton farmers in India by *Srijita Ghosh,* New York University, USA

9-Jul-18	No Free Lunch: Using Technology to Improve the Efficacy of School Feeding Programs by *Sisir Debnath,* Indian School of Business, Hyderabad
29-Mar-19	On the marketing of experience goods: the case of movies by *Sridhar Moorthy,* University of Toronto, Canada
8-Oct-18	Optimal Taxation in a Federation and GST in India by *Partha Chatterjee,*Shiv Nadar University, Uttar Pradesh
15-Feb-19	Out-of-merit costs and blackouts: Evidence from the Indian electricity market by *Louis Preonas,* University of Chicago, USA
10-May-18	Payment system shocks under Goods and Financial Market Segmentation by *Parag Waknis,* Ambedkar University, Delhi
14-Sep-18	Public Safety for Women: Is Regulation of Social Drinking Spaces Effective? by *Kanika Mahajan,* Ashoka University, Haryana
7-Jun-18	Rationalizing dynamic choices by *Rohit Lamba*, Penn State University, USA
8-Jul-18	Scarf's Lemma and Stable Matchings by *Rakesh Vohra*, University of Pennsylvania, USA
23-Jan-19	The Impact of a Spinoff on the Parent Firm: A Model of Double Adverse Selection with Correlated Types by *Suraj Shekhar*, University of Cape Town, South Africa
3-May-19	The Nitrogen Legacy: Long-Term Effects of Water Pollution on Human Capital by *Esha Zaveri,* World Bank, USA
31-Jan-19	The Secret Behind The Tortoise and the Hare: Information Design in Contests by *Alejandro Melo Ponce,* SUNY Stony Brook, USA
11-Sep-18	Virtual Implementation in Nash Equilibrium: Complete Information by *Ritesh Jain,* Academia Sinica, Taiwan
2-Jan-19	Votes and Policies: Evidence from Close Elections in India by *Sourav Sarkar,* Massachusetts Institute of Technology, USA
28-Jan-19	What Do Good Managers Do? Evidence from an Insurance Firm in India by *Samarth Gupta,* National Council of Applied Economic Research, New Delhi
8-Feb-19	Why Do Discrete Choice Approaches to Valuing Climate Amenities Yield Different Results Than Hedonic Models? by *Paramita Sinha,* Research Triangle Institute International, USA
14-Dec-18	Wisdom of the confused crowd by *George Mailath,* University of Pennsylvania, USA
Linguistic Research Unit , Kolkata	
2-Apr-18	Problems in Machine Translation from Bangla to Odia by *Biswa Ranjan Das,* North Odisha University, Baripada, Odisha
28-May-18	Challenges and issues in translation of literary texts by *Sriparna Das,* CALTS, University of Hyderabad
30-May-18	Sociolinguistic Convergence of Bengali Migrants in Kerala by *Paramita Nandi,* Kerala University, Kerala
18-Sep-18	Problems of documentation of endangered languages in Assam by *Amalesh Gope,* Tezpur University, Assam
5-Nov-18	Neurolinguistic issues and challenges in Indian subcontinent by *Shantanu Ghosh,* MIT, Harvard, USA
14-Jan-19	Problems faced in experimental cognitive linguistic research in Indian academic scenario by *Amrita Basu,* Jadavpur University, Kolkata, India
14-Jan-19	Role of experimental phonetics in the study of language cognition by *Aditi Lahiri,* University of Oxford, UK
14-Jan-19	How to develop Bangla lexical search Engine in the model of Celex database of European languages by *Henning Reetz,* Konstanz University, Germany
15-Mar-19	Optimality Theory and Gemination in Bangla; Distributed Morphology: Verbal Inflections in Bangla; Speech Corpus generation: Current Trends; and Speech Analysis in Forensic Linguistics by *Somdev Kar,* IIT, Ropar
Population Studies Unit , Kolkata	
31-May-18	A Multistate Time-to-event Model of Disease,Disability and Death of the Older Population: Estimates from the HRS data. P.S.U., I.S.I by *Raut Lakshmi Kant,* Visiting Fellow, University of Chicago
Sampling and Official Statistics Unit, Kolkata	
15-Jan-19	Public Lecture on Microfinance to Banking: The Bandhan Journey by *Chandra Shekhar Ghosh,* CMD, Bandhan Bank

20-Feb-19	Modeling of Heterogeneity and Zero inflation in Longitudinal Data by *Prajamitra Bhuyan*, Imperial College, London, UK
Sociological Research Unit, Kolkata	
26-Oct-18	Reaching to the Unreached: GO-NGO initiatives in offering services to PWD children by *Professor Subhabrata Dutta*, Head, Dept. of Social Work, Assam University, Silchar
6-Nov-18	Women's Right and its Relevance in Contemporary Society by *Dr. Basabi Chakraborty,* Asst. Professor & Co-Ordinator, Dept. of Sociology, Rabindra Bharati University, Kolkata
14-Nov-18	Understanding Techno-Work-Life Stress: A Cross-Cultural Perspective by *Dr. Asmita Bhattacharya,* Asst. Professor & Head, Dept. of Sociology, Vidyasagar University, West Midnapore.
16-Nov-18	Reflection of Socio-Cultural Reality of Bengal in Films of Tarun Majumdar in Context of 'Palatak' as a Case Study by *Dr.Pallav Mukhopadhyay,* Asst. Professor, Dept. of Journalism & Mass Communication; and Co-Ordinator, Dept. of Film Studies, West Bengal State University.
19-Nov-18	Transphobia: the unjust fear towards the Gender Outlaws by *Dr. Natasa Dasgupta*, Asst. Professor, Dept. of Statistics, Lady Brabourne College, Kolkata
26-Mar-19	Human Rights – Meaning & Nature by *Dr. Payel Rai Chowdhury Dutt*, Co-Ordinator, Dept. of Human Rights and Human Development, Rabindra Bharati University, Kolkata
THEORETICAL STATISTICS AND MATHEMATICS DIVISION	
Theoretical Statistics and Mathematics Unit, Bangalore	
7-Aug-18	Is there a difference between chemicals and biochemicals by *Shachi Gosavi*, NCBS, Bangalore
10-Jan-19	Large deviations for Cox processes and Cox/G/infinity queues, with a biological application by *Ayalvadi Ganesh,* University of Bristol, UK
23-Jul-18	A hitting question for stochastic flows by *Carl Mueller,* University Rochester, USA
10-Jan-19	A phase transition in a spatial permutation model on infinite trees by *Milind Hegde*, UC Berkeley, USA
23-Apr-18	A relative anti-concentration inequality by *Manjunath Krishnapur,* Indian Institute of Science, Bangalore
26-Mar-19	Adjusting to College life Challenges and Coping strategies by *Sumana Hari,* Parivarthan Counseling Training and Research Centre, Bangalore
31-Jul-18	Automating Mathematics & Homotopy type theory by *Siddhartha Gadgil,* Indian Institute of Science, Bangalore
19-Feb-19	Automation and Analytics in the Cloud and 5G world by *T.R. Sridhar*, VMware, Bangalore
25-Sep-18	Beyond the walls of schooling by *Jane Sahi*, Azim Premji University, Bangalore
15-Nov-18	Boundary behavior of optimal approximants by *Daniel Seco*, ICMAT, Madrid, Spain
14-Mar-19	Carve your data for inference: Don't split it by *Snigdha Panigrahi,* University of Michigan, USA
18-Feb-19	Cheeger Inequalities for Graph Limits by *Abhishek Khetan*, TIFR, Mumbai
20-Sep-18	Conformal field theory; vertex operator algebras and some problems by *Robin Hillier*, Lancaster University, UK
4-Mar-19	Construction of set-valued dual processes via random mappings by *Laurent Miclo,* University Paul Sabatier, France
9-Apr-18	Convergence of Markov processes to the invariant measure with applications to SPDEs and stochastic delay equations by *Oleg, T.U. Butkovsky,* Berlin, Germany
5-Feb-19	Distances between transition probabilities of diffusions and applications to nonlinear Fokker-Planck-Kolmogorov equations by *Stanislav Shaposhnikov*, Moscow State University and Higher School of Economics, Russia
31-Jan-19	Distributions of maxima of quadratic forms and homogeneous functions of Gaussian random vectors by *Vladimir Bogachev,* Moscow State University and Higher School of Economics, Russia
11-Oct-18	Documentary film on Professor S.N. Bose by *Shila Datta*, Independent Film Maker, Kolkata
9-Aug-18	Equivariant Serre problem for principal bundles by *Mainak Poddar*, Middle East Technical University, Turkey

17-Jan-19	Excursion probabilities for Gaussian processes and fields (Part 1 and Part 2) by *Gennady Samorodnitsky,* Cornell University, USA
3-Sep-18	Existence of self-dual cuspidal representations by *Manish Mishra,* IISER, Pune
12-Feb-19	Flexible Visomotor Control: Insights From Parkinsons Disease by *Aditya Murthy*, Indian Institute of Science, Bangalore
5-Oct-18	Groups with norms: a PolyMath adventure by *Apoorva Khare* Indian Institute of Science, Bangalore
19-Mar-19	Implications of quantum theory for the future of statistics by *Luigi Accardi,* University of Rome Tor Vergata, Italy
29-Nov-18	Inequalities involving Mean; Variance and Linear Maps on Matrix Algebra by *Rajesh Sharma,* Himachal Pradesh University, Shimla
4-Sep-18	Infusing Statistical Ecology into Species Recovery: Tigers in India by *Ullas Karanth,* Wildlife Conservation Society, Bangalore
23-Jul-18	Limit shapes for groves by *Terrence George,* Brown University, USA
13-Nov-18	Multivariate Output Analysis for Markov Chain Monte Carlo by *Dootika Vats,* University of Warwick, UK
20-Apr-18	On the Yang-Mills functional in Noncommutative Geometry by *Satyajit Guin,* IISER, Mohali
13-Feb-19	P.C. Mahalanobis memorial lectures by *Terry Speed,* Walter & Eliza Hall Institute of Medical Research, Australia
5-Apr-18	Polynomial indexing of the lattice points; On (2;3)-generated groups; Robin Chapmans evil determinant problem and Hilberts Tenth Problem and Diophantine Equations by *Maxim A. Vsemirnov,* St. Petersburg Department of Mathematics of Steklov Institute, Russia
4-Mar-19	Queue-based activation protocols in random-access wireless networks by *Matteo Sfragara,* Leiden University, Netherlands
28-Jun-18	Rank Identities and Finite von Neumann Algebras by *Soumyashant Nayak,* University of Pennsylvania, USA
28-Feb-19	Rigidity for equivariant K-theory by *Charanya Ravi,* University of Regensburg, Germany
27-Aug-18	RKHS Embedding of Probabilities & Measures of (In)dependence by *Bharath K. Sriperumbudur,* Penn State University, USA
23-Apr-18	Sequence Computation In The Brain Through Subcellular Mechanisms by *Upinder S. Bhalla,* National Centre for Biological Sciences, Bangalore
8-Oct-18	Simultaneous small noise limit for singularly perturbed slow-fast coupled diffusions by *Rajesh Sundaresan,* Indian Institute of Science, Bangalore
18-Feb-19	Some consequences of comparison principles for stochastic differential equations by *Mohammud Foondun,* University of Strathclyde, UK
7-Jan-19	Space time and society: Three different flavors of spatio-temporal modeling and applications to social science by *Shyam Ranganathan*, Virginia Tech University, USA
18-Sep-18	Statistical physics and statistics in understanding dynamics of ecological systems by *Vishwesha Guttal,* Center for Ecological Sciences Indian Institute of Science, Bangalore
5-Feb-19	Storytelling with Data by *Subash Bolar,* Cisco Systems, Bangalore
5-Feb-19	Sum rules: Random Matrices and analysis by *Fabrice Gamboa,* Institut de Mathématiques de Toulouse, France
9-Apr-18	The dynamical Allen-Cahn equation from a random initial datum by *Khoa Le,* Imperial College, London, UK
21-Aug-18	The Linear Algebra method in Combinatorics and Geometry by *Koushik Ramachandran,* TIFR, Bangalore
14-Feb-19	Universal models in ergodic theory by *Nishant Chandgotia,* Einstein Institute of Mathematics, Jerusalem
Theoretical Statistics and Mathematics Unit, Delhi	
25-Apr-18	Certain Character sums, hypergeometric series, and their connections to algebraic curves by *Neelam Saikia,* IIT, Guwahati
13-Jun-18	A path approach to the Kostant version of the PRV theorem by *K.N. Raghavan,* IMSc, Chennai
11-Jul-18	Lehmer's Euler numbers with their generalizations and applications by *Takao Komatsu,* Wuhan University, China

25-Jul-18	abc- Conjecture by *T.N. Shorey,* NIAS, Bangalore
8-Aug-18	CCR flows associated to closed convex cone by *S. Sundar*, CMI, Chennai
20-Aug-18	Quadratic loss minimization with portfolio and intertemporal wealth constraints by *Andrew Heunis,* University of Waterloo, Canada
24-Aug-18	Linear Hahn Banach Extension of module homomorphisms in Hilbert and Banach modules by *Sudeshna Basu,* George Washington University, USA
31-Aug-18	Trace formula in two operator variables - extension of Krein's formula by *K.B. Sinha,* Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru
4-Sep-18	Applications of Local-Global Principle for the Transvection Subgroups by *Rabeya Basu,* IISER, Pune
12-Sep-18	Monotonicity Properties of L-functions by *Sneha Chaubey,* IIIT, Delhi
3-Oct-18	The Unity of Mathematics: Examples from Transcendental Number Theory by *Michel Waldschmidt,* University Jussieu, Paris, France
4-Oct-18	Design of experiments for networks with interference by *Alexander Volfovsky,* Duke University, USA
17-Oct-18	Periodic Points of Rational Polynomials by *Chatchawan Panraksa,* Mahidol University, Thailand
12-Nov-18	Betti Numbers of Gaussian Excursions in the Sparse Regime by *Thoppe Gugan,* Duke University, Durham, USA
14-Nov-18	Geometric Quantization of various moduli spaces by *Rukmini Dey,* ICTS, Bangalore
20-Nov-18	Quartic and higher degree diophantine equations by *Ajai Choudhry,* HRI, Allahabad
5-Dec-18	The Stochastic Cauchy Problem Driven by a Cylindrical Levy Process by *Umesh Kumar,* Rajdhani College, University of Delhi
12-Dec-18	Bures-Wasserstein isometries of positive definite cones in C^*-algebras by *Lajos Molnar,* Bolyai Institute, University of Szeged, Hungary
11-Jan-19	The counting problem in inverse Littlewood-Offord theory, and its applications to discrete random matrix theory by *Vishesh Jain*, MIT, USA
25-Jan-19	Queueing networks in heavy traffic History and some recent results by *Arka P.Ghosh*, Iowa State University, USA
12-Feb-19	Maps of Variability in Cell Lineage Trees by *Terry Speed,* Walter & Eliza Hall Institute of Medical Research, Australia
20-Feb-19	Infinite systems of hard core balls with long-range interactions by *Hideki Tanemura,* Keio University, Tokyo, Japan
27-Feb-19	On the interlacing of the zeros of Poincar\'e series by *N. Saradha,* Centre for Excellence in Basic Sciences, Mumbai
20-Mar-19	American Contingent Claims with Asymmetric Information and RBSDE by *Esmaeeli Neda*, University of Isfahan, Iran
Theoretical Statistics and Mathematics Unit,Kolkata	
13-Mar-18	Equivariant Serre problem for principal bundles by *Mainak Poddar,* Middle East Technical University, Cyprus
10-Apr-18	On the Plethora of Representations Arising in Noncommurive Quantum Mechanics and An Explicit Construction on Noncommutatice 4-tori by *Syed Hasibul Hassan Chowdhury,* Univ. of Dhaka
16-Apr-18	Analysis on semihypergroups: An Overview by *Choti Bandyopadhyay*, University of Alberta
27-Apr-18	Manin-Drinfeld Theorem and Eisenstein cycles by *Debargha Baneerjee,* IISER Pune
5-Jun-18	Toric Vector Bundles by *Vivek Mohan Mallick,* IISER Pune
7-Jun-18	Rank Identities and Finite Von Neumann Algebras by *Soumyashkant Nayak,* University of Pennsylvania
8-Jun-18	Optimal Inference with a multidimensional Multiscale Statistics by *Bodhisattva Sen,* Columbia University, USA
12-Jul-18	Diophantine approximation in function field of positive characteristic by *Arijit Ganguly,* Tel Aviv University, Israel
19-Jul-18	Approximation of invariant Distributions of Ergodic Diffusions CLT And Moderate Deviations by *Arnab Ganguly,* Louisiana State University

30-Jul-18	Analytic new vector theory and its application to moments of L-functions by *Shubhajit Jana,* ETH, Zurich
30-Jul-18	KCL – A mathematical model to describe evolution of curves and surface by *Phoolan Prasad,* IISC, Bangalore
3-Aug-18	Sampling Convergence for random graphs: graphexes and multigraphexes (Joint work with Christian Borgs, Jennifer Chayes, and Sovik Dhara) by *Subhabrata Sen* (MIT, MSR)
6-Aug-18	Stein's method and its applications in Dickman approximations (Joint work with the Professor Larry Goldstein) by *Chinmoy Bhattacharjee,* USC, Los Angeles
8-Aug-18	Accurate Change Point Detection in Large Random Graphs via Sampling by *Moulinath Banerjee*, University of Michigan
14-Aug-18	Groups of homotopy equivalences of Postnikov sections by *Somnath Basu*, IISER, Kolkata
17-Aug-18	Consistent Community Detection Algorithms for Multiple Heterogeneous Sparse Networks by *Shirshendu Chatterjee*, City University New York
27-Aug-18	High-dimensional tests for general linear hyposheses through spectral shrinkage by *Debashis Paul,* University of California, Davis
31-Aug-18	Bridgeland Stability Conditions for curves and Surfaces by *Chirantan Chowdhury,* University of Duisburg-Essen, Germany
3-Sep-18	Topological constructions in graphs by *Rekha Santhanam,* IIT Bombay
11-Sep-18	Homogeneous Hermitian holomorphic vector bundles and the Cowen-Douglas class over bounded symmetric domains by *Gadadhar Misra,* Indian Institute of Science
24-Sep-18	Hypergeometric series in Arithmetic Geometry by *Rupam Barman,* IIT Guwahati
29-Oct-18	A spectral resolution of the large sieve and a circle method a la H. Iwaniec by *Olivier Ramare,* CNRS and University of Merseille, France
30-Oct-18	A closed-form solution to the geometric goat problem by *Ingo Ullisch,* Chongquing University, P R China
30-Oct-18	A closed-form solution to the geometric goat problem by *Ingo Ullisch,* Chongquing University, China
26-Nov-18	The Martingale Problem in Quantam Probability by *Kalyan B Sinha,* JNCASR, Bangalore
5-Dec-18	Line bundles over noncommutative spaces by *Giovanni Landi,* University of Trieste, Italy
17-Dec-18	Probability, Combinatorics and Logic by *Joel Spencer,* Courant Institute (New York)
17-Dec-18	Probability, Combinatorics and Logic by *Joel Spencer,* Courant Institute, New York
18-Dec-18	A generalization of Ogg's conjecture (Mazur's theorem) for number fields by *Debargha Banerjee,* IISER Pune
20-Dec-18	Non-Standard Asymptiotics in High Dimensions: Manski's Maximum Score Estimator Revisited by *Moulinath Banerjee,* University of Michigan
24-Dec-18	Compact hypersurfaces and Alexandrov's theorem by *Jyotshana V. Prajapat,* University of Mumbai
31-Dec-18	Goodness-of-fit and Independence testing using Optimal Transportation by *Bodhisattava Sen*, Columbia University
4-Jan-19	Hilbert Geometry by *Mitul Islam,* University of Michigan
7-Jan-19	Detection Thresholds for Two-Sample Tests Based on Geometric Graphs by *Bhaswar B. Bhattacharya,* University of Pennsylvania
9-Jan-19	Tails of KPZ equation by *Promit Ghosal,* Columbia University
14-Jan-19	On the normal number of prime factors of shifts of the Euler totient function by *Arpita Kar,* Queen's University
14-Jan-19	Queueing networks in heavy traffic: History and some recent results by *Arka P. Ghosh,* Iowa State University
25-Jan-19	Fundamental Theorem of Algebra – Yet Another Proof by *Anindya Sen*, University of Otago
28-Jan-19	Scoring Predictions at Extreme Quantiles with application to Cyber Netflow Data by *Kaushi Jana*, Imperial College London.
15-Feb-19	Measuring Gene Expression: Biology, Batches, and Breast Cancer by *Terry Speed,* Walter and EliZa Hall Institute of Medical Research, Australia.
18-Feb-19	Queue-based activation protocols in random-access wireless networks by *Matteo S fragara,* University of Leiden.

19-Feb-19	Fractional Poincare inequality on strips by *Prosenjit Roy,* IIT Kanpur
25-Feb-19	Fixed and Bounded Width Interval Estimation of the Common Correlation in an Equi-Correlated Multivariate Normal distribution by *Shyamal Krishna De,* National Institute of Science Education & Research Bhubaneswar
28-Feb-19	Covariance based Moment Equations for Improved Variance Component Estimation by *Sanjay Chaudhuri*, National University of Singapore
6-Mar-19	Carve Your Data For Inference: Don't Split It by *Snigdha Panigrahi,* University of Michigan.
15-Mar-19	Paramodular forms coming from elliptic curves by *Manami Roy,* University of Oklahoma.
Center for Soft Computing Research, Kolkata	
28-Jun-18	Observational Cosmology at Low Radio Frequencies– Prospects with the Square Kilometre Array (SKA) by *Abhirup Datta,* IIT, Indore
14-Aug-18	Noise and Dynamics in Complex Networks by *Sanjukta Bhowmick,* University of Nebraska Omaha, USA
14-Nov-18	How Might the Brain Learn and Remember Information – A Brief Mathematical Exploration by Suchitra Sampath, Centre for Neural and Cognitive Sciences, University of Hyderabad

REGIONAL MATHEMATICAL OLYMPIAD (RMO- 2018) and INDIAN NATIONAL MATHEMATICAL OLYMPIAD (INMO -2019)

The Mathematical Olympiad Programme in India, which leads to participation of Indian students in the International Mathematical Olympiad (IMO) is organized by the Homi Bhabha Centre for Science Education (HBCSE) on behalf of the National Board for Higher Mathematics (NBHM) of the Department of Atomic Energy (DAE), Government of India. Its main purpose is to spot mathematical talent among pre-university students in the country. For the purpose of *training and selection of students* for the Olympiad contest, 25 regions all over the country have been designated and each assigned a Regional Coordinator. Additionally, three groups (Central Board of Secondary Education (CBSE), Navodaya Vidyalaya Samiti (NVS) and Kendriya Vidyalaya Sangathana (KVS) have a 'Regional Coordinator' each.

The Indian Statistical Institute (ISI), Kolkata organizes the Regional Mathematical Olympiad (RMO) followed by the Indian National Mathematical Olympiad (INMO) for West Bengal while the Bangalore Centre of ISI has been co-ordinating the RMO and INMO for Karnataka for several years. The regional Co-ordinator from ISI, Kolkata is Dr. Mridul Nandi from ASU and Dr. Goutam Paul as a Joint Co-ordinator from R C Bose Centre. Dr. Manish Kumar, SMU, Bangalore is the regional Co-ordinator for Karnataka.

Activities: Pre-Regional Mathematical Olympiad (Pre-RMO) is organized regionally prior to the RMOs for the purpose of selecting candidates for RMO.

RMO, 2018 was held on October 07, 2018 - 375 students from Karnataka and 371 students from West Bengal appeared for the test at the ISI Bangalore Centre and ISI Kolkata Centre respectively. Based on their performance, 41 students qualified for the INMO in each region.

Training camps - A week long training camp for students was organized at both regional centres. The purpose of the camps was to train prospective candidates for INMO-2019. Students were familiarized with advanced problem solving techniques during **January 16-19, 2019** at the *ISI Bangalore Centre* and during **December 31, 2018 - January 4, 2019** at *ISI, Kolkata.* Several distinguished speakers including ISI faculty members and students who had previously represented India in IMO were invited for delivering lectures.

INMO, 2019 was held on January 20, 2019 at both the regional centres.

XXXI ASIA PACIFIC MATHEMATICAL OLYMPIAD (APMO -2019)

APMO is an International Mathematics Competition held every year in a country in the Asia-Pacific rim in the month of March. As part of Mathematical Olympiad Programme in India, the ISI Regional Centres hosted the Asia Pacific Mathematics Olympiad, 2019 on **March 12, 2019.** The participants were selected by HBCSE from Karnataka and West Bengal based on their performance in INMO 2019 or in recent years.

OTHER MATHEMATICS COMPETITIONS COORDINATED BY ISI, BANGALORE

October 13, 2018	**Simon Marais Mathematics competition** was organized for ISI Undergraduate students
January 06, 2019	ISI, Bangalore co-ordinated the activities of the **The Madhava mathematics competition** which is held in various parts of India for undergraduate students. Dr. Jaydeb Sarkar was the co-ordinator this year for the exam held in ISI, Bangalore . With the assistance of post-doctoral fellows and research scholars, the scripts were evaluated and sent to the national co-ordinator.
March 24, 2019	The Prize distribution ceremony of the Madhava Mathematics Competition was also held at ISI Bangalore Centre.

OUTREACH PROGRAMMES

Apart from academics, ISI faculty and staff are also strongly committed to educational as well as community outreach. Some of the events held during the 2018-19 are as follows –

August 28, 2018 - A Seminar on "Healthy Mind : Way to Success" at the Platinum Jubilee Auditorium, ISI by Medical Welfare Unit and Dean's Office in collaboration with MON Foundation, an NGO - Students, Faculty members, academic and non academic staff enthusiastically participated in the event which was organized to provide informal counselling and social support to students in particular. Dr Ashim Chatterjee, an eminent Psychiatrist and member of MON Foundation delivered a thoughtful lecture stressing on the importance of a healthy mind, emphasizing on ways to deal with academic stress and the importance of seeking clinical advice in time of need. Clinical Psychologist Ms Swati Mitra, Mr Mohit Ranadip and Professor Saurabh Ghosh participated in an enriching interactive session that followed after the lecture. Students' active participation in the event and intelligent questions raised by them emphasized the necessity of such programmes in the campus.

Dr. Ashim Chatterjee delivering the address

October 5-8, 2018 - India International Science Festival 2018 was organized by Ministry of Science and Technology, Ministry of Earth Sciences in association with Vijnana Bharati at Indira Gandhi Pratishthan, Lucknow where ISI participated in the exhibition and showcased glimpses of life and works of Prasanta Chandra Mahalanobis, the great founder of the institute by highlighting Professor Mahalanobis' works on Anthropometry, Biometry, Meteorology and Flood, Large-Scale sample survey, Fractile Graphical analysis, Computers in ISI, Planning, Dinosaur in ISI, Tagore's association with Mahalanobis along with the latest developments in ISI and the courses offered in ISI.

November 19, 2018 - An Outreach Programme at Kendriya Vidyalaya ONGC, Jorhat, Assam conducted by ISI N-E Centre -Students were provided with a stimulus for developing mathematical reasoning and aptitude. They were also informed, through PPT presentation, of the flagship UG courses of the Institute *viz.,* B. Stat. (Hons.) and B. Math (Hons.), along with a brief review of the Master level courses, so that they are inspired to pursue higher studies inStatistics, Mathematics, and allied emerging subjects at ISI. Approximately 80 higher secondary students were present. The resource persons were Professor Nityananda Sarkar, ERU- Kolkata & Head, ISI N–E Centre, and Dr. Sourav Jyethi, ISI N-E Centre, Tezpur.

Professor Nityananda Sarkar addressing the lecture

The participants and faculty members of the programme

December 11-15, 2018- Training Programme on Official Statistics for Government Officials of North-Eastern States organized by ISI N-E Centre at Tezpur - this programme, conducted regularly from the academic year 2016-17 at the North-East Centre, aims to provide extensive training including Hands-on learning to Government officials of the eight North-Eastern states on various topics of Official Statistics and their uses/applications in government decision making. There were 26 participants and the resource persons were Professor Nityananda Sarkar, ERU-Kolkata & Head, ISI N-E Centre, and ISI N-E Centre faculties, Dr.Kushal Banik Choudhury, Dr. Holendro Singh Chungkham, Dr.Sanjit Maitra, and Dr.Darpa Saurav Jyethi.

The participants and faculty members of the programme

January 15-19, 2019 - Winter School on Mathematics for College Students of North-Eastern region conducted by ISI N-E Centre Tezpur - The programme, conducted regularly from the academic year 2016-17 at the North-East Centre, aims to provide rigorous training and impetus to 29 selected bright college students pursuing Mathematics at the undergraduate level in North-East India. The primary objective is to motivate these students toward learning of Mathematics and pursuing carrier in Mathematical/Statistical Sciences. Resource persons were Professor Swagato K. Ray, SMU-Kolkata, Dr.Biplab Basak, SMU- Kolkata, Professor Sumitra Purkayastha, ASU-Kolkata, Professor Guruprasad Kar, PAMU-Kolkata, and Professor Goutam Mukherjee, SMU- Kolkata & Dean of Studies, ISI. SMU- Kolkata & Dean of Studies, ISI.

January 31, 2019 - An Outreach Programme was held at the Government Zirtiri Residential Science College, Aizawl (affiliated with Mizoram University), as part of the North-East Centre's mission to reach out to college / university students from remote areas and provide exposure, through presentations, to the subject of Statistics, and the various courses of the Institute so that they get motivated in pursuing career's in Statistics, Mathematics, Quantitative Economics, Computer Science, and other allied subjects. About 150 students from the departments of Statistics, Mathematics, Economics and Computer Science as well as students of Class XII from Government Republic Higher Secondary School, Aizawl, attended the programme. The resource persons were Professor Nityananda Sarkar, ERU-Kolkata & Head, ISI N–E Centre at Tezpur and Professor Goutam Mukherjee, SMU- Kolkata & Dean of Studies, ISI. Professor Mukherjee also delivered lectures on*Real Analysis* to the final year students of Mathematics (Honours).

Professor Nityananda Sarkar adderssing the participants

January 15-31 2019 - The 4th Basic Training Programme on Multimedia for School Students from economically Challenged family was conducted by Reprography & Photography Unit of the Library Division. A total 20 participants was 5 Bengali/Hindi/Urdu medium schools affiliated by West Bengal Board of Education attended the course. Multimedia software is the benchmark for digital imaging excellence. It provides strong performance, powerful image editing, graphic designing features, and an intuitive interface. It enriches works of digital image editing and helps one turn one's dreams into designs more easily. It is a fundamental course for promising career prospect. In future, there is an opportunity for getting a job or self employment in different sector like Image Editing, DTP, Graphic Designing, etc. The students were exposed to the same.

March 14-15, 2019 - 9th Workshop on Digital Pictorial Photography, Photography Exhibition and Photo Contest conducted Reprography & Photography Unit of the Library Division where more than 70 persons participated. The workshop focused on digital photography, image processing, techniques of digital photo editing etc.

OTHER ACADEMIC ACTIVITIES

PATENTS

Patent Applications submitted / awarded (2018-19)

Sl. No.	Title of Patent	Name of the Inventor*	Date of Filing & Application no	Award date and Patent No / Status	Country of filing
1	Sumentox Entomotoxic hydrophobic silica nanoparticle	Department of Biotechnology and Indian Statistical Institute (**Arunava Goswami**, AERU)	April 30, 2010 1032/DEL/2010 -292184	January 29, 2018 Patent No 292184	India
2	A method for automatically selecting one or more image processing algorithms and systems	Tanushyam Chattopadhyay, Ramu Vempada Reddy, **Utpal Garain** (CVPR)	May 23, 2014 CN 201410222004	June 05, 2018 Patent No CN104182770B	China
3	Task allocation in a computing environment	Himadri Sekhar Paul, Arijit Mukherjee**, Ansuman Banerjee** (ACMU), Swarnava Dey, Arpan Pal	March 24, 2015 EP20150160431	August 29, 2018 Patent No EP2977898B1	European Union (EU)
4	System and method for object recognition based estimation of planogram compliance	Pranoy Hari, Nishant Kumar, **Dipti Prasad Mukherjee** (ECSU), Rajashree Ramakrishnan, Shilpa Yadukumar Rao, Archan Ray, Avishek Kumar Shaw	October 12, 2017 PCT IB2017/056318 January 17, 2019 Publication No: AU2017342154A1	Application status pending	Australia
5	A process for the recovery of squalene from natural sources	Indian Statistical Institute (**Suparna Mandal Biswas,** AERU, Panchanan Pramanik)	March 25, 2019 201931011512	Application status pending	India

* Names in bold denote ISI faculty

SANKHYĀ

The internationally renowned journal *Sankhyā,* an official publication of the Indian Statistical Institute, was founded by **Professor P.C. Mahalanobis** in 1932 and began publication under his editorship.

This quarterly journal,with ISSN 0976-8378 is devoted to original research articles in Applied Statistics, Mathematical Statistics and Probability. Reviews and discussion articles on current research activity in the above areas are also published. A rigorous peer review process is followed for acceptance of articles submitted for publication in *Sankhyā*. Many seminal articles in Probability, Theoretical Statistics and Applied Statistics have appeared in *Sankhyā.*

The journal is published in two separate series – Series A and Series B.

Series A, with 2 issues per year (February and August) covers Probability & Theoretical Statistics.

Series B, with 2 issues per year (May and November) covers Applied and Interdisciplinary Statistics.

Beginning 2010, the Institute has been collaborating with Springer for printing and marketing the international edition of *Sankhyā, in both prints and electronic editions.* The editorial system is now completely electronic, starting from submission to editorial processing and ending in final editorial decision for articles. Free access to articles of every edition of *Sankhyā* is available through the *Sankhyā* website.

The present **Editorial Board** of *Sankhyā* took over in January 2019 and is as follows:

Editor-in-Chief	: Dipak K. Dey, University of Connecticut, USA.
Series A Editors	: Krishna Athreya, Iowa State University, Ames, USA
	: Soumendra Nath Lahiri, Washington University in St. Louis, USA
	: Abhay G Bhatt, Indian Statistical Institute, Delhi, India
	: Francisco Louzada, University of Sao Paulo, Sao Paulo, Brazil
Series B Editors	: Sujit Ghosh, North Carolina State University, Raleigh, USA
	: Bertrand Clarke, University of Nebraska, Lincoln, USA
	: Saurabh Ghosh, Indian Statistical Institute, Kolkata, India
Technical Editors	: Biswaranjan Behera, Indian Statistical Institute, Kolkata, India
	: Kiranmoy Das, Indian Statistical Institute, Kolkata, India
Technical Support	: Urmichhanda Bhattacharya, Indian Statistical Institute, Kolkata, India
Editorial Office Support	: Sarvagnan Subramanian, Springer Journal's Editorial Office, Chennai, India

This journal is abstracted/ indexed in Current Index to Statistics, EBSCO Discovery Service, Emerging Sources Citation Index, Google Scholar, JSTOR, Japanese Science and Technology Agency (JST), Mathematical Reviews, OCLC WorldCat Discovery Service, ProQuest-ExLibris Primo, ProQuest-ExLibris Summon, Research Papers in Economics (RePEc), SCImago, SCOPUS and zbMATH.

The following four regular issues and one special issue were published during April 2018 to March 2019 -

Series A - Volume 80, Part II & Volume 81, Part I

Series B - Volume 80, Part I & Volume 80, Part II

A special issue [Series A - Volume 80, Supplement 1] – published in December, 2018 was dedicated to the memory of Prasanta Chandra Mahalanobis, the founder of Indian Statistical Institute and the founder Editor of *Sankhyā*, on the occasion of his 125th birth anniversary. The issue highlights his contributions and their influence in modern Statistics, in theory or in different fields of application, including original contributions on topics of contemporary interest. The list of articles that appeared in the Special Issue can be accessed via https://sankhya.isical.ac.in/issues/47.

NATIONAL AND INTERNATIONAL LINKAGES

The faculty of the Institute have always been interested in facilitating the development of collaborative programs in fields of mutual interests, both nationally and internationally, which serve to enhance partnerships for research and academic activities through appropriate Memorandum of Understanding (MoU). This serves to stimulate exchange of information relating to activities in teaching and research, promote appropriate joint research projects and endeavor to encourage faculty and students to spend periods of time in the host University/ Institute/Organization which enhances their cultural exposure and furthers their intellectual life. The faculty of ISI also undertake various projects for the Industry and Government of India and provide training and consultancy in areas of their expertise.

National and International MoUs

Sr. No	University/Institution/Organization	Country
	MoUs signed during 2018-19	
1.	Airport Authority of India	India
2.	Cognizant Technology Solutions India Pvt. Ltd.	India
3.	CSIR National Metallurgical Laboratory	India
4.	MIT-Skills, Pune	India
5.	National Sample Survey Office, MOSPI	India
6.	Quality Council of India	India
7.	Springer (India) Pvt. Ltd.	India
8.	Wipro Limited	India
9.	Tata Consultancy Service Limited	India
10.	Basque Centre for Applied Mathematics (BCAM)	Spain
11.	Cancer Research	Malaysia
12.	Technical University of Košice, (Erasmus+ Programme)	Slovakia
13.	Universita Degli Studi Di Trieste	Italy
14.	University of Technology	Australia
15.	University of Aegean, (Erasmus+ Programme)	Greece
16.	University of Auckland	New Zealand
	Existing MoUs	
17.	WISeKey India Private Limited	India
18.	Tata Consultancy Services Foundation	India
19.	Department of Biotechnology, Government of India	India
20.	Dhirubhai Ambani, DA-IICT, Gandhinagar	India
21.	Ericsson India Pvt. Ltd	India
22.	Hitachi India Private limited	India
23.	Indian Institute of Technology, Madras	India
24.	Kyungpook National University	South Korea
25.	Dauphine Université Paris	France
26.	University of Amsterdam	Netherlands
27.	University of Gothenburg	Sweden
28.	University of Malaysia	Malaysia
29.	University of Porto (Erasmus+ Programme)	Portugal

Some International activities:

1. Academic Exchange

ISI-Technical University of Košice, Slovakia (Erasmus+ Programme):

Marta Prepokova and JurajJanocko of Technical University of Kosice, Slovakia, visited the Geological Studies Unit (GSU), Kolkata from January 7-20, 2019.

ISI-University of Aegean, Greece (Erasmus+ Programme):

Bilateral visits from both organizations took place during this period. Professor Dipti Prasad Mukherjee, Electronics and Communication Sciences (ECSU) Unit, Kolkata visited University of Aegean, Samos, Greece during October 11-17, 2018 while Professor Tsekouras Georgios, University of the Aegean, Samos, Greece, visited the Computer Vision & Pattern Recognition Unit (CVPR) Unit, during February 26-March 2, 2019.

ISI-University of Malaysia, Kuala Lumpur:

Dr. P. Shivakumara, Faculty of Computer Science and Information Technology, University of Malaya, Kuala Lumpur, visited the Computer Vision & Pattern Recognition Unit(CVPR) Unit, Kolkata during September 20-23, 2018. Under this MoU, Professor Umapada Pal, CVPR, Kolkata supervised a PhD student there and the student has completed her PhD thesis on *Recognition of multi-type and multioriented text in videos* in 2018. In total, 14 journal papers and 25 conference papers have been published under this MoU.

2. Student Exchange

ISI-Dauphine Université Paris, France: Two students from France, visited ISI during July to December, 2018 and undertook courses in the M.Stat. programme in Kolkata.

3. International Training Programmes

Overseas Training Programmes on Recent Developments in International Statistical Systems: These programmes were organized consecutively for the fourth time by Sampling and Official Statistics Unit (SOSU), Kolkata with funding from MoSPI, Government of India in collaboration with Statistics Netherlands, National Statistics Office of Government of Netherlands as a part of mid-career training programme of Indian Statistical Service officers (ISS officers - level: Director and above) and ISS Officers on Probation.

During the academic year 2018-19, 25 officers participated in the training held during May13-20, 2018 while 17 officers participated in the programmes held during March10-16, 2019 and March17-23, 2019 in the premises of Statistics Netherlands, The Hague and University of Utrecht, The Netherlands.

Overseas training programme for ISS officers (2018-19)

Technical Cooperation Program of the Food and Agriculture Organization (FAO) of the UN:

Professor Anup Dewanji and Professor Debasis Sengupta, Applied Statistics Unit (ASU), ISI, Kokata undertook a statistical training program on sampling methodology and basic statistics followed by hands-on training on SPSS for the benefit of the researchers at the Forest Research Institute (FRI), Yezin, Myanmar during November 5-14, 2018. The training was part of a Technical Cooperation Program (TCP) of the Food and Agriculture Organization (FAO) of the UN awarded to Myanmar with the objective of strengthening the capacity of the Forest Research Institute. The training focused on improving the capability of the researchers on statistical planning of forestry research and analysis of data.

Staff training programme at Forest Research Institute, Myanmar

Some National Activities:

Sr. No.	Project Name/ Principal Investigator	Funding Agency
Ongoing Projects/ Training programmes undertaken for Government of India		
1.	Reviewing the existing system of compilation of trade indices by *Nachiketa Chattopadhyay,* SOSU, Kolkata	DGCIS, Government of India
2.	Design and Conc. Evaluation of Foreign Trade Policy by *Nachiketa Chattopadhyay,* SOSU, Kolkata	DGCIS, Government of India
3.	Socio-Economic Impact of National Highways by *Nachiketa Chattopadhyay,* SOSU, Kolkata	National Highways Authority of India
4.	Developing an Appropriate Structure Preserving Estimation (SPREE) Method for Estimating Domain-Level Aggregates from NSSO Household Surveys by *Nachiketa Chattopadhyay,* SOSU, Kolkata	MoSPI, Government of India
5.	Developing an Appropriate Methodology for Estimating Proportion of Villages with Specific Infrastructural Facility by *Nachiketa Chattopadhyay*, SOSU, Kolkata	MoSPI, Government of India
6.	UNDP consultancy assignment for development of Disaster Score Card for India: development of Disaster Risk Index for the districts/ States/UTs and Disaster Resilience Index by *Diganta Mukherjee,* SOSU, Kolkata	UNDP
7.	Surguja Special Socio Economic Survey by *Nachiketa Chattopadhyay,* SOSU, Kolkata	Directorate of Economics and Statistics, Raipur, Chhattisgarh
8.	Development of Browser-based Application of CAPI for NSSO 77th Round Schedule (Phase I, II & III) by *Nachiketa Chattopadhyay*, SOSU, Kolkata	NSSO (FOD), MoSPI, Government of India
9.	Developing of a demonstration module of e-learning on -Basic Official Statistics by *Nachiketa Chattopadhyay,* SOSU, Kolkata	NSSTA, MoSPI, Government of India
10.	Strengthening livelihood opportunities for the forest dwellers in Jharkhand and Odisha by *Hari Charan Behera,* SRU, Kolkata & Giridih	Ministry of Tribal Affairs, Government of India
11.	Baseline Survey for horticulture development in Paschimanchal districts in West Bengal by *Hari Charan Behera,* SRU, Kolkata & Giridih	Department of Food Processing Industries and Horticulture, Government of West Bengal

Sr. No.	Project Name/ Principal Investigator	Funding Agency
12.	Quality System Developments by *Amitava Bandyopadhyay* & *Ranjan Sett,* SQC&OR, Kolkata	5 Ordnance Factories
13.	Training Programme on Quality Management by *Amitava Bandyopadhyay,* SQC&OR, Kolkata	NADP, Nagpur
14.	Training Program by *Amitava Bandyopadhyay* & *Ranjan Sett,* SQC&OR, Kolkata	4 Ordnance Factories
15.	Training Program by *Ranjan Sett* & *Amitava Bandyopadhyay,* SQC&OR, Kolkata	3 Ordnance Factories
16.	Implementation of Defence Production Transformation Plan at Ordnance factories (Medak and Kanpur) by *Amitava Bandyopadhyay,* SQC&OR, Kolkata, G Murali Rao & ALN Murthy	Ordnance Factory, Ministry of Defence, Government of India
17.	BOBASIO Region Airspace Safety Assessment Study by *Antar Bandyopadhyay* & Deepayan Sarkar, SMU, Delhi	Airport Authority of India
18.	Project for the XV Finance Commission by Monisankar Bishnu	Ministry of Finance, Government of India
Completed Projects in 2018-19		
1.	International Passengers Survey Phase- II by *Ashis Sen Gupta,* ASU, Kolkata	Ministry of Tourism, Government of India
2.	Directorate General of Commercial Intelligence & Statistics (DGCIS) project by *Ashis Sen Gupta,* ASU, Kolkata	Ministry of Commerce and Industry, Government of India
3.	Traffic Survey on Fare Structure by *Diganta Mukherjee,* SOSU, Kolkata	Metro Railway, Kolkata
4.	ISI-RBI collaboration Research Project by *Diganta Mukherjee,* SOSU, Kolkata	Reserve Bank of India
5.	Training Programme by R. Sett, SQCOR, Kolkata	Ordinance Factory, Ambajhari
6.	Implementation of ISO 9001 QMS by R. Sett, SQCOR, Kolkata	ISC, ITC Limited
7.	Baseline Survey by R. Sett, SQCOR, Kolkata	LWSIT, Kolkata
8.	Support to Carry Out Large Scale Government Projects, by A. Bandyopadhyay, SQCOR, Kolkata	QCI, Delhi

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.

Applied Statistics Division

Applied Statistics Unit, Kolkata

1. Sultana Farha, IIT, Patna, December 01, 2018–March 31, 2019.

Interdisciplinary Statistical Research Unit, Kolkata

1. Hazra Arnab, North Carolina State University, USA, August 16, 2018–February 28, 2019.
2. Mukherjee Soumendu Sundar, University of California, USA, June 01–December 31, 2018.

Biological Sciences Division

Agricultural & Ecological Research Unit, Kolkata

1. Edmonds Christopher, Tokyo International University, Japan, January 03-30, 2019.
2. Chakraborty Bratati, Lady Brabourne College, Kolkata, October 08–November 07, 2018.
3. Samanta Sudip, King Abdulaziz University, Saudi Arabia, June 01–August 31, 2018.
4. Saha Bapi Govt. College of Engineering Textile Technology, Berhampur, Murshidabad, June 12–July 11, 2018.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit, Kolkata

1. Bhattacharya Anup, IIT, Delhi, April 02 -June 29, 2018
2. Bhattacharyya Rishiraj, NISER, Bhubaneswar, September 18-22, 2018.
3. Chakraborty Goutam, Iwate Prefectural University, Japan, December 24, 2018-January 2, 2019.
4. Chattopadhyay Arpan, IIT, Delhi, September 06-October 14, 2018.
5. Das Goutam K., IIT, Guwahati, July 05-12, 2018.
6. Jallu Ramesh Kumar, IIT, Guwahati, April 02-June 29, 2018
7. Mukherjee Joydeep, SERB, Since March 01, 2017-February 28, 2019
8. Meel Kuldeep Singh, National University of Singapure, Singapore, February 26-March 04, 2019.
9. Pritam Siddarth, INRIA, Sophia, France, December 26, 2018- January 10, 2019.
10. Rahman Sohel, Bangladesh University of Engineering & Technology, July 05-13, 2018.
11. Ray Rajarshi, National Institute of Meghalaya, Shillong, January 03-January 20, 2019.
12. Sardar Gopal Chandra, IISER, Kolkata, November, 05-30, 2018.
13. Sen Arunabha, Arizona State University, USA, December 21, 2018-January 21, 2019.

Computer Science Unit, Chennai

1. Pandey Arti, IIT, Ropar, December 19-25, 2018.

Computer Vision and Pattern Recognition Unit, Kolkata

1. Bhattacharya Saumik, IIT, Roorkee, January 26-February 04, 2019.
2. Chaudhuri Ayan, INRIA, France, November-December, 2018.

3. El-Khoury Jessica, University of Bourgogne Franche-Comte, Dijon, France, January 20-February 04, 2019.
4. Roy Partha Pratim, IIT, Roorkee, December, 2018.
5. Shivkumar P., University of Malay, Malaysia, December, 2018.

Machine Intelligence Unit, Kolkata

1. Jha Shalini, ISM, Dhanbad, June 01, 2018-Till June 01, 2019.
2. Mitra Ramkrishna, Thomas Jefferson University, Philadelphia, USA, July 09-31, 2018.
3. Sengupta Debarka, Indraprastha Institute of Information Technology, Delhi, January 04-08, 2019.

Systems Science and Informatics Unit, Kolkata

1. Mariethoz Gregoire, Institute of Earth Surface Dynamics (IDYST) University of Lausanne, Switzerland, May 31-June 02, 2018.
2. McKinley Jennifer, Queen's University Belfast, UK, November 14-18, 2018.
3. Kumar Satish, Queen's University Belfast, UK, November 14-18, 2018.
4. Prasad Awadhesh, University of Delhi, New Delhi, February 20-21, 2019.

Physics and Earth Sciences Division

Geological Studies Unit, Kolkata

1. Juraj Janocko, Institute of Geosciences, Technical University of Košice, Slovakia, January 07-21, 2019.
2. Kierstin Rosenbach, University of Michigan, Ann Arbor, USA, February 02–08, 2019.
3. Marta Prekopova, Institute of Geosciences, Technical University of Košice, Slovakia, January 07-21, 2019.

Physics and Applied Mathematics Unit, Kolkata

1. Agrawal Aniket Institute of Astronomy and Astrophysics, Academia Sinica, Taipei, Taiwan, February 18–21, 2019.
2. Das T., Center for Nanoscale Science and Technology, National Institute of Standards and Technology, Maryland, USA, April 01–September 30, 2018.
3. De Debajyoti, The Neotia University, West Bengal, April 01–October 31, 2018.
4. Mishra Arindom, Jadavpur University, Kolkata, November 12–March 31, 2018.
5. Mondal Debasis, National University of Singapore, Singapore, April 18–20 and April 25–26, 2018.
6. Rahaman Ramij, Allahabad University, Allahabad, June 04–14, 2018.
7. Sharma Deepa, NIT, Kurukshetra, Haryana, June 19–26, 2018.
8. S Aravinda, The Institute of Mathematical Sciences, CIT Campus, Taramani, Chennai, November 12–March 31, 2018.
9. Venkatesan S.K., TNQ, Chennai, July 11–15, 2018.

Social Sciences Division

Economic Analysis Unit, Bangalore

1. Durga A.R., Tamilnadu Agricultural University, Coimbatore, April 01, 2018–February 27, 2019.
2. Jain Chandan, Shiv Nadar University, Noida, USA, July 01-September 30, 2018.

Economics and Planning Unit, Delhi

1. Abreu Dilip, New York University, USA, February 22, 2019.
2. Aney Madhav S., Singapore Management University, Singapore, April 27, 2018.
3. Attanasio Orazio, University College London, UK, December 19-21, 2018.

4. Bhattacharjee Swagata, Ashoka University, April 20, 2018.
5. Borah Abhinash, Ashoka University, October 12, 2018.
6. Chakrabarti Subir K., Indiana University–Purdue University Indianapolis,USA, July 10, 2018.
7. Chatterjee Partha, Shiv Nadar University, Noida, Uttar Pradesh, August 10, 2018.
8. Chatterjee Shoumitro, University of Cambridge, UK, August 01– September 30, 2018.
9. Debnath Sisir, Indian School of Business, Hyderabad, September 07, 2018.
10. Dhamija Gaurav, Shiv Nadar University, Noida, Uttar Pradesh, January 25, 2019.
11. Dimitrov Dinko, Saarland University, Germany, May 25, 2018.
12. Dubey Ram Sewak, Montclair State University, July 27, 2018.
13. Dubey Pradeep, SUNY Stony Brook and Yale, USA, November 16, 2018.
14. Gopalakrishnan Pawan, Reserve Bank of India, Mumbai, February 01-28, 2019.
15. Gupta Samarth, National Council of Applied Economic Research, New Delhi, January 28, 2019.
16. Jain Ritesh, Academia Sinica, Taiwan, November 09, 2018.
17. Jayachandran Seema, Northwestern University, USA, March 27-29, 2019.
18. Jha Kumar Chandan, Le Moyne College, USA, August 17, 2018.
19. Khanna Madhu, University of Illinois, Urbana-Champaign, USA, October 18, 2018.
20. Kumar Rohit, Toulouse School of Economics, France, May 04, 2018.
21. Lamba Rohit, Penn State University, USA, July 06, 2018.
22. Mahajan Kanika, Ashoka University, Haryana, September 14, 2018.
23. Mailath George, University of Pennsylvania, USA, December 14, 2018.
24. Moorthy Sridhar, University of Toronto, Canada, March 29, 2019.
25. Muralidharan Karthik, UC San Diego, USA, April 04, 2018.
26. Ponce Alejandro Melo, SUNY Stony Brook, USA, January 31, 2019.
27. Preonas Louis, University of Chicago, USA, February 15, 2019.
28. Ravn Morten O., University College London, UK, December 19-21, 2018.
29. Ray Debraj, New York University, USA, December 19-21, 2018.
30. Roychowdhury Punarjit, IIM, Indore, March 15, 2019.
31. Sane Renuka, NIPFP, New Delhi, July 23- November 30, 2018.
32. Sarkar Sourav, Massachusetts Institute of Technology, Cambridge, USA, February 01, 2019.
33. Sharma Bhavyaa, NIPFP, New Delhi, July 23-November 30, 2018.
34. Sinha Paramita, RTI International, USA, February 08, 2019.
35. Singha Pramod, NIPFP, New Delhi, July 23-November 30, 2018.
36. Singh Gurbachan, Free Lancer, January 01- April 30, 2019.
37. Vohra Rakesh, University of Pennsylvania, USA, August 07, 2018.
38. Wadehra Shivani, TERI School of Advanced Studies, New Delhi, July 20, 2018.
39. Wadhwa Wilima, ASER Centre, New Delhi, July 23-November 30, 2018.
40. Waknis Parag, Ambedkar University, Delhi, October 05, 2018.
41. Zaveri Esha, World Bank, USA, March 05, 2019.

Economic Research Unit, Kolkata

1. Bera A. Anil, University of Illinois, USA, January 01-14, 2019.
2. Bhowmik Anuj, Indira Gandhi Institute of Development Research, Mumbai, October 11-25, 2018 & January 07-21, 2019.

3. Chakraborty Bikas, K., Saha Institute of Nuclear Physics, Kolkata, Since August, 2018.
4. Chatterjee Kalyan, The Pennsylvania State University, USA, December 17, 2018–January 05, 2019.
5. Ghosh Arghya, University of New South Wales, Sydney, Australia, May 21–June 01, 2018 & January 21–February 22, 2019.
6. Mondal Debasis, IIT, New Delhi, January 05-12, 2019.
7. Mutuswami Suresh, University of Leicester, UK, January 01–March 31, 2019.
8. Goonj Mohan, Adugodi, Bangalore, Karnataka, January 07–10, 2019.

Linguistic Research Unit, Kolkata

1. Basu Amrita, Jadavpur University, Kolkata, January 14, 2019.
2. Das Biswa Ranjan, North Odisha University, Baripada, April 02-03, 2018.
3. Das Sriparna, CALTS, University of Hyderabad, May 28-30, 2018.
4. Ghosh Shantanu, MIT, Harvard, USA, November 05-06, 2018.
5. Gope Amalesh, Tezpur University, Assam, September 18-20, 2018.
6. Kar Somdev, IIT, Ropar, March 11-15, 2019.
7. Lahiri Aditi, University of Oxford, UK, January 12-14, 2019.
8. Nandi Paramita, Kerala University, May 30-31, 2018.
9. Reetz Henning, Konstanz University, Germany, January 12-14, 2019.

Psychology Research Unit, Kolkata

1. Ali Khalid Mohammad, University of Science and Technology, Dhaka, May 31, 2018.
2. Bhattacharya Rahul, University of Calcutta, March 25, 2019.
3. Chakrabarti Satyabrata, Asiatic Society, Kolkata, March 27, 2019.
4. Chatterjee Ishita, Calcutta University, May 31, 2018.
5. Dash Manoj, Khallikote University, Berhampur, March 25, 2019.
6. Dutta Tinni, Asutosh College, Kolkata, June 21, 2019.
7. Ghosh Atanu Kumar, Presidency University, Kolkata, March 26, 2019.
8. Ghosh Sadhan Kumar, Jadavpur University, Kolkata, May 31, 2018.
9. Guha Sumon, Presidency University, Kolkata, March 27, 2019.
10. Mahakud Lalit, Jadavpur University, Kolkata, March 25, 2019.
11. Roy S.K., Formerly Central Board for Workers Education, Ministry of Labour and Employment, Government of India, May 31, 2018.
12. Sengupta Shriya, Calcutta University, Kolkata, May 31, 2018.
13. Sinha Rajesh Kumar, Manipal Academy of Higher Education, Karnataka, March 25, 2019.

Sampling and Official Statistics Unit, Kolkata

1. Bhuyan Prajamitra, Imperial College, London, February 20, 2019.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Coimbatore

1. Edison John, Cognizant Technology Solutions, Coimbatore, June 29, 2018.
2. Ilangovan Department of Nephrology, KG Hospital, June 29, 2018.
3. Parikh Sunny, Cambridge Deanery, UK, May 10, 2019.
4. Ramesh Ganga Medical Centre & Hospitals Pvt Ltd., Coimbatore, June 29, 2018.

5. Shivaad S Aravinth, BS Engineering, May 11, 2019.
6. Varadhan Vishnu, Pondicherry University, June 29, 2018.

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Bangalore

1. Accardi Luigi, Centro Interdipartimentale Vito Volterra, Italy, February 21–March 22, 2019.
2. Aneesh M., NBHM, April 02, 2018 for two years.
3. Banerjee Tathagata, NPDF, Since September 01, 2017 for two years.
4. Basu Rabeya, IISER, Pune, April 22-29, 2018.
5. Bhosle U.N., INSA Senior Scientist, January 01, 2019 for three years.
6. Blaszczyszyn Bartlomiej, ENS-INRIA, Paris, November 25–December 12, 2018.
7. Bogachev Vladimir, Moscow State University, Russia, January 30–February 06, 2019.
8. Bose Snehasish, NBHM, February 01, 2019 for two years.
9. Chattopadhyay Pratyusha, INSPIRE Faculty Fellow, Since November 01, 2013–October 31, 2018 and November 01, 2018–March 31, 2019.
10. Choudhuri Manoj, NBHM, Since April 03, 2017–March 31, 2019.
11. De Sandipan, NBHM, Since February 01, 2017 for three years.
12. Dey Santanu, IIT, Bombay, January 27–February 02, 2019.
13. Dolai Dhriti Ranjan, INSPIRE Faculty Fellow, Since September 01, 2017 for five years.
14. Garg Mansi, ISF-UGC Project, January 08–October 31, 2018.
15. Gatsinzi Jean-Baptiste, University of Namibia, Namibia, September 01-30, 2018.
16. Ghatak Anindhya, JC Bose Fellowship, January 01–March 31, 2019.
17. Guin Satyajit, IISER, Mohali, April 19-23, 2018.
18. Kasilingam Ramesh, INSPIRE Faculty Fellow, Since September 24, 2015-August 31, 2018.
19. Kaur Gursharn, ISF-UGC Project, Visiting Scientist, May 02–November 30, 2018.
20. Koilpitchai Lavy, INSPIRE Faculty Fellow, June 25, 2018–March 31, 2019.
21. Krishnan Arundhathi, ISF-UGC Project, Since November 01, 2017-September 30, 2018.
22. Kumar Santhosh P. NBHM, April 02, 2018 for two years.
23. Maji Amit, NPDF Post-Doctoral Fellow, Since September 01, 2017-July 13, 2018.
24. Malik Neha, ISF-UGC Project, May 02–March 31, 2019.
25. Mallick Nirupama, IMSc., Chennai, June 03-23, 2018.
26. Mukherjee Mithun, IISER, Trivandrum, May 22-31, 2018.
27. Nair Saranya G., NBHM, Since March 31, 2017 for two years.
28. Paul Kallol, Jadavpur University, Kolkata, June 18-30, 2018.
29. Raani Senthil K.S., NBHM Post- doctoral Fellow, Since December 04, 2017-June 30, 2018.
30. Rajendran Dhanya, INSPIRE Faculty Fellow, Since April 20, 2016-April 23, 2018.
31. Rakshit Narayan, JC Bose Fellowship, January 01, 2018–March 31, 2019.
32. Rao Koteswara, NBHM, Since September 27, 2017 for two years.
33. Reddy Nanda Kishore S., INSPIRE Faculty Fellow, April 02, 2018 for five years.
34. Saha Arnab, ISF-UGC Project, April 16-September 30, 2018.
35. Sapra Gunjan, JC Bose Fellowship, February 15–March 31, 2019.
36. Seco Daniel, ICMAT, Madrid, November 04-24, 2018.

37. Sethuraman Bharath, California State University, USA, January 01–March 31, 2019.
38. Shah Riddhi, Jawaharlal Nehru University, Delhi, June 26-30, 2018.
39. Shaposhnikov Stanislav, Moscow State University, Russia, January 30–February 06, 2019.
40. Sarkar Santanu, INSPIRE Faculty Fellow, Since October 31, 2016–May 16, 2018.
41. Subhash B., IISER, Tirupati, July 02-15, 2018.
42. Shukla Samir, INSPIRE Faculty Fellow, Since August 02, 2017-May 31, 2018.
43. Vaish Vaibhav, INSPIRE Faculty Fellow, Since January 04, 2016 for five years.
44. Vsemirnov Maxim A., St. Petersburg Department of Steklov, Russia, March 01, 2018 for two months and January 02-31, 2019.

Stat-Math Unit, Delhi

1. Atik Fouzul, IIT, Kharagpur, Since July 13, 2017–July 02, 2018.
2. Basu Rabeya, IISER, Pune, September 03–04, 2018.
3. Basu Sudeshna, George Washington University, USA, August 22-23, 2018.
4. Bose Anirban, IISER, Mohali, June 29, 2018–July 06, 2018.
5. Chintamani Mohan, University of Hyderabad, March 18-23, 2019.
6. Choudhry Ajai, HRI, Allahabad, November 19-23, 2018.
7. Dalawat C.S., HRI, Allahabad, August 25- 28, 2018.
8. Devi A.R. Usha, Bangalore University, June 17–July 21, 2018.
9. Dey Rukmini, International Centre for Theoretical Sciences, Bangalore, November 14, 2018.
10. Dutta Ratna, IIT, Kharagpur, July 02-05, 2018.
11. Esmaeeli Neda, University of Isfahan, Iran, March 01-31, 2019.
12. Estaji Ehsan, Hakim Sabzevari University, Iran, August 04-31, 2018.
13. Ghosh Arka Prasanna, Iowa State University, USA, January 21–February 25, 2019.
14. Guin Satyajit, IIT, Kanpur, December 24-28, 2018.
15. Heunis Andrew, University of Waterloo, Canada, August 18-21, 2018.
16. Juyal Abhishek, HRI, Allahabad, November 06-17, 2018.
17. Komatsu Takao, Wuhan University, China, July 02-13, 2018.
18. Kumar Senthil, NISER, Bhubaneswar, October 04-07, 2018.
19. Majid Shahn, University of London, UK, November 21-26, 2018.
20. Mohari Anilesh, IMSc, Chennai, January 14-15, 2019.
21. Molnar Lajos, Bolyai Institute, University of Szeged, Hungary, December 09-13, 2018.
22. Mukhopadhyay Sourav, IIT, Kharagpur, July 02-05, 2018.
23. Nimbalkar U.V. Naik, IISER, Pune, March 05-08, 2019.
24. Panraksa Chatchawan, Mahidol University, Bangkok, Thailand, October 14-17, 2018.
25. Parvaneh Azadeh, University of Isfahan, Iran, October 01–December 31, 2018.
26. Paul Prabal, BITS, Goa, March 18-23, 2019.
27. Raghavan K.N., IMSc, June 12-14, 2018.
28. Ramare Olivier, University of Marseilles, France, November 04-08, 2018.
29. Roy Sutanu, NISER, Bhubaneshwar, December 24-28, 2018.
30. Saha Biswajyoti, TIFR, Mumbai, June 04-06, 2018.
31. Saha Ekata, TIFR, Mumbai, June 04-06, 2018.

32. Sahoo Gopinath, IIT, Bhubaneswar, Since February 15, 2018–February 14, 2020.
33. Saikia Neelam, IIT, Guwahati, April 15-26, 2018.
34. Sajadi Farkhondeh, University of Isfahan, Iran, March 01-31, 2019.
35. Saradha N., DAE Center for Excellence in Basic Sciences, Mumbai, February 22-28, 2019.
36. Saurabh Bipul, HRI, Allahabad, August 26-29, 2018.
37. Sengupta Ritabrata, IISER, Berhampur, May 22-30, 2018.
38. Sharma Divyum, University of Wateloo, Canada, August 16-21, 2018.
39. Sharma Ritika, HRI, Allahabad, November 04-08, 2018.
40. Shorey T.N., NIAS, Bangalore, July 23-28, 2018.
41. Sengupta Ritabrata, IISER, Berhampur, December 09-14, 2018.
42. Singh Radhey S, University of Waterloo, Canada, May 01-02, 2018.
43. Sinha Kalyan B., JNCASR, Bengaluru, August 30-September 01, 2018.
44. Sinha K.B., JNCASR, Bengaluru, January 13-15, 2019.
45. Strung Karen, Institute for Mathematics, Astrophysics and Particle Physics, Radboud Universiteit, Nijmegen, Netherlands, May 07-12, 2018.
46. Sundar S., CMI, Chennai, July 01–August 31, 2018.
47. Tanemura Hideki, Keio University, Japan, February 18-26, 2019.
48. Thorisson Hermann, University of Iceland, Iceland, December 27-30, 2018.
49. Varma Gayathri, NIT, Calicut, Kerala, February 20–April 19, 2019.
50. Volfovsky Alexander, Duke University, USA, October 03-05, 2018.
51. Waldschmidt Michel, University Jussieu, Paris, France, October 01-06, 2018.

Stat-Math Unit, Kolkata

1. Adhikari Kartick, SERB, Since April 05, 2017-October 01, 2018.
2. Bandyopadhyay Choiti, University of Alberta, Canada, April 11-June 30, 2018.
3. Banerjee Soumyarup HRI, Allahabad, June 25-August 05, 2018.
4. Basu Depan, DST, Since September 20, 2017-March 31, 2022.
5. Chakraborty Sagnik, NBHM, Since April 01, 2016-January 01, 2019.
6. Ganguly Arijit, Telaviv University, July 02-30, 2018.
7. Ghosh Sayan, IIT, Bombay, Mumbai, January 25-December 31, 2018.
8. Mawia Ramdin, HRI, Allahabad, April 01, 2018-March 31, 2023.
9. Pandey Manish Kumar, HRI, Allahabad, September 03-10, 2018.
10. Ramare Olivier, CNRS, France, October 28-November 04, 2018.
11. Saha Ekta, TIFR, Mumbai, October 01, 2018-June 12, 2019.
12. Sarkar Swagata, UM-DAE Centre for Excellence in Basic Sciences, Mumbai, July 09-16, 2018.
13. Sensarma Aryaman, IIT, Kanpur, Since June 27, 2017-July 31, 2018.

SCIENTIFIC ASSIGNMENTS ABROAD

Applied Statistics Division

Applied Statistics Unit, Chennai

Sen Rituparna:
Vietnam Institute for Advanced Study in Mathematics, March 29, 2019.

Applied Statistics Unit, Kolkata

Chowdhury Pabitra Pal:
(1) Johns Hopkins University, USA, April 03-18, 2018; (2) C Q University, Melbourne, Australia, October 31, 2018; (3) Claflin University, South Carolina, USA, March 26-29, 2019.

Dewanji Anup:
41stInternational Academic Conference, Venice, Italy, September 04-07, 2018.

Interdisciplinary Statistical Research Unit, Kolkata

Basu A.:
(1) Complutense University of Madrid, Spain, May, 2018; (2) 5th IMS-APRM Meeting, Singapore, June, 2018; (3) International Conference on Robust Statistics, Belgium, July, 2018; (4) University of Trento, Italy, July, 2018.

Bose S.:
(1) Academia Sinica, Taiwan, January 09-14, 2019; (2) National Tsing Hua University, Taiwan, January 15, 2019.

Das K.:
Penn State University, USA, August 15–December 16, 2018.

Ghosh A.:
(1) University of Gothenburg, Gothenburg, Sweden, June 10-16, 2018; (2) Katholieke Universiteit Leuven, Belgium, July 02-07, 2018; (3) International Biometric Conference (IBC), Barcelona International Convention Centre, Barcelona, Spain, July 08-13, 2018; (4) ISI–ISM–ISSAS Three Institute Joint MeetingInstitute of Statistical Sciences Academia Sinica (ISSAS), Taipei, Taiwan, January 17-19, 2019; (5) University of Madrid, Spain, March 19-30, 2019.

Saha Ray R.:
Sunway University, Malaysia, August 01-02, 2018.

Biological Sciences Division

Agricultural & Ecological Research Unit, Kolkata

Mukherjee A.:
XV International Symposium on Biological Control of Weeds, Engelberg, Switzerland, August 26–31, 2018.

Human Genetics Unit, Kolkata

Datta S.:
AACR Annual Meeting 2018, Chicago, IL, USA, April 14-18, 2018.

Ghosh S.:
(1) Mathematical Genetics Meeting, Italy, April 17-19, 2018; (2) Duke-NUS Medical School, July 09-13, 2018; (3) RIKEN, Tokyo, September 10-14, 2018; (4) ISSAS, Taipei, January 17-19, 2019.

Mukhopadhyay I.:
(1) Invited Lecture, Novartis, Basel, Switzerland, December 2018; (2) Agro ParisTech, INRA, Paris, December 2018; (3) Invited Lecture, Le Moulon, France, December 2018.

Roy B.:
(1) Conference on "Genomics: from, disease prevention to treatment, population, medicine and society", Haifa, Israel, October 02-05, 2018; (2) Institute of Dental Science, Hebrew University of Jerusalem, Israel, October 09, 2018.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit, Kolkata

Banerjee A.:
(1) International Conference on Service-Oriented Computing (ICSOC), Hangzhouand East China Normal University and NYU, Shanghai. China, November 12–15, 2018 (2) Microsoft Conference Center, Redmond, WA, USA, August 01-02, 2018.

Chakraborty S.:
Schloss Dagstuhl–Leibniz-Zentrum für Informatik, Germany, September 23-28, 2018 and March 17-22, 2019.

Das N.:
(1) Washington State University, Pullmann, USA, June 10–July 20, 2018; (2) San Jose State University, USA, June 10–July 20, 2018; (3) University of Washington, Bothell, USA, June 10–July 20, 2018.

Ghosh, A.:
INRIA Sophia Antipolis, France, December 03-22, 2018.

Ghosh S.C.:
15th Wireless On-demand Network Systems and Services Conference, Switzerland, January 20–27, 2019.

Sur-Kolay S.:
(1) Institute of Quantum Optics and Quantum Information (IQOQI), Innsbruck, Austria, April 05-May 18, 2018; (2) T U Munich, Germany, April 05-May 18, 2018; (3) T U Eindhoven, The Netherlands, April 05-May 18, 2018; (4) T U Delft, The Netherlands, April 05-May 18, 2018; (5) Durham University, United Kingdom, April 05-May 18, 2018; (6) Newcastle University, Newcastle upon Tyne, United Kingdom, April 05-May 18, 2018.

Das S.:
School of Computing Science, SFU, Canada, June 25-August 24, 2018.

Computer Science Unit, Chennai

Ghosh S.:
University of Groningen, The Netherlands, April 09-June 15, 2018.

Computer Vision and Pattern Recognition Unit, Kolkata

Bhattacharya U.:
(1) TU Wien (Vienna University of Technology), Vienna, Austria, April 24-27, 2018; (2) International Conference on Pattern Recognition (ICPR) 2018, Beijing, China, August 20-24, 2018.

Pal U.:
(1) International Conference on Pattern Recognition (ICPR) 2018, Beijing, China, August, 20-24, 2018; (2) Nanjing University, China, October, 29-31, 2018; (3) Each China Normal University, Shanghai, China, November, 2018.

Palit S.:
International Conference on Image and Signal Processing ICISP 2018, Cherbourg-Octeville, France, July 02-04, 2018.

Cryptology and Security Research Unit, Kolkata

Molla A.R.:
15th Annual Conference on Theory and Applications of Models of Computation (TAMC 2019), Kitakyushu, Japan, April 13-16, 2019.

Ruj S.:
University of New South Wales, April 29-May 10, 2019.

Documentation Research and Training Centre, Bangalore

Krishnamurthy M.:
Sukhothai Thammathirat Open University, Korea Institute of Science and Technology, Nonthaburi, Thailand, August 18-19, 2018.

Madalli D.P.:
(1) Pratt Institute, USA, May 02-11, 2018; (2) Workshop-Wellcome Trust, UK, May 31–June 01, 2018; (3) Kyungpook National University, Korea, August 12-18, 2018; (4) 4th International Conference on Research Infrastructures (ICRI-2018), Hofburg, Vienna, Austria, September 10–15, 2018; (5) Thammathirat Open University, Thailand, January 21-22, 2019; (6) Institute of Vietnamese Studies &Development Science and Vietnam National University, January 28–31, 2019.

Prasad A.R.D.:
(1) National University of Samoa, June, 25-29 2018; (2) Kyungpook National University, Korea, August 12-18, 2018; (3) UNESCO, Colombo, Sri Lanka, September 27-29, 2018; (4) University of Malayisa Sabah, Malaysia, November 06-10, 2018.

Electronics and Communication Sciences Unit, Kolkata

Chanda B.:
(1) ESIEE, Paris, March 25-28, 2019; (2) Sapienza University of Rome, Rome, March 28-29, 2019.

Das S.:
(1) 8thInternational Conference on Bio-inspired Optimization Methods and Their Applications (BIOMA) 2018, Paris, France, May 16-18, 2018; (2) Sorbonne University, Paris, May 22, 2018; (3) 9th International Conference on Swarm Intelligence (ICSI) 2018, Shanghai, China, June 17-22, 2018; (4) VSB-Technical University of Ostrava, Czech Republic, Europe, September 11-13, 2018; (5) 4thInternational Conference on Advanced Machine Learning Technologies and Applications (AMLTA) 2019, Cairo, Egypt, March 28-30, 2019.

Mukherjee D.P.:
(1) 2018European Conference on Computer Vision (ECCV), Munich, Germany, September 08-14, 2018; (2) 2018 IEEE International Conference on Image Processing, Athens, Greece, October 07-10, 2018; (3) University of Aegean, Samos, Greece, October 10-17, 2018.

Pal N.R:
(1) XVII International conference on Data Science and Intelligence Analysis of Information (ICDSIAI'2018), Kyiv, Ukraine, June 04-07, 2018; (2) IEEE Technical Activities Board meetings series, New Brunswick, USA, June 20-23, 2018; (3) Qingdao Forum on Science and Technology and the 2nd Qingdao International Academician Conference, Qingdao, China, August 16-18, 2018, (4) China University of Petroleum, Qingdao, China, October 15-November 14, 2018; (5) IEEE Technical Activities Board meetings series, Vancouver, Canada, November 15-18, 2018.

Machine Intelligence Unit, Kolkata

Bandyopadhyay S.:
(1) G-SCOP Lab, Grenoble INP, Grenoble, France, May 25-June 04, 2018; (2) ICTP, ITALY, November 25-December 01, 2018.

Ghosh A.:
(1) Rochester Institute of Technology, Rochester, New York, August 29, 2018; (2) Kings Mongkut's University of Technology, Thonburi, Thailand, September 21-October 01, 2018;(3) 2nd Deep Learning and Artificial Intelligence Summer School, Bangkok, Thailand, December 11-12, 2018.

Ghosh K.:
University of Trieste, Trieste, Italy, August 26-30, 2018.

Mitra S.:
(1)Purdue University, USA, August 09-19, 2018 and March 15-31, 2019; (2) University of South Florida, Tampa, USA, December 14, 2018-March 14, 2019; (3)Leeward Community College, Pearl City, Honolulu, Hawaii, USA, January 31, 2019; (4) Member, IEEE Frank Rosenblatt Award Committee, 2019-2020.

Systems Science and Informatics Unit, Bangalore

Sagar B.S.D.:
(1) International Association of Mathematical Geosciences (IAMG) Golden Anniversary Conference, Olomouc, Czech Republic, September 02-09, 2018; (2) Doctoral Thesis Examination Committee, Multimedia University, Malaysia, 2018-19.

Library and Documentation Sciences Division

Library, Kolkata

Pal Jiban K:
Karlsruhe Institute of Technology, Karlsruhe, Germany, July 16-17, 2018.

Physics and Earth Sciences Division

Geological Studies Unit, Kolkata

Saha D.:
33rdHimalaya-Karakorum-Tibet Workshop, Lausanne, Switzerland, September 07-12, 2018.

Physics and Applied Mathematics Unit, Kolkata

Basu B.:
Université Paris-Saclay, France, June 11–26, 2018.

Sarkar S.:
Rajshahi University, Bangladesh, July 10–15, 2018.

Pal S.:
Physikalisches Institut der Universitaet, Bonn, Germany, July 11–20, 2018.

Maiti S.K.:
Kwansei Gakuin University, Japan, November 01–30, 2018.

Theoretical and Applied Sciences Unit, North-East Centre Tezpur

Maitra S.:
(1) Spatial Cognition 2018, Tuebingen, Germany, September 05-08, 2018; (2) SPIE Remote Sensing 2018, Berlin, Germany, September 10-13, 2018.

Social Sciences Division

Economics and Planning Unit, Delhi

Afridi F.:
(1) ABCDE Conference, World Bank, Washington DC, June 25-26, 2018; (2) South Asia Workshop, Monash-IIPS, Colombo, January 07-08, 2019.

Ghate C.:
(1) International Research Conference, Central Bank of Sri Lanka, Colombo, December 07, 2018; (2) Deakin University, Melbourne, August 19-September 02, 2018; (3) Lee Kwan Yew School of Public Policy, Singapore, September 02, 2018.

Mishra D.:
(1) Social Choice and Welfare meeting, Seoul, South Korea, 2018; (2) Korea University, Seoul, South Korea, 2018; (3) Paris School of Economics, Paris, France, 2018;(4) Shanghai University of Finance and Economics, Shanghai, China, 2019.

Mukhopadhyay A.:
(1) World Bank, Washington DC, June, 2018;(2) University of Connecticut, October 2018.

Roy Chowdhury P.:
University of New South Wales and University of Sydney, Australia, June 2018.

Sen A.:
(1) Department of Economics, University of Oslo, Norway, May 02-05, 2018; (2) Stockholm School of Economics, Sweden, May 07-11, 2018; (3) Maastricht University, The Netherlands, May 12-18, 2018; (4) City University of Hong Kong, September 08-12, 2018;(5) University of Padova, Italy, November 26-December 07, 2018.

Somanathan E.:
(1) Peking University, Haidian, China, April 06-07, 2019; (2) Duke University, USA, May 15-16, 2018; (3) University of Gothenburg, Sweden, May 21-25, 2018; (4) University of Gothenburg, Sweden, June 25-29, 2018; (5) Dauphine University, Paris, October 04, 2018; (6) EfD Annual Meeting, Hanoi, Vietnam, November 01-05, 2018; (7) Paris School of Economics, November 26, 2018 (8) SANDEE Steering Committee Meeting, Kathmandu, Nepal, December 10-13, 2018.

Economic Research Unit, Kolkata

Banerjee P.:
(1) 7th Xiamen University International Workshop on Experimental Economics, Xiamen, Fujian, China, December 13-18, 2018; (2) WEAI 15th International Conference, Tokyo, Japan, March 20-25, 2019.

Mitra M.:
Seoul National University, Seoul, South Korea, February 21-March 03, 2019.

Munshi S.:
Bristol University, United Kingdom, May 31–June 02, 2018.

Kabiraj T.:
19th Asia-Pacific Conference on "Global Business, Economics, Finance and Banking", Singapore, July 27-29, 2018.

Pal, M.:
(1) International Conference, Nigeria, April 09-13, 2018; (2) Annual International Symposium, Greece, July 02-06, 2018.

Roy S.:
Seoul National University, South Korea, June 12-19, 2018.

Linguistic Research Unit, Kolkata

Dash N.S.:
(1) Lexicography Advisor, Bangla Dictionary Project, Oxford University Press, UK, Since February 2018-September 2018; (2) 11th Language Resources and Evaluation Conference, Miyazaki, Japan, May 07-12, 2018; (3) University of Reading, UK,July 10-September09, 2018; (4) 23rd KES International Conference 2019, Budapest, Hungary, September 04-06, 2019; (5) Shahjalal University of Science and Technology, Sylhet, Bangladesh,September21-28, 2018; (6) Research Advisor: NLP works of REVE Systems Ltd., Bangladesh Computer Council, Information & Communication Technology Division, Dhaka, Govt. of Bangladesh, From June 2018- May 2021.

Population Studies Unit, Kolkata

De P.:
University of Dhaka, Bangladesh, August 11–13, 2018.

Psychology Research Unit, Kolkata

Chatterjee G.:
University of Liberal Arts, Dhaka, Bangladesh, April 28-30, 2018.

Dutta Roy D.:
(1) Tribhuban University, Kathmandu August 03-05, 2018; (2) APORS, Kathmandu, Nepal, August 06, 2018.

Sampling and Official Statistics Unit, Kolkata

Kar A.:
(1) Consultant, Asian Development Bank (reviewer of GDP estimation),International Comparison Project, 2018-19; (2)Consultant, UN-Economic and Social Commission for Asia and Pacific (for development of training materials on Economic Statistics), 2018-19; (3) Consultant, Asian Development Bank (incorporating the changes in the methods, and related revisions in the data/estimates to produce National Accounts Statistics and Supply-Use Tables; Documenting the methods and sources used for this purpose for Myanmar for 2014-15 and 2015-16), 2018-19.

Sociological Research Unit, Kolkata and Giridih

Behera H.C.:
Asian Institute of Technology, Thailand, March 07-08, 2019.

Ghosh B.N.:
(1) 13th Annual International Symposium on Economic Theory and Applications, Athens, Greece, July 02-05, 2018; (2) University of Dhaka, Dhaka, Bangladesh, August 11-13, 2018.

Jana R.:
(1) University of Dhaka, Dhaka, Bangladesh, August 11-12, 2018.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Delhi

Neogy S.K.:
University of Bordeaux, France, July 01-06, 2018.

SQC & OR Unit, Kolkata

Anis M.Z.:
(1) University of Windsor, July 31, 2018; (2) Rider University, August 04-12, 2018.

SQC & OR Unit, Mumbai

Sarkar A.:
Six Sigma Management Institute Asia, Colombo, July, 24-29 2018.

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Bangalore

Athreya Siva:
(1) National University of Singapore, Singapore, June 25-July 03, 2018; (2) Technion–Israel Institute of Technology, Israel, November 17-29, 2018; (3) Leiden University, The Netherlands, February 02-09, 2019; (4) National University of Singapore, Singapore, February 18-22, 2019.

Kumar Manish:
KIAST, South Korea, May 24–June 04, 2018.

Mathew Joseph:
(1) University of Sussex, UK, August 02-07, 2018; (2) Strathclyde University, UK, August 07-10, 2018.

Naolekar Anita:
Université de Haute Alsace, Mulhouse, France, June 19-30, 2018.

Rajarama Bhat B.V.:
(1) Ben Gurion University of the Negev, Beer-sheva, Israel, April 29-May 11, 2018; (2) Casa Matematica Oaxaca, Mexico, September 02-07, 2018; (3) Université de Franche-Comté, Besanconand, France, September 09-16, 2018;(4) Centro Internazionale per la Ricerca Matematica (CIRM), Levico Terme, Italy, October 15-19, 2018.

Roy Parthanil:
University of Michigan, USA, June 13-22, 2018.

Rajeev B.:
(1) Linnacus University, Sweden, June 06-08, 2018; (2) Chalmers University of Technology, Gothenburg, Sweden, June 11-15, 2018.

Rao T.S.S.R.K.:
(1) Jussieu Institute of Mathematics–Paris Rive Gauche (IMJ-PRG), Paris France, April 02–18, 2018; (2) University of Granada, Spain, April 19, 2018: (3) University of Memphis, Tennessee, USA, May 02-15, 2018;(4) International Congress of Mathematicians (ICM), Rio de Janeiro, Brazil, July 30-August 12, 2018.

Sarkar Jaydeb:
(1) Universitöt des Saarlandes, Germany, May 28–June 03, 2018; (2) Institute of Mittag-Leffler, Sweden, June 04-05, 2018; (3) Department of Mathematics, Stockholm University, Sweden, June 06-08, 2018; (4) Hebei Normal University, China, July 13-21, 2018; (5) ICM 2018, Rio de Janeiro, Brazil, August 01-09, 2018; (6) 39th International Conference on Infinite Dimensional Analysis, Quantum Probability and Related Topics, Levico Terme, Trento, Italy, October 15-19, 2018; (7) Dipartimento di Matematica del Politecnico di Milano, Italy, October 21-24, 2018.

Sreekantan Ramesh:
Korea Advanced Institute of Science and Technology (KIAST), South Korea, November 01-16, 2018.

Yogeshwaran D.:
(1) KIT, Karlsruhe, Germany, May 04-11, 2018 and May 24-June 3, 2018; (2) Stochastic Geometry Days 2018, Paris, May 14-18, 2018; (3) ENS-INRIA, Paris, May 21-23, 2018; (4) Stochastic Models VII, Bedlewo, Poland, June 03-08, 2018; (5) Leiden University, Leiden, June 08-14, 2018 (6) Bern University, Switzerland, October 29-November 09, 2018; (7) KIT, Karlsruhe, Germany, November 04-08, 2018; (8) ENS-INRIA, Paris, March 16-29, 2019; (9) INRIA, Paris, March 20-22, 2019.

Stat-Math Unit, Delhi

Bandyopadhyay Antar:
(1) Budapest University of Technology and Economics, Hungary, June 13–18, 2018;(2) 9th International Workshop on Applied Probability (IWAP), Budapest, Hungary, June 18–21, 2018; (3) 11th ISI–ISM–ISSAS Three Institute Joint Meeting, Taipei, Taiwan, January 17–19, 2019.

Bapat R.B.:
(1) Hong Kong Polytechnic University, Hong Kong, April 9-13, 2018; (2) Seoul National University, Korea, November 13–25, 2018.

Chatterjee Arindam:
National University of Singapore, Singapore, June 25–29, 2018.

Laishram Shanta:
(1) Mahidol University International College, Thailand, October, 31, 2018;(2) International Congress ofMathematicians (ICM-2018), Rio-de-Janeiro, Brazil, July 30–August 10, 2018; (3) Khon Kaen University, Thailand, October 29-30, 2018; (4) National University of Laos, Laos, November, 02-04, 2018; (5) University of Witwatersrand, South Africa, December 19-30, 2018.

Roy Rahul:
(1) Conference in Gothenburg, Sweden, June 08–15, 2018; (2) International Congress of Mathematicians (ICM-2018), Rio-de-Janeiro, Brazil, July 31–August 10, 2018;(3) Keio University, Tokyo, Japan, October 08–18, 2018; (4) University of Waterloo, Canada, November 05–23, 2018.

Sarkar Anish:
ISM-ISI-ISSAS Joint Conference, Taipei, Taiwan, January 15-19, 2019.

Sarkar Deepayan:
ISM-ISI-ISSAS Joint Conference, Taipei, Taiwan, January 16-20, 2019.

Thakur Maneesh:
University Munster, Germany, September 21–October 31, 2018.

Stat-Math Unit, Kolkata

Basu Samik:
(1) Factorization Homology Workshop, Caesarea, Israel, June 18-20, 2018; (2) University of Haifa, Israel, June 21-28, 2018.

Bose Arup:
(1) Columbia University, USA, May 31-June 02, 2018; (2) University of Washington, USA, June 06-11, 2018; (3) University of Cincinnati, USA, June 12-22, 2018; (4) University of Paris East, France, October 10-30, 2018; (5) Waseda Symposium, Waseda, Japan, February 25-27, 2019; (6) Kinosaki Seminar, Kinosaki, Japan, February 28-March 02, 2019.

Goswami Debashish:
State University of Buffalo, USA, October 06-13, 2018.

Munshi Ritabrata:
International Congress of Mathematicians, Rio de Janerio, Brazil, 2018.

Center for Soft Computing Research, Kolkata

Ghosh A.:
(1) Rochester Institute of Technology, Rochester, USA, August 29, 2018; (2) University of Massachusetts, Dartmouth, United States, August 22-September 12, 2018; (3) King Monkut's University of Technology Thonburi, Bangkok, Thailand, December 11-12, 2018.

Ghosh K.:
University of Tuebingen and Max Planck Institute for Biological Cybernetics, Tuebingen, Germany, September 05-08, 2018.

Pal S.K.:
(1) Qingdao Forum on Science & Technology and 2nd Qingdao International Academician Conference, Qingdao, China, August 16-20, 2018; (2) 5thInternational Winter School on Big Data (BigDat 2019), Cambridge, United Kingdom, January 07-14, 2019; (3) International Conference on Information System and Convergence Applications (ICISCA 2019), Bangkok, Thailand, January 23-26, 2019; (4) International Conference on Smart Grid Technology and Data Processing (SGTDP 2019), Suzhou, China, February 26–March 02, 2019.

SCIENTIFIC ASSIGNMENTS INDIA

Applied Statistics Division

Applied Statistics Unit, Chennai

Sen R.:
(1) Chennai Mathematical Institute, April 28-May 05 and May 25-June 25, 2018; (2) IISER, Pune, July 12-16, 2018; (3) DRBCC Hindu College, September 24, 2018; (4) M.O.P. Vaishnav College for Women, Chennai, December 07-13, 2018; (5) Ford Global Data Insight and Analytics (GDI&A) India, Chennai, February 19, 2019.

Applied Statistics Unit, Kolkata

Dewanji A.:
Cochin University of Science and Technology, Cochin, February 19-23, 2019.

Purkayastha S.:
Ramanujan School of Mathematical Sciences, Pondicherry University, October 16-17, 2018.

Applied and Official Statistics Unit, Tezpur

Chungkham H.S.:
Tata Institute of Social Sciences, Regional Centre, Nagaland, February 22-23, 2019.

Interdisciplinary Statistical Research Unit, Kolkata

Mukherjee S.S.:
IISER, Kolkata, February 14, 2019.

Biological Sciences Division

Agricultural & Ecological Research Unit, Kolkata

Banik P.:
(1) The Agricultural Society of India and Institute of Agricultural Science, Calcutta University, Kolkata, June 27, 2018; (2) Department of Planning, Statistics and Programe Monitoring, Govt. of West Bengal, June 29, 2018; (3) Kalyani University, March 25-26, 2019.

Human Genetics Unit, Kolkata

Ghosh S.:
(1) ISMS Meeting, NIMHANS, Bangalore, October 31-November 02, 2018; (2)National Genetics Congress, IARI, New Delhi, December 13-15, 2018; (3)Guru Nanak Dev University, Amritsar, January 08, 2019; (4)IASRI, February 07, 2019; (5) Puducherry University, February 11-15, 2019.

Mukhopadhyay I.:
Department of Statistics, Visva-Bharati, Santiniketan, August 2018.

Chatterjee R.:
(1) Symposium on Moving from Analog to Digital, Mahipalpur, New Delhi, September04, 2018; (2) Saha Institute of Nuclear Physics, Kolkata, September 26-28, 2018; (3) NIBMG and Kalyani University, Kalyani, WB, January 30-February 01, 2019.

Sikdar N.:
(1) 1st Joint Conclave of DBT, Jaipur, Rajasthan ,June 08-10, 2018; (2) Institute of Genetic Engineering, Madhyamgram, West Bengal, September 07, 2018; (3) National Institute of Biomedical Genomics, Kalyani, West Bengal, January 31-February 02, 2019.

Computer and Communication Sciences Division

Advanced Computing and Microelectronics Unit, Kolkata

Chakraborty S.:
(1) Microsoft Research India Lab, Bangalore, January 24-25, 2019; (2) University of Calcutta, January 10, 2019; (3) Chennai Mathematical Institute, January 21-25, 2019;(4) NISER, Bhubaneswar February 07-10, 2019.

Das N:
(1) NIT, Silchar, December 03–07, 2018; (2) 11th International Conference on Communication Systems and Networks, Bangalore, January 07-11, 2019.

Ghosh A.:
Chennai Mathematical Institute, January21-25, 2019.

Mukhopadhyaya K.:
IIT, Guwahati, Assam, February 27–March 02, 2019.

Sur-Kolay S.:
(1) BP Poddar Institute of Management & Technology, Kolkata, September 08, 2018; (2) IEEE WINTECHCON-2018, Bangalore, September 28, 2018; (3) Narula Institute of Technology (JIS Group), Kolkata, November 23-24, 2018 (4) 32ndInternational Conference on VLSI Design, Manekshaw Centre, New Delhi, January 05-09, 2019; (5)Ministry of Electronics and Information Technology, New Delhi, March 30, 2019.

Computer Science Unit, Chennai

Francis M.C.:
(1) St. Berchmans College, Changanassery, Kerala, January 17-19, 2019; (2) SRM Institute of Science and Technology, Chennai, January 04, 2019; (3) IIT, Palakkad, Kerala, July 27, 2018; (4) Institute of Mathematical Sciences, Chennai, November 01, 2018.

Ghosh T.:
(1) Shiv Nadar University, Uttar Pradesh, June 21-23, 2018; (2) IISER, Bhopal, January 20-24, 2019; (3) IIT, Delhi, March 02, 2019.

Karthick T.:
(1) Dhirubhai Ambani Institute of Information and Communication Technology, Gujarat, June 06-10, 2018; (2) Bharathidasan University, Trichy, July 13-August 02, 2018; (3)SSN College of Engineering, Chennai, December 03-05, 2018; (4)Amrita University, January 04-09, 2019; (5) University of Madras, March 06-08, 2019.

Venkateswarlu A.:
CR Rao AIMSCS, Hyderabad, September 05-07, 2018.

Computer Vision and Pattern Recognition Unit, Kolkata

Bhattacharya U.:
(1) NIT, Manipur, December 01-05, 2018; (2) Calcutta University, December 31, 2018-January 12, 2019; (3) Administrative Training Institute, West Bengal, Kolkata, January 08, 2019; (4) The LNM Institute of Information Technology, Jaipur, February 12-16, 2019; (5)Maulana Abul Kalam Azad University of Technology, WB, March 25-29, 2019.

Garain U.:
(1) National Institute of Technology, Durgapur, April 16-20, 2018; (2)Department of Information Technology & Electronics, Govt. of West Bengal, Kolkata, May 18, 2018; (3) AI Labs Academy, Kolkata, July 20, 2018; (4) Confederation of Indian Industry (CII), Eastern Region, September 18–19, 2018; (5) Indian Institute of Management, Ahmadabad, December 07-09, 2018; (6) Jadavpur University, Kolkata, March 26-28, 2019.

Pal U.:
(1) The University of Burdwan, December 21, 2018; (2) NIT. Durgapur, January 09, 2019; (3) University of Calcutta, March 13, 2019.

Cryptology and Security Research Unit, Kolkata

Chakraborty D.:
(1) Indocrypt 2018, New Delhi, December 09-12 2018; (2) NIT, Durgapur, November 12-16, 2018; (3) NIIT University, Neemrana, April 06-07, 2019.

Molla A.R.:
(1) IIT, Guwahati, Assam, February 28-March 02, 2019; (2) IIT, Madras, Chennai, March 11-15, 2019.

Paul G.:
(1) Defence Research & Development Organisation (DRDO) Bhawan, New Delhi, October 05, 2018; (2) NIT, Durgapur, November 12-16, 2018; (3) IISER, Kolkata, December 19-23, 2018; (4)IIT, Hyderabad, January 11-13, 2019

Ruj S.:
(1) Blockhash live, Kerala, December 06-08, 2019; (2) Global Blockchain Conference, New Delhi, February 14-15, 2019; (3) National Workshop on Blockchain Technology, Pondicherry, March 22-23, 2019; (4) NetApp India Pvt. Ltd., Bangalore, March 29, 2019.

Documentation Research and Training Centre, Bangalore

Dutta B.:
NIT, Durgapur, May 14-17 2018 and December 17-21, 2018.

Krishnamurthy M.:
(1) Bharathiar University, Coimbatore, Tamil Nadu, May 26, 2018. (2)Goa University, Goa, June 15, 2018. (3) University of Mysore, Mysore, August 04, 2018; (4) Bangalore University, Bangalore, August 13, 2018; (5) Bharathidasan University, Trichy, Tamil Nadu, August 29, 2018; (6) Karnataka University, Dharwad, Karnataka, September 25, 2018; (7) Calicut University, Calicut, Kerala,December04, 2018; (8) Population Research Centre, Institute for Social Economic Change, Bangalore, January 04, 2019; (9)Jain University, Bangalore, January 25, 2019; (10)Tumkur University, Karnataka, February 16, 2019.

Madalli D.P.:
(1) Shillong College, Meghalaya, September 03-06, 2018; (2) NASSCOM, Bangalore, October 26, 2018; (3) IGNCA, New Delhi, December 03-06, 2018;(4)St. Thomas' College, Thrissur, Kerala, December 17-18, 2018.

Prasad A.R.D.:
(1) Central University of Gujarat, Gandhinagar, April 17–20, 2018; (2) Central University, Lucknow, May 07-09, 2018; (3) TISS, Mumbai, May 21-24, 2018; (4) Public Library Survey of National Mission on Libraries NML, New Delhi, June 15, 2018; (5) Gokhale Institute of Politics and Economics, Pune, August 20-25, 2018; (6) NACLIN, Vishakapatnam, October 04-06, 2018; (7) TISS, Mumbai, October 25-26, 2018; (8) Andhra University, Vishakapatnam, November 27-29, 2018; (9) IGNCA, New Delhi, December 03-06, 2018; (10) St. Thomas' College, Thrissur, Kerala, December 17-18, 2018; (11) Librarians Training Programme, Dharwad, December 31 2018; (12) NCERT, New Delhi, January 08-09, 2019; (13) University of North Bengal, West Bengal, January 06-08, 2019; (14) Sri Venkateswara University Library, Tirupati, January 18, 2019; (15) Cochin University of Science and Technology, Cochin, March 26, 2019.

Electronics and Communication Sciences Unit, Kolkata

Chanda B.:
(1) NIT, Durgapur, April 19, 2018; (2) Indian Institute of Information Technology & Management, Trivandrum, Kerala, May 30-31, 2018; (3) St Thomas' College of Engineering & Technology, Kolkata, June 11, 2018; (5) IIT, Kharagpur, August 11-12, 2018; (6) Institute of Engineering and Management, Kolkata, September 15, 2018; (7)IIIT, Kalyani, October 28–30, 2018; (8) IIIT, Hyderabad, December 18, 2018; (9) Techno Main, Salt Lake, Kolkata,January07-11, 2018; (10) University of Calcutta (Salt Lake Campus), January 29-31, 2019; (11) IIT Jodhpur, March 9-10, 2019.

Das S.:
(1) IIT, Kanpur, December 05-07, 2018; (2) NIT, Jalandhar, December 21–23, 2018(3) TIFR, Bangalore, December 27-29, 2018; (4) IIEST, Shibpur, WB, January 20–21, 2019.

Mukherjee D.P.:
(1) NIT Durgapur, April 16, 2018;(2) IIT Kharagpur, May 18, 2018; (3) Innovation in Imaging Technology, Shell Science Council Symposium, Bengaluru, January 31, 2019; (4) Brainware University, February 02, 2019; (5) IIT, Kharagpur, March 23, 2019; (6) Ramakrishna Mission Vivekananda Educational and Research Institute, Howrah, March 30, 2019.

Machine Intelligence Unit, Kolkata

Bhattacharyya M.:
IIT, Kharagpur, October 03-04, 2018.

Ghosh A:
(1)Shri Mata Vaishno Devi University, Jammu, April 03-07, 2018; (2) NIT, Agartala, April 09-13, 2018; (3) Hyderabad Central University, Hyderabad, April 24, 2018; (4) Institute for Development and Research in Banking Technology, Hyderabad, April 24 and June 07-08, 2018; (5) GMR Institute of Technology, Visakhapattam, April 26-27, 2018; (6) South Asian University, Delhi, May 12, 2018; (7) National Remote Sensing Agency, Hyderabad, June 08, 2018; (9) NIT, Silchar, October 05, 2018; (10) Indian International Science Fair (IISF), Lucknow, October 07, 2018; (11) IEEE-CIS Summer School, Hyderabad, November 23-24, 2018; (12) Vellore Institute of Technology, Vellore, February 21, 2019; (13) SSN College of Engineering, Chennai, February 21-23, 2019.

Ghosh K.:
(1) North-Eastern Hill University, June 25, 2018; (2) S.N. Bose National Center for Basic Sciences, September 18-20, 2018; (3) ACM India Joint International Conference on Data Science & Management of Data (CoDS-COMAD 2019), January 05, 2019; (4) University of Calcutta, January 11, 2019; (5) Ali Yavar Jung National Institute of Speech and Hearing Disabilities, Kolkata, February 15, 2019.

Mitra S.:
(1) Member, Board of Studies, Dept. of Computer Science & Engineering, Tezpur University, 2019;(2) Member, Board of Studies, Dept. of Information Technology, Govt. College of Engineering and Ceramic Technology, Kolkata (autonomous), 2019;(3) Member, PG Board of Studies, Surendranath College, 2019; (4) Member, Sectional Committee II, Indian National Academy of Engineering, 2019.

Systems Science and Informatics Unit, Bangalore

Meher S.K:
(1) VBIT, Hyderabad, June 18-23, 2018; (2) Seemanta Engineering College, Majurbhanj, Odisha, July 07-14, 2018; (3) PES University, Bangalore South Campus, July 16-18, 2018; (4) Sri Sivani College of Engineering, Srikakulam, Andhra Pradesh, September 18-20, 2018; (5) Veer Surendra Sai University of Technology (VSSUT), Sambalpur, Odisha, December 15-16, 2018; (6) Periyar University, Salem, March 21-22, 2019.

Sagar B.S.D:
(1) Member of Doctoral Committee, IIT, Bombay, 2018-19; (2) Member of Doctoral Committee, University of Hyderabad, 2018; (3) Member of Doctoral Panel Committee, Indian Institute of Space Science and Technology, Trivandrum, 2018-19; (4) Doctoral Thesis Examination Committee, Nirma University, Ahmedabad, 2018; (5)RV College of Engineering, Bangalore, November 30, 2019; (6) Ramaiah Institute of Technology, Bangalore, March 12, 2019; (7) Periyar University, Salem, March 21, 2019;(8) VC Lecture, Group-6 of Chandrayaan-2 Project Members, Ahmedabad,20 March 2019.

Library and Documentation Sciences Division

Library, Kolkata

Satpathy KIshor Chandra:
(1) Indian Institute of Management, Bangalore, February 27, 2019; (2) eBook Forum on "Evidence & Impact: Transforming Research Through Analytics and Insights", Guwahati, May 21-23, 2019; (3) Springer Nature eBook Conclave, Jaipur, August 27-28, 2018; (4) Dr. Harisingh Gour Vishwavidyalaya, Sagar, MP, September 11, 2018.

Physics and Earth Sciences Division

Geological Studies Unit, Kolkata

Chakraborty T.:
(1) GeoIndia 2018, New Delhi, September08, 2018; (2) Presidency University, Kolkata, September 07, 2018.

Ghosh P.:
Hydrogeological Field Survey, Rayagada, Orissa (west), February 08-12, 2019.

Saha D.:
(1) University of Delhi, New Delhi,October 04-06, 2018; (2) University of Calcutta, June 01, September 28, November 20, 2018 andFebruary 28, 2019; (3)Jadavpur University, October 01, 2018.

Sengupta D.P.:
(1) Presidency University, Kolkata, September 24, December 12, 2018 andMarch 14, 2019; (2) Presidency University, Kolkata, October 12, 2018 and March 08, 2019.

Physics and Applied Mathematics Unit, Kolkata

Basu B.:
DAIICT, Gandhinagar, December 10, 2018.

Ghosh D.:
Jawaharlal Nehru University, New Delhi, October 11–14, 2018.

Ghosh S.:
Deshbandhu College, Delhi University, January 17–19, 2019.

Kar G.:
(1) Raman Research Institute, Bengaluru, April 30–May 04, 2018; (2) National Workshop on Quantum Information and Information Security (NWQIIS), IIT, Hyderabad;(3) IMSc, Chennai, October 15–23, 2018.

Maiti S.K.:
(1) BBK DAV College, Amritsar, Punjab, September 07, 2018; (2) Ramkrishna Mission Vidyamandir, Belur Math, Howrah, February 07, 2019; (3) Neotia University, Jhinga, Sarisa,March 01, 2019.

Pal S.:
(1) RGIPT, Amethi, Uttar Pradesh, August 20, 2018; (2) Presidency University, Kolkata, September 19, 2018; (3) IACS, Kolkata February 25–27, 2019; (4) IACS, Kolkata, February 25-27, 2019; (5) Visva-Bharati University, Santiniketan, September 08, 2018;(6) Indian Association for theCultivation of Science, Kolkata, Oct 11, 2018; (7) Inter-University Centre for Astronomy and Astrophysics, Pune, March 07-09, 2019.

Roy B.:
(1) Visva-Bharati, Santiniketan, September 17, 2018; (2) External examiner of Ph.D. Thesis and Viva-voce examiner, NIT Agartala, November 05-06, 2018.

Social Sciences Division

Economic Analysis Unit, Bangalore

Swaminathan M.:
(1) Tata Institute of Social Sciences, Mumbai, July 12-13, 2018; (2) Calicut University, September 09–October 31, 2018; (3) 78th Annual Conference of the Indian Society of Agricultural Economics, New Delhi, November 01-03, 2018; (4) Golden Jubilee Conference of Nutrition Society of India, Hyderabad, November 15-17, 2018; (5) International Conference on Women's Work in Rural Economies, Vayalar, Kochi, November 30-December 02, 2018; (6) Azim Premji University, January 30, 2019; (7) Centre for Development Studies, Thiruvananthapuram, February 14-28, 2019.

Chattopdhyay M.:
(1) 44th All India Sociological Conference, Mysore, Dec 27-29, 2018; (2) International conference on Women's Work in Rural Economies, Vyalyar, Kochi Nov 30-Dec 2, 2018.

Economics and Planning Unit, Delhi

Afridi F.:
(1) IIM, Bangalore, May 10, 2018; (2) TIFR, Bangalore, May 11, 2018; (3)Indian School of Business, Hyderabad, July 06-07, 2018; (4) IIPS Workshop, Mumbai, October 08, 2018;(5) Workshop on Empirical and Computational Social Sciences, TCPD, Ashoka University, December 14, 2018; (6) Jadavpur University, March 13, 2019.

Ghate C:
(1) Ramanujan Distinguished Lecture in Economics, Ramanujan College, September 13, 2018. (2) St. Stephens College, New Delhi, September 07, 2018; (3) IIT Kharagpur, October 31, 2018; (4) Ashoka University, November 9, 2018;(5) Shiv Nadar University, Uttar Pradesh, March 23, 2019;(6)IIM, Ahmedabad, February 28, 2019.

Mukhopadhyay A.:
(1) IISER, Bhopal, March 2019; (2) Ashoka University, October 2018; (3) RBI, June 2018.

Ray T.:
(1) National Institute of Educational Planning and Administration (NIEPA), New Delhi, June 26, 2018 and February 12, 2019; (2) IIM Bangalore, July 14-15, 2018; (3) IIM Bangalore, July 28-29, 2018; (4) XIII International Conference on Public Policy and Management, New Delhi, August 23-25, 2018; (5) South Asian University, New Delhi, October 05, 2018.

Somanathan E.:
(1) Field Research, Indore, Madhya Pradesh, June 06-08 2018 (2) NCBS, Bangalore, July 05, 2018;(3) Madras School of Economics (MSE), Chennai, July 12-13, 2018; (4) IISC, Bangalore, July 26, 2018; (5) Interdisciplinary Global Environmental Health Collaborations Conference, October 30, 2018; (6) CECFEE Annual Workshop, Goa, November 16-17, 2018; (7) Research for Policy Action on Air Pollution – As part of CPR Dialogues in collaboration with CECFEE, Delhi, December 17, 2018; (8) Tezpur University, March 06-08, 2019.

Economic Research Unit, Kolkata

Kabiraj T.:
(1) West Bengal State University, May 29 and December 12, 2018; (2) FLAME University, Pune, March 01-05, 2019; (3) Gokhale Institute of Politics and Economics, Pune, March 04, 2019.

Mitra M.:
The Department of Mathematics, Dibrugarh University in collaboration with Queen's Management School, Queen's University, Belfast, UK. September 13-15 2018.

Sarkar N.:
(1) St. Xavier's University, Kolkata, November 28, 2018; (2) NIT, Durgapur, December 05-06, 2018; (3) Annual Conference of Indian School of Business & Management and Indian Economic Association, January 19, 2019; (4) Tezpur University, Tezpur, Assam, January 28, 2019.

Sarkar A.:
Raigunge University, February 03, 2019.

Linguistic Research Unit, Kolkata

Dash N.S.:
(1) Jadavpur University, Kolkata, June 21,2018; (2)Aliah University, Kolkata, November 30, 2018; (3)ICFOSS, IITM-K, Technopark, Trivandrum, Kerala, January 24 2019; (4) Sarsuna College, Kolkata, February 25 2019; (5) IIT, Kharagpur, March 02 2019; (6)Vidyasagar University, Midnapore,March 19, 2019; (7)IIT, Patna, January 11-12, 2019; (8) School of Sanskrit and Indic Studies, Jawaharlal Nehru University, New Delhi, October 11-13, 2018; (9) Jawaharlal Nehru University, New Delhi, February 15-17, 2019; (10)Institute of Engineering and Management, Kolkata, July 26-28, 2018; (11) Rabindra Bharati University and Byanjanbarna Foundation, Kolkata, April 26-27, 2018; (12) Jadavpur University, Kolkata, June 21-23, 2018; (13) Central Institute of Indian Languages, Mysore, Karnataka, December 05-07, 2018;(14) Jawaharlal Nehru University, New Delhi, February 15-17, 2019; (15) Sarsuna College, Kolkata, February 25-26, 2019;(16)Advisory Committee Member, Technological Development of Rajasthani Language, JRN Rajasthan Vidyapeeth, Udaipur, Rajasthan, April 2018-March 2019; (17) Member, Research Advisory Committee-PhD and MPhil Scholars, Jadavpur University, Kolkata: April 2018-March 2019.

Population Studies Unit, Kolkata

De P.:
Jadavpur University, Kolkata, November 15and November 24, 2018.

Psychology Research Unit, Kolkata

Chatterjee G.:
Indian Institute of Management, Ahmedabad, February 28, 2019.

Datta S.:
NIMHANS, Bangalore, September 28– 29, 2018.

Dutta Roy D.:
(1) Vinoba Bhabe University, Hazaribagh, Jharkhand, August 13-17, 2018; (2) R.G. Kar Medical College, Kolkata, August 31, 2018; (3) Department of Psychology and Centre with Potential for Excellence in particular Area (UGC-CEPA),September 07-08, 2018; (4)Symbiosis Teaching Learning Resource Center, Symbiosis International, January 28-31, 2019; (5) Sharda University, Greater Noida, February 11-13, 2019.

Khatoon M.:
Andhra University, October 11-13, 2018.

Sampling and Official Statistics Unit, Kolkata

Chakraborty A.B.:
Member, Advisory Committee on National Accounts Statistics, Ministry of Statistics and Programme Implementation, Govt. of India, Since 2017-till date.

Chattopadhyay N.:
Member, Working group for the 73rd Round of NSS, NSSO, Since 2014 and onwards.

Dihidar K:
(1) NEHU, TURA Campus, Meghalaya, August 03-11, 2018; (2) Sikkim Government College, September 22-28, 2018.

Kar A:
(1) Member, Standing Committee on Labour Force Statistics (SCLFS), National Commission of Statistics, Since July 2018-till date;(2) Member, Standing Committee on Services Sector and Unincorporated SectorEnterprises (SCSSUSE),Since October 2018-till date.

Mitra S.:
Invited Lecture, Reserve Bank of India, December 18, 2018.

Sociological Research Unit, Kolkata and Giridih

Behera H.C.:
(1) Vinoba Bhave University, Hazaribagh, Jharkhand, May 16-22, 2018; (2) Pune University, February 21-23, 2019.

Bharati S.:
(1)West Bengal State University, Barasat, December 23, 2018; (2) Lovely Professional University, Jalandhar, Punjab, January 06, 2019.

Ghosh B.N.:
(1) Member, Jury Board of Indian Chamber of Commerce (ICC Social Impact), January 10, 2019; (2) Vidyasagar University, Midnapore, February 07-08, 2019; (3) Amity University, Uttar Pradesh, January 23-24, 2019; (4) Jawaharlal Nehru University, New Delhi, December 10-12, 2018; (5) Rabindra Bharati University, Kolkata, December 20, 2018.

Socio-Economic Research Unit, North-East Centre, Tezpur

Goswami M.P.:
Dibrugarh University, September 13-15, 2018 and March 25-30, 2019.

Statistical Quality Control and Operations Research Division

SQC & OR Unit, Bangalore

Gijo E.V.:
(1) Kerala University, Trivandrum, December 13-15, 2018; (2) Karnataka Science and Technology Academy, Bangalore, June 20, 2018; (3) R V College of Engineering, Bangalore, December 22, 2018.

John B.:
(1) Sri Ramakrishna Engineering College, Coimbatore, June 22, 2018; (2) JSS Academy of Technical Education, Bangalore, July 24, 2018; (3) Crescent Institute of Technology, Chennai, November 02, 2018; (4) Loyola ICAM College of Engineering and Technology, Chennai, January 07, 2019.

Perumallu P.K.:
Kerala University, Trivandrum, December 13-15, 2018.

SQC & OR Unit, Chennai

Sampangi Raman D.:
(1) Vellore Institute of Technology, Vellore, February 20, 2019; (2) Presidency College, Chennai, March 06, 2019; (3) Bharathiyar University, Coimbatore,January 30, 2019.

SQC & OR Unit, Coimbatore

Rajagopal A:
(1) Bharathiar University, May 03, 2018; (2) Acharya Nagarjuna university, February 01, 2019; (3) Kumauraguru College of Technology, October 11, 2018; (4) KG Post Graduate Medical Centre, June 11, 2018;(5) Ganga Post Graduate Medical Centre, June 02, 2018; (6) Paper Presentation, CODISSIA, Coimbatore, October 27, 2018; (7) Annual Conference of Indian Orthopaedic Association (IOACON), Coimbatore, November 28-29, 2018; (8) Acharya NG Ranga Agricultural University, SV College of Agriculture, Tirupati, January 29–31, 2019; (9) MS Ramaiah University of Applied Sciences, Peenya, Bangalore, March 21-23, 2019; (10) Acharya Nagarjuna University, Vijayawada, February 01, 2019.

SQC & OR Unit, Kolkata

Chakraborty A.K.:
(1) NIT, Silchar, August 10-14, 2018; (2) NIT, Durgapur, November 14, 2018; (3) S.P.Jain Global Management School, Mumbai, January 26, 2019.

Theoretical Statistics and Mathematics Division

Stat-Math Unit, Bangalore

Raja C.R.E:
IIT, Jodhpur, February 07-08, 2019.

Rajarama Bhat B.V.:
(1) INSA, New Delhi, April 25-26 and May 2 and July 23, 2018; (2) DST-DBT Scientific Conclave and evaluation of INSPIRE Faculty Fellows, Jaipur, June 08-10, 2018; (3) IIT, Madras, June 18-22 and June 28, 2018; (4) RV College of Engineering, Bangalore, June 27, 2018; (5) Indian Academy of Sciences, June 29-30, 2018; (6) IISc, Bangalore, July 20, 2018 and February 28, 2019; (7) IIT, Kanpur, October 04, 2018 and March 04, 2019; (8) KLE University, Belagavi, October 04, 2018; (9) Alagappa University, Karaikudi February 19, 2019.

Rajeev B.:
(1) Calicut University, Kerala, August 03, 2018; (2) IIT, Kanpur, October 24-26, 2018; (3) University of Kerala, Trivandrum, December 12-17, 2018 and March 07-09, 2019.

Sarkar J:
(1) IIT, Kanpur, April 26-28, 2019; (2) IISER Kolkata, May 02-05, 2018; (3) NISER, Bhubaneswar, September 04-07, 2018; (4) Bhawanipur Education Society College and St. Xavier's College, Kolkata, September 12-19, 2018; (5) Sardar Patel University, November 20-22, 2018; (6) Himachal Pradesh University, Shimla, November 23-25, 2018;

(7)University of Delhi, Delhi, December 18-22, 2019; (8)Indian Academy of Science, Coorg, December 07-09, 2018; (9) Ashoka University, Delhi, January-February 28-March 01,2019; (10) Periyar University, Salem, February 06-07, 2019; (11)LNMIIT, Jaipur, March 11-15, 2019; (12) University of Jammu and Jammu Mathematical Society, Jammu, March 27-30, 2019.

Stat-Math Unit, Delhi

Bandyopadhyay A.:
NISER, Bhubaneswar, July 09–13, 2018.

Jain T:
(1) ICTS, Bengaluru, May 15-16, 2018; (2) Conference ICTS-TIFR, Bengaluru, September 07–12, 2018; (3) NISER, Bhubaneswar, October 27-28, 2018.

Laishram S:
(1) TIFR, Mumbai, 18-22 April 2018; (2) HRI, Allahabad, May 20-June 13, 2018; (3) IIT, Guwahati, June 11-23, 2018; (4) HRI, Allahabad, September 26-29 and October 08-11, 2018; (5) BITS, Goa, December 02-06, 2018; (6) RKMVERI, Belur, Kolkata January 10-12, 2019; (7) Bhaskaracharya Pratisthan, Pune, January 12-16, 2019; (8) IMSc, Chennai, January 16-18, 2019; (9) IISER, Mohali, January 26-28, 2019; (10) TIFR Mumbai, January 30-February 04, 2019; (11) NISER, Bhubaneswar, February 08-10 2019 and March 01-03 2019; (12) Manipur University, Imphal, March 11-16, 2019.

Pal A.K.:
Kerala School of Mathematics, November 22–25, 2018.

Roy R.:
NISER, Bhubaneswar, July 09-13, 2018.

Sarkar A.:
(1) NISER, Bhubaneswar, July 15 – 20, 2018; (2) IIM, Bangalore, January 21–25, 2019.

Sarkar D.:
IIM, Indore, July 02 –04, 2018.

Stat-Math Unit, Kolkata

Basu S.:
Calcutta University, Kolkata, February 21, 2019.

Bose A.:
(1) TIFR, School of Computer Science, Mumbai, August 31, 2018; (2) Ashoka University, Sonepat, February 05, 2019; (3) ICTS, Bengaluru, January 14-February 08, 2019.

Choudhury U.:
(1) TIFR Mumbai, July, 2018; (2) IISER, Pune, November, 2018; (3) IISER Pune, July, 2018.

Dutta A.K.:
(1) Ramakrishna Mission Institute of Culture, April 03, 06, 13-14, 17, 27-28, May 19, 22,2018 and March 01-02, 09, 16, 2019; (2)Sri Aurobindo Pathamandir, June 09, 2018; (3)Department of Statistics, University of Calcutta, November 01,2018; (4) SMVD University, Jammu, November 27-28, 2018.

Datta M.:
(1) IISER-NISER meeting, IISER, Bhopal, July 07-08, 2018; (2) NISER, Bhubaneswar, October 27-28, 2018; (3)IISER, Bhopal, December 03-14, 2018.

Ray S.K.:
(1)Presidency University, July 19-20, 2018; (2) IIT Bombay, August 22-25, 2018; (3) IISER Bhopal, December 13-20, 2018; (2) NISER, Bhubaneswar, December 24-29, 2018.

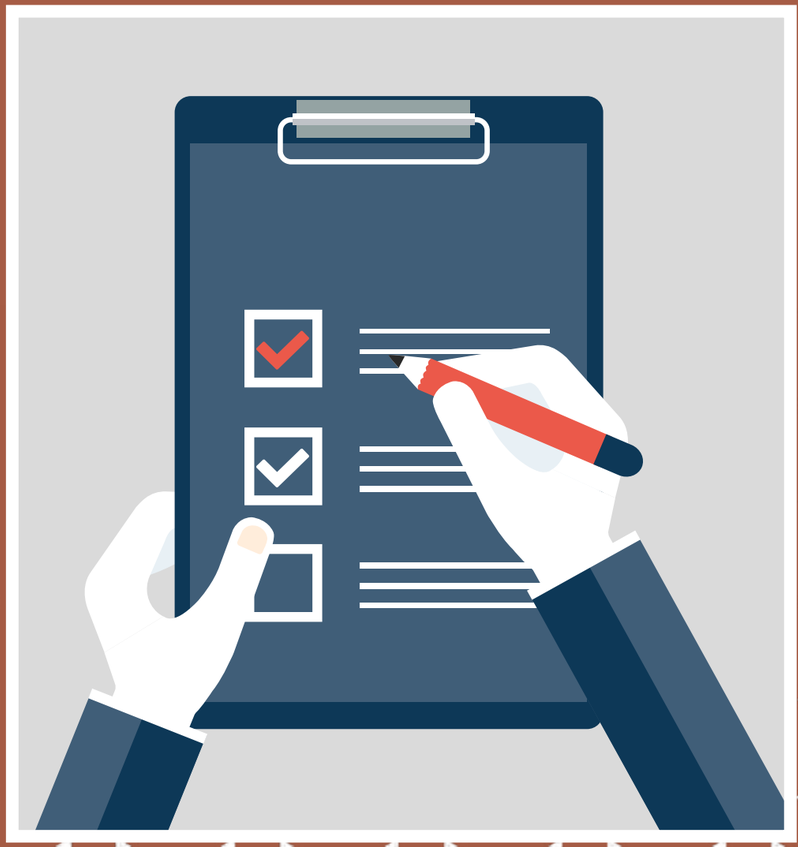
Center for Soft Computing Research: A National Facility, Kolkata

Ghosh A.:
(1) SSN College of Engineering, Chennai, February 21-23, 2019; (2) Vellore Institute of Technology, Vellore, February 21, 2019; (3)IEEE-CIS Summer School, Hyderabad, November 23-24, 2018; (4) Invitation Lecture, Indian International Science Fair, Lucknow, October 07, 2018; (5) NIT, Silchar, October 05, 2018; (6) National Remote Sensing Agency, Hyderabad, June 08, 2018; (7) Institute for Development and Research in Banking Technology, Hyderabad, April 24 and June 07-08, 2018; (8) South Asian University, Delhi, May 12, 2018; (9) GMR Institute of Technology, Visakhapattam, April 26-27, 2018; (10) Hyderabad Central University, Hyderabad, April 24, 2018; (11) NIT, Agartala, April 09-13, 2018; (12) Shri Mata Vaishno Devi University, Jammu, April 03-07, 2018.

Ghosh K.:
(1) Ali Yavar Jung National Institute of Speech and Hearing Disabilities, August 09, 2018; (2) NIT, Patna, January 09, 2019; (3) Ramkrishna Mission Residential College(Autonomous), Narendrapur, March 15, 2019.

Pal S.K.:
(1) NIT, Agartala, Tripura, April 08-10, 2018; (2) National Institute of Plant Genome Research, New Delhi, April 28, 2018; (3) Biotechnology Industry Research Assistance Council (BIRAC), Department of Biotechnology, New Delhi, May 07-10 and November 01-02,2018; (4) DIT University, Dehradun, May 10-12, 2018; (5) MAKAUT, Kolkata, May 26, 2018;(6) TCS Research and Innovation, Embedded Systems and Robotics Lab, Kolkata, June 06, 2018; (7) SRM University, Amaravati, Andhra Pradesh, June 19-20, 2018; (8)The National Academy of Sciences, Allahabad, July 18-21, 2018; (9) IIT, Patna, August 06, 2018; (10) Maulana Azad National Institute of Technology (MANIT), Bhopal, August 24-27, 2018; (11) Indian Agricultural Research Institute, New Delhi, September 04-05, 2018; (12) IIT, Guwahati, September 17-18, 2018; (13) NIT, Calicut, Kozhikode, Kerala, September 29, 2018; (14) CSIR-NML, Jamshedpur, October 04-07, 2018; (15) RCC Institute of Information Technology, Kolkata, November 22, 2018; (16) Mahatma Gandhi Chitrakoot Gramoday Vishwavidyalaya Chitrakoot, Satna, Madhya Pradesh, December 05-09, 2018; (18) IIT, Kharagpur, March 07-08, 2019; (19)Banaras Hindu University, Varanasi, March 29-30, 2019.

ADMINISTRATIVE SERVICES DIVISION



ADMINISTRATIVE SERVICES DIVISION

Staff Affairs

1. 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, Bangalore, Chennai and Tezpur, each having a number of scientific units, by and large are getting administrative support from the administrative units/sections there. The Administrative Services Divisions of the Institute has the following units at the Headquarters in Kolkata:

Sl. No.	Name of the Unit	Sl. No.	Name of the Unit
1.	Accounts Section	16.	Import & Travel Cell
2.	Audio-Visual Unit	17.	Internal Audit Cell
3.	Canteen Unit	18.	Legal Cell
4.	Cash Unit	19.	Medical Expenses Reimbursement Unit
5.	CE (A & F)'s Office	20.	Medical Welfare Unit
6.	Despatch Unit	21.	Personnel Unit
7.	Central Stores	22.	Provident Fund Unit
8.	Council Section	23.	Public Relations Unit
9.	Director's Office	24.	Printing and Publication Unit
10.	Electrical Maintenance Unit	25.	Official Language Cell
11.	Engineering Unit	26.	Retirement Benefit Cell
12.	Estate Office	27.	Security Unit
13.	Guest House	28.	Telephone Unit
14.	Hostels	29.	Transport Unit
15.	House Building Advance Cell	30.	SC / ST / OBC Cell

2. Apart from the above mentioned Units, there are few cells dealing with Budget, and other issues 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 Canteens 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 constructional activities of the Institute at its Headquarters and also at outlying centres/ branches. A brief report on the construction and other activities during the year is narrated in the subsequent paragraphs.

   The Administrative activities in the four Centres, namely Delhi, Bangalore, Chennai and North East Centre at Tezpur and in other outlying branches of the Institute and Giridih Office, are more or less similar to the Headquarters but on a much smaller scale.

3. **Office bearers of the Institute Administration during the year:**

Director	:	Professor Sanghamitra Bandyopadhyay
Professors-in-Charge of Scientific Divisions	:	Professor B.V. Rajarama Bhat (Theoretical Statistics & Mathematics) Professor Sumitra Purkayastha (Applied Statistics) Professor E. Somanathan (Social Sciences) Professor Parthasarathi Ghosh (Physics & Earth Sciences) Professor Susmita Mukhopadhyay (BiologicalSciences) Professor Bhabatosh Chanda (Computer & Communication Sciences)

Head, SQC & OR	:	Dr. Ashis Kr. Chakraborty
Head, Delhi Centre	:	Professor Abhay G. Bhatt
Head, Bangalore Centre	:	Professor C.R.E. Raja
Acting Head, Chennai Centre	:	Dr. D. Sampangi Raman
Head, North-East Centre, Tezpur	:	Professor Nityananda Sarkar
Dean of Studies	:	Professor Goutam Mukherjee
Chief Executive (A & F)	:	Brigadier Jagdish Narayan Pandey (Retd.)

4. List of workers joined/ retired/ voluntarily retired/ resigned/ terminated/ died during the year

A. Appointments

(i) Scientific / Technical Workers

Srl. No.	Name	Srl. No.	Name
1.	Samik Basu	7.	Abhik Ghosh
2.	Partha Sarathi Chakraborty	8.	Arijit Ghosh
3.	Utsav Choudhury	9.	Anisur Rahaman Molla
4.	Sourav Chakraborty	10.	Darpa Saurav Jyethi
5.	Monali Mitra (Paladhi)	11.	Sanjit Maitra
6.	Malay Bhattacharyya	12.	Kushal Banik Chowdhury

(ii) Non-Scientific Workers

Srl. No.	Name	Srl. No.	Name
1.	Brig Jagdish Narayan Pandey	6.	Vikrant Kumar
2.	Bhaskar Kalita	7.	Sanjit Mondal
3.	R. Sridharan	8.	Srinibash Sarder
4.	Pratyush Banerjee	9.	Gurudayal Mandal
5.	Vivek Agarwal	10.	Kousik Ghosh

B. Retirement/Voluntary Retirement:

(i) Scientific & Technical Workers

Srl. No.	Name	Srl. No.	Name
1.	Ashis SenGupta	13.	Debaprasad Bandyopadhyay
2.	Pinaki Roy	14.	Himani Bhattacharya
3.	S. Krishnappa	15.	Suparna Shome
4.	P. Narendar	16.	Ranjit Mandal
5.	Prakash Wati	17.	Bhaskar Bagchi
6.	C. Periasamy	18.	Parasmani Dasgupta
7.	Bhargab Bikram Bhattacharya	19.	Bharat Ramaswami
8.	Lakshman Kr. Halder	20.	T.S.S.R.K. Rao
9.	Manoranjan Pal	21.	Roma Choudhury Sahu
10.	Jaba Mukherjee	22.	Madhabi Banerjee
11.	Swapan Kr. Parui	23.	Bhola Nath Ghosh
12.	Probal Dasgupta		

(ii) Non-Scientific Workers

Srl. No.	Name	Srl. No.	Name
1.	Jamini Bhattacharaya	20.	Kalipada Roy
2.	Darshana Bhatia	21.	Susanta Kr. Dey
3.	V. Balachandran	22.	Ram Kumar
4.	G. Ramachandra	23.	Bhikari Routh
5.	Sukumar Saha	24.	Subal Ch. Bag
6.	Dilip Kr. Bhattacharyya	25.	Samir Kr. Das
7.	Dipak Barua	26.	Subir Mukherjee
8.	Uttam Dey	27.	Aloke Mondal
9.	Ashok Kr. Seal	28.	Satyajit Bhattacharya
10.	A.R. Vaidya	29.	Gour Ch. De
11.	Ramesh Prasad	30.	Manik Kr. Dey
12.	Krishan Chand Mahato	31.	Prafulla Purkait
13.	Soumitra Chakraborty	32.	Bharat Hazra
14.	Arun Kumar Tiwari	33.	Sunil Mallick
15.	Trishna Chatterjee	34.	Satyajit Malakar
16.	Ranen Das	35.	Nithish Biswas
17.	Kamlu Lal Mallick	36.	Mahavir Singh
18.	Amal Krishna Biswas	37.	Tapan Kr. Das
19.	Aniruddha Karmakar		

C. Resignation/Discontinuation of Deputation

(i) Scientific Worker

1. S. Ponnusamy

(ii) Non - Scientific Worker

1. Amitabh Mukerjee
2. Vivek Agarwal
3. Bhaskar Kalita

(iii) Relieved: Non-Scientific Worker

1. Kaisar Alam

D. Death

(i) Non - Scientific Worker

Srl. No.	Name	Srl. No.	Name
1.	Sukumar Biswas	5.	Lal Bahadur
2.	Bablu Das	6.	Goutam Nath
3.	Ashok Kumar	7.	Sagar Dutta
4.	Kartick Ch. Bhowmick	8.	Jayanta Saha

5. Number of workers in the Institute as on 31st March 2019

Number of workers in the Institute as on 31st March 2019:

(i)	Scientific and Technical Workers-		360
(ii)	Non-Scientific Workers	-	395
		Total :	755

6. Breakup of manpower by Gender, Social Category and Disability group as on 31st March 2019

Total Strength		Persons with Disabilities (PWD)	Scheduled Caste (SC)	Scheduled Tribe (ST)	Other Backward Classes (OBC)	Minorities
Male	643	06	84	21	67	21
Female	112	01	11	01	04	02
Total	755	07	95	22	71	23

7. Annual Return on Cases of Sexual Harassment

1.	Number of complaints of sexual harassment received in the year	Headquarters - 1 Bangalore Centre - 2
2.	Number of complaints disposed off during the year 2018-19	Headquarters - 1 Bangalore Centre - 2
3.	Number of cases pending for more than 90 days	Nil
4.	Number of workshops on awareness programmers against sexual harassment conducted during the year	Nil
5.	Nature of action	Bangalore Centre - Situation resolved through warning the concerned party. Headquarter – Suitable action taken

RIGHT TO INFORMATION ACT (RTI)

Applications received and action taken by the Institute under RTI Act, 2005

Name of the Appellate Authority:

1. Professor Sanghamitra Bandyopadhyay, Director, ISI Kolkata.
2. Brig. Jagdish Narayan Pandey (Retd.), CE(A&F), ISI Kolkata.
3. Dean of Studies.
4. Head, Delhi Centre.
5. Head, Bangalore Centre.
6. Head, North-East Centre.
7. Head, Chennai Centre.

Name of Central Public Information Officer:

1. Shri Samapan Padhi, Dy. CE (Admn.), ISI Kolkata.
2. Shri Durgam Giri, Sr. AO, ISI Kolkata.
3. Shri Anjan Mookherjee, Sr. AO, ISI Kolkata.
4. Dy. CE (Admn.), Delhi Centre.
5. Ms. Ashwini Ganesh Tambe, Dy. CE(Admn.), Bangalore Centre.
6. Sr. AO, North-East Centre.
7. AO, Chennai Centre.

The summary statement in this regard for the year 2018-19 is given below: -

No. of Applications received	No. of cases accepted	Decisions where requests were fully or partially rejected		No. of decisions from Appellate Authority	C I C decision			Amount collected (Rs.)		
		Fully rejected	Partially rejected		No. of decisions received	Penalty imposed	Disciplinary action, if any	Fee	Other Charges	Penalty amount
126	125	01	Nil	23	01	NIL	NIL	1030	2958	NIL

RTI Training Programme by MoSPI at NSSO, Kolkata during January 23-25, 2019

OTHER ADMINISTRATIVE ACTIVITIES

Budget and Finance

For the year 2018-2019, ISI Council recommended Rs.29599.52 lakhs under salary head Rs.19377.87 lakhs under 'Creation of Assets' head and Rs.5123.32 lakhs under General Head (BE). The Government approved a sum of Rs.20398.00 lakhs, Rs.4749.10 lakhs and Rs.2795.00 lakhs for salary, capital and general expenditure respectively. At the revised estimate stage, the Institute sought for a grant of Rs.27249.00 lakhs, Rs.5779.10 lakhs and Rs.4145.00 lakhs under salary, capital and general respectively, which was also recommended by the ISI Council. The Government sanctioned Rs.24260 lakhs, Rs.4749.10 lakhs and Rs.2940.00 lakhs under salary, capital & general heads respectively. The revenue expenditure was more by Rs.534.73 lakhs from the fund allotted by the Ministry and Miscellaneous receipt. Capital Expenditure was Rs.102.63 Lakhs more than the fund allotted. The Audited Annual Accounts of the Institute for the year 2018-2019 has been furnished in Statement of Accounts and Auditors' Report.

Major Construction / Repair works taken up by the Institute during 2018-2019

A. Kolkata

R C Bose Centre for Cryptology and Security

The centre is located at Gupta Niwas campus of the Institute. Construction of entire campus including all necessary infrastructure was given to M/s NBCC as deposit work at an estimated project cost of Rs. 80 crore. Construction activity started in May, 2015. The project consists of the main Academic Block (Cryptology Centre G+7), Hostel (G+7), two Residential Blocks (G+10 & G+4) including all necessary internal and external services. Restoration of the existing old building of Abanindranath Tagore (the great painter-writer and nephew of Rabindranath Tagore) is also included in the project.

The Hostel (80 bed + 20 Transit Quarters) and one Residential Block (G+4) have been completed. All efforts are given to complete the services of Academic Block so that academic activities can start from July, 2019. Total expenditure so far is INR 75 Cr (approx.) and expenditure during FY 2018-2019 is INR 11 crore.

- Construction of New Academic Building - Construction of a new Academic Building (G+5) has been undertaken at main campus. M/s Bridge & Roof Co (India) Ltd is the PMC. Work has been awarded at a contract price of INR 26 crore. Civil work is to start from June, 2019.
- Repair, Renovation work of R. A. Fisher Bhavan & S.N. Bose Bhavan - Major repair and renovation of these two buildings at the main campus is almost complete. M/s Bridge & Roof is the PMC. Repair of external surface, structural repair, repair / renovation of toilets including sanitary & plumbing system, renovation of offices of some Units etc. are mainly in the scope of work. Total expenditure so far is INR 4.8 crore and expenditure in FY 2018-2019 is INR 3.3 crore.
- M.Tech. Hostel - The repair-renovation work has been undertaken as a deposit work to CPWD. Estimated project cost is INR 5.57 crore. The work is in progress and expected to complete within Dec 2019

B. Delhi

(i) Major civil and electrical works during the period April 01, 2018 to March 31, 2019 are :-

Sl. No	Description of Work	Total Amount
	(CIVIL WORKS)	
1.	Renovation, water proofing and fencing work Renovation work of PA room, civil engineering room, faculty lounge etc	Rs. 17,04,455
2.	Providing disabled friendly infrastructure	Rs. 12,58,659
3.	Providing & Fixing of concertina Coil over boundary wall & replacing windows in library	Rs. 12,37,630
4.	A & B Block windows replacement	Rs. 41,07,330

Sl. No	Description of Work	Total Amount
	(Electrical Works)	
1.	Replacement of the old air-conditioners of ISI Delhi-Campus with new air-conditioners	Rs. 27,86,600
2.	SITC of testing & commissioning of 25 Kwp Roof-Top Grid-connected solar power plant in Admin Block in ISI Campus Delhi Centre New Delhi-110016	Rs. 14,42,500

C. Chennai

Construction:

Earth Filling: Earth filling work which has commenced during August 2017 by CPWD after the retainer cum boundary wall construction by NBCC is nearing completion. About 62,000 cum of earth has been filled against 70,000 cum.

D. Tezpur

The construction work of ISI-NE Centre campus which started in the last quarter of 2017 is in progress and, in fact, is now in full swing. We would start functioning from our own campus 1 June 2019. Initially two buildings, namely, Administrative Building and Academic Building, along with minimum infrastructural support are expected to be ready by 31 May 2019. The next priority buildings are Boys' Hostel and Girls' Hostel which are expected to be ready by 15 July 2019. The construction of other buildings including Guest House, Amenities Building, and Quarters is also under progress.

The Government of Assam has also been approached for construction of the approach road to our permanent campus. The total expenditure incurred in construction work during 2018-19 is Rs. 10.02 crore.

Society Type Activities

A. Membership: April 2018 – March 2019

During the period 28 persons became Ordinary members of the Institute and 5 Ordinary members became Life members of the Institute.

The membership position as on 31st March, 2019 is as follows:

Ordinary Members	-	316
Life Members	-	1043
Institutional Members	-	05
	Total -	1364

B. Council Meetings: During the period under report (2018-2019), the Council met five times on 9th June, 2018, 4th September, 2018, 10th October, 2018, 5th November, 2018 and 26th February, 2019 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 2018-2019 and BE 2019 – 2020) were considered in the meeting of the Council Held on 5th November, 2018, as recommended by the Finance Committee in its meeting held on 1st November, 2018. The Annual report including audited statement of Accounts for the year 2017 -2018 was considered and approved by the Council in its meeting held on 5th November, 2018.

C. Annual General Meeting: During the period under report (2018 – 2019) the Annual General Meeting was held on 16th November, 2018. The Annual Report of the Institute for the year 2017 – 2018 and audited statement of Accounts for the year 2017 – 2018 together with the auditor's comments and replies of the Administration there to were adopted in the meeting of the General Body held on 16th November, 2018.

Awareness programmes conducted by Medical Welfare Unit

Medical Welfare Unit caters to the Health Care need of the students, faculty, workers and their family members of Indian Statistical Institute.

- Two full time Resident Medical Officers perform regular OPD services as well as Emergency Medical Services as and when necessary.

- Specialist clinic of Eye and Psychiatry are held twice a week.
- Specialist clinic of ENT is held three days a week.
- Regular Counselling sessions by two Psychological Counsellors are held two days a week, which is availed by students and all workers and their family members.
- Retired staff and their spouses are also provided with Medical care on OPD basis.
- Some essential medicines are supplied by the Pharmacy of MWU.

Medical Welfare Unit organises various awareness programmes for the benefit of workers and students. A large number of workers and students participated in the following sensitization programme last year.

 # Sensitization program on Healthy Mind: Way to Success on 28/08/2018

Speakers: Dr. Asim Chatterjee
Mr. Mohit Ranadip

Training programme

Sl. No.	No of Participants	Topics	Venue	Duration
1.	2	Pension and other Retirement Benefits (PRB-II)	ISTM, New Delhi	April 09-13, 2018
2.	4	Pay Fixation (WPF-18)	ISTM, New Delhi	April 23-25, 2018
3.	2	Noting & Drafting	ISTM, New Delhi	August 01-03, 2018
4.	1	Awareness Training on GST	Indian Maritime University, Kolkata	August 13-14, 2018
5.	2	Export Import Procedures	Indian Maritime University, Kolkata	August 20-21, 2018
6.	8	Online Right to Information Portal	FOD, NSSO, Kolkata	January 23-25, 2019

Foundation Day

The Institute organized its Foundation Day on 17th December, 2019.

Prpfessor Sanghamitra Bandyopadhyay, Director addressing on Foundation Day

Birth Anniversary Celebration of Dr. B.R. Ambedkar

Republic Day Celebration at ISI, Kolkata

OFFICIAL LANGUAGE ACTIVITIES

A brief description of specific achievements and functions related to the implementation of the Official Language Policy by the official language of the Institute

The Rajbhasha Implementation Committee of the Institute is headed by Professor Sanghamitra Bandyopadhyay, Director & Chairperson and other members of the committee are as follows:-

1. Professor Sanghamitra Bandyopadhyay, Director - Chairperson
2. Professor Preeti Parashar - Chairperson (Acting)
3. Professor Barun Mukhopadhyay - Member
4. Professor Amita Pal - Member
5. Brigadier J. N. Pandey (Retd.), Chief Executive (Admin. & Finance) - Member
6. Shri Amitabh Mukherjee, Deputy Chief Executive (Finance) - Member
7. Dr. Jadab Kumar Pal, Dy. Chief Executive (Adm.) - Member
8. Shri Anjan Mukherjee, Senior Administrative Officer - Member
9. Shri Manoj Kumar Pandey, Senior Administrative Officer - Member and Convener
10. Shri Raj Narayan Mukherjee, Administrative Officer, - Member
11. Shri Sounak Chakrabarty, Administrative Officer - Member
12. Shri Prashant Tiwari, Official Language Officer (Contractual) - Member

In accordance with the provisions of the Official Language Act of 1963 and Official Language Rule 1976, the Official Language Cell has been set up by the Indian Statistical Institute. Official Language Implementation Committee has been set up to run the Official Language Room efficiently. While discussing the annual program set by the Government of India, the Official Language Department, the committee decides the implementation and compliance of the official language, as well as meetings of the Official Language Implementation Committee are organized during each quarter. During each quarter, the compliances and works related to the Official Language are reviewed by the Official Language Implementation Committee in the said meetings.

During the year 2018-19, the First Quarterly meeting of the Official Language Implementation Committee was held on dated 29.06.2018, second quarterly meeting was held on 28.09.2018, third quarterly meeting was held on 28.12.2018 and the fourth quarterly meeting was held on 26.03.2019 respectively, under the Chairpersonship of the Professor Preeti Parashar, Chairperson (Acting), of the Institute. During the said meetings, the works related to the official language were reviewed and the necessary action was taken accordingly.

Hindi Workshop was organized for the officers / employees of the institute on 22.06.2018, 14.09.2018, 14.12.2018 and 25.03.2019 respectively during every quarter in our institute as per the annual program issued by the Government of India, Ministry of Home Affairs, Department of Official Language. The said workshops were organized in two sessions. During each workshop, two official language experts working under the central government or implementing Hindi were invited to give a lecture on various subjects.

During the year 2018-19, the first Hindi workshop was organized on 22.06.2018, in which 26 Officers / Employees of the Institute participated. The first session of the said workshop was taken by Mrs. Poonam Dixit, Assistant Director, Hindi Teaching Scheme, Ministry of Home Affairs, Official Language Department, Kolkata. Whose training subject was "Official Language Policy and Information related to implementation of Government of India" and in the second session of the said workshop was taken by Mrs. Rita Bhattacharya, Ex Chief Manager (Rajbhasha), United Bank of India, Kolkata. Whose training subject was "Noting-Drafting, Standardization of Devanagari Script and spelling".

During the financial year 2018-19, the Hindi Pakhwara program was inaugurated by the director of the institute Professor Sanghamitra Bandyopadhyay on 14th September, 2018. After the inauguration of the Hindi Pakhwara, the Hindi workshop of the officers and employees of the Institute was organized in two sessions.

Hindi Pakhwara was organized from 14.09.2018 to 28.09.2018. During the fortnight, various competitions such as Hindi essay writing competition, Hindi Extempore Competition, Vocabulary competition, Official language Knowledge competition, Hindi Recitation Competition were organized in two categories for Hindi speaking and non-Hindi speaking for the officers/employees working in the institute and the first, second and third prize winners of the said competitions were awarded Rs.1000/, 800/- and 600/- cash prize money respectively, as well as other participants were given consolation prizes during the conclusion of Hindi Pakhwara.

During the year 2018-19, Hindi classes were regularly organized in NAB-2 seminar room located in the institute's campus for getting the working knowledge of Hindi, i.e. Hindi language training for the officials / employees to make proficient in Hindi. The said Hindi training classes were taken by Mrs. Poonam Shaw, Hindi Pradhyapak, Hindi Teaching Scheme, Government of India, Ministry of Home Affairs, Official Language Department.

Apart from this, during the year 2018-19, Workers form the various Departments / Sections / Units of the Institute were nominated for the training program for working in Hindi on computer organized by the Central Hindi Training Institute, New Delhi in Kolkata, and to participate in the Intense Hindi Workshop organized in New Delhi for Hindi training.

Our institute is an active member of the Town Official Language Implementation Committee, Kolkata (Office 2). Shri Manoj Kumar Pandey, Senior Administrative Officer and Official Language in-charge and Shri Prashant Tiwari, Official Language Officer (Contractual) has taken part in the meetings organized by the Town Official Language Implementation Committee, Kolkata (Office-2) during each half of the year on 27.04.2018 and 18.09.2018 respectively. In addition to this A technical workshop based on subject “Information Technology and Hindi” has been organized by Town Official Language Implementation Committee Kolkata (Office-2) on 12th March 2019, in which Shri Manoj Kumar Pandey, Official Language in-charge and Shri Prashant Tiwari, Official Language Officer (Contractual) has taken part.

An Essay writing competition for all member offices of NARAKAS was organized by Town Official Language Implementation Committee, Kolkata (Office-2) under the aegis of Indian Statistical Institute, Kolkata on 24th August 2018 from 3.00 PM, in which 30 Participants participated from all member offices of NARAKAS. The competition was conducted by the Official Language Cell of the Institute.

Delhi Centre

Rajbhasha Implementation Committee has been constituted in the Institute for the year 2018-19 (July 09, 2018) in which the following members are:

1. Professor Abhay Gopal Bhatt, Head, Delhi Centre - President
2. Shri S A Srinivas, Administrative Officer - Member
3. Shri Lalan Singh, Senior Assistant - Member
4. Shri Praveen Pandey, Office Assistant - Member
5. Shri Amardeep, Office Assistant - Member
6. Smt. Simmi Marwah, Administrative Officer - Member and Advisor
7. Smt. Raj Rani, Hindi Translator - Convener

During the year, 03 meetings of the Official Language Implementation Committee were held on 29.06.2018, 20.07.2018, and 28.11.2018 in which the selection of new members in place of retired members respectively, organization of Hindi Fortnight, Hindi workshops organization in the Institute, discussion regarding Hindi Pakhwara, discussion on topics related to sending personnel of the institute to basic training program for working in Hindi on computer etc. and to follow up on them.

In the year 2018-19 Hindi Fortnight was celebrated from 14.09.2018 to 28.09.2018**.** On 14.09.2018, inauguration ceremony was organized in the auditorium of the institute on Friday at 10:15 am in which all the personnel of the institute participated. The Head of the institute, Professor Abhay Gopal Bhatt, lit the lamp and congratulated everyone on Hindi Day and insisted on working in Hindi throughout the year.

Various competitions were also organized in the institute during the Hindi fortnight. Hindi essay writing, pictography and dictation, Hindi translation, Hindi Extempore, Hindi recitation and Hindi Quiz competitions were organized. All the employees of the institute participated vigorously in all these competitions. The number of contestants for all these competitions was kept at least seven. Award distribution and closing ceremony was organized on 28.09.2018. The Chairperson presented the first, second and third prizes to all the winning contestants and congratulated them.

Three one-day Hindi workshops were organized at the institute on 02.04.2018, 28.08.2018 and 07.12.2018 Around 25-30 personnel of the institute attended these workshops.

With reference to the Official Language Department, Ministry of Home Affairs Circular No. 13/19/2018 DD (T/O)/3087 dated 12.06.2018, the three personnel of the Institute Mr. Imran Ahmed, Office Assistant A, Mr. Anil Kumar, Office Assistant B and Mrs. Raj Rani, Hindi Translator were sent to Central Hindi Training Sub Institute, Department of Official Language from 10.12.2018 to 14.12.2018 for basic training program for working in Hindi on computer.

Workshop on Official Language

Closing Ceremony of Hindi Pakhwada

ANNUAL ACCOUNTS

INDIAN STATISTICAL INSTITUTE

Balance Sheet as at 31.03.2019

(Amount In Rupees)

PARTICULARS	SCHEDULE	CURRENT YEAR (2018-19)	PREVIOUS YEAR (2017-18)
LIABILITIES			
CORPUS/CAPITAL FUND	1	1849663131	1260859734
EARNMARKED /ENDOWMENT FUNDS	3	933392256	856094955
CURRENT LIABILITIES & PROVISION	7	506641993	276671378
LIABILITIES FOR FIXED ASSETS OF EXT. AIDED FUND		196980689	163714017
LIABILITIES FOR FIXED ASSETS OF ISEC FUND		732894	732894
LIABILITIES FOR FIXED ASSETS OF IGP PROJECT		7113633	7113633
TOTAL		**3494524596**	**2565186611**
ASSETS			
EARNMARKED / ENDOWMENT FUNDS	3	4502778	2784181
FIXED ASSESTS	8	1913955500	1226522820
INVESTMENT / ASSETS FROM EARMARKED/ EARMARKED/ENDOWMENT FUNDS	9	713618836	588925269
CURRENT ASSETS OF EXT. AIDED FUND	11	657620266	575393797
FIXED ASSETS OF EXT. AIDED FUND		196980689	163714017
FIXED ASSETS OF ISEC FUND		732894	732894
FIXED ASSETS OF IGP PROJECT		7113633	7113633
TOTAL		**3494524596**	**2565186611**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES & NOTES ON ACCOUNTS	25		

Signed in terms of our Report of even date.

Place : Kolkata
Date: 27.09.2019

Sd/-
A Mukherjee/ S.K Chakraborty
Dy.Chief Executive(F)

Sd/-
Brig J N Pandey
Chief Executive (A&F)

Sd/-
Sanghamitra Bandyopadhyay
Director

For S. K. Mallick & Co
Chartered Accountants
Firm Registration No. 324892E

Sd/-
Pradip Baksi
Partner
Membership No. 054264
UDIN: 19054264AAAAA01995

INDIAN STATISTICAL INSTITUTE

Income & Expenditure Account for the Year Ended 31.03.2019

(Amount in Rupees)

PARTICULARS	SCHEDULE	CURRENT YEAR (2018-19)		PREVIOUS YEAR (2017-18)	
		GRANT SALARY	GRANT GENERAL	GRANT SALARY	GRANT GENERAL
INCOME					
MISCELLANEOUS RECEIPTS	**12**	0	72520616	0	65970763
GRANT IN AID FROM GOVT OF INDIA	**13**	2519642536	224069752	1916256000	119189444
TOTAL (A)		**2519642536**	**296590368**	**1916256000**	**185160207**
EXPENDITURE					
ESTABLISHMENT EXPENSES	**20**	2577243187	0	1893140464	0
OTHER ADMINISTRATIVE EXPENSES	**21**	0	292462418	0	303750455
TOTAL(B)		**2577243187**	**292462418**	**1893140464**	**303750455**
BALANCE BEING SURPLUS / (DEFICIT)[A-B]		-57600651	4127950	23115536	-118590248
CARRIED TO CORPUS/ CAPITAL			-53472701	-95474712	
SIGNIFICANT ACCOUNTING POLICIES	**24**				
CONTINGENT LIABILITIES & NOTES ON ACCOUNTS	**25**				

Signed in terms of our Report of even date.

Place : Kolkata
Date: 27.09.2019

Sd/-
A Mukherjee/ S.K Chakraborty
Dy.Chief Executive(F)

Sd/-
Brig J N Pandey
Chief Executive (A&F)

Sd/-
Sanghamitra Bandyopadhyay
Director

For S. K. Mallick & Co
Chartered Accountants
Firm Registration No. 324892E

Sd/-
Pradip Baksi
Partner
Membership No. 054264
UDIN: 19054264AAAAA01995

INDIAN STATISTICAL INSTITUTE

Capital Utilization Statement for the Year Ended 31.03.2019

(Amount in Rupees)

PARTICULARS	CURRENT YEAR (2018-19)	PREVIOUS YEAR (2017-18)
GRANT RECEIVED FOR CREATION OF CAPITAL ASSETS (INCL C/F OF PREVIOUS YEAR)	401576000	543191000
TOTAL(A)	**401576000**	**543191000**
EXPENDITURE ON CREATION OF CAPITAL ASSETS	411839295	412822454
TOTAL(B)	**411839295**	**412822454**
NET BALANCE(A-B)	**-10263295**	**130368546**

Place : Kolkata

Date: 27.09.2019

Signed in terms of our Report of even date.

Sd/-
A Mukherjee/ S.K Chakraborty
Dy.Chief Executive(F)

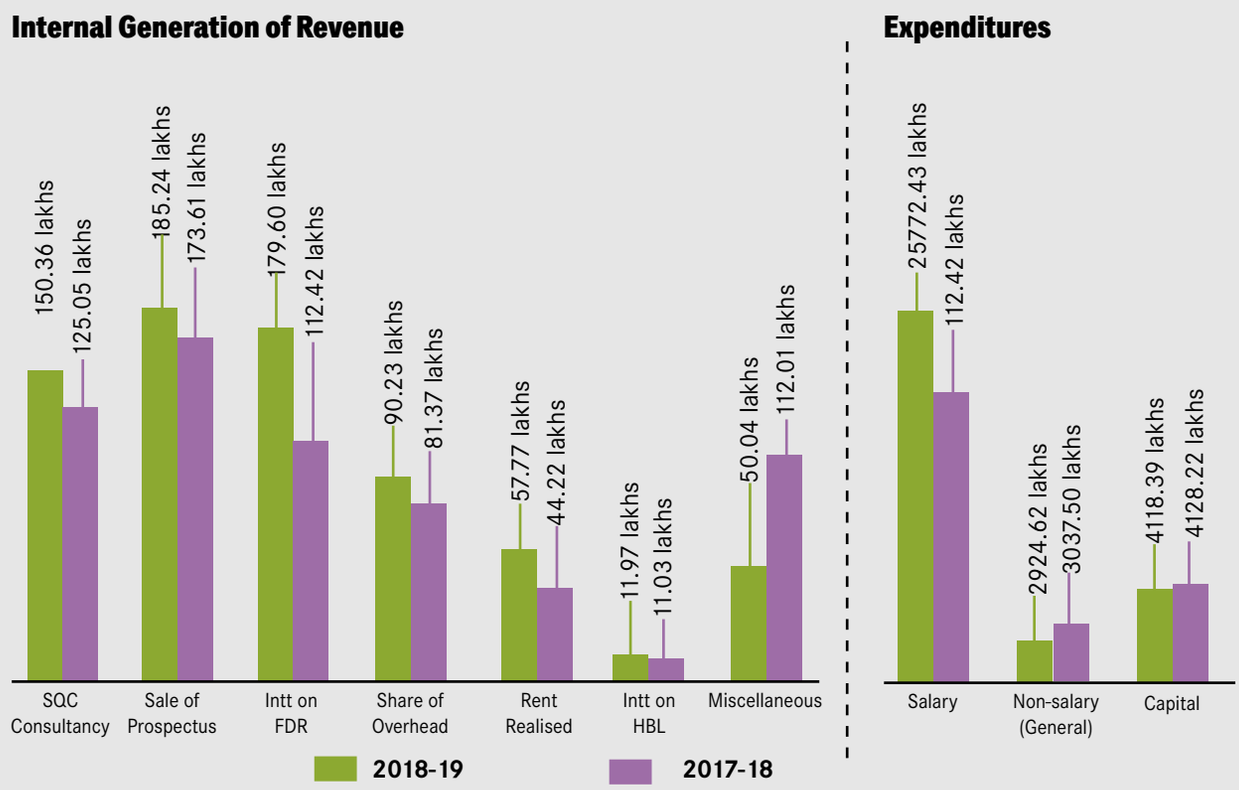
Sd/-
Brig J N Pandey
Chief Executive (A&F)

Sd/-
Sanghamitra Bandyopadhyay
Director

For S. K. Mallick & Co
Chartered Accountants
Firm Registration No. 324892E

Sd/-
Pradip Baksi
Partner
Membership No. 054264
UDIN: 19054264AAAAA01995

AT A GLANCE



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