

#### SIXTIETH ANNUAL REPORT: 1991-92

A Seminar entitled "Frontiers of quality and optimisation techniques" was held in Calcutta during 24-27 February '92. About 40 staff members along with colleagues of other divisions participated in the Seminar.

A panel discussion on "Quality through scientific approach" was organised on 10 April '91 at Doordarshan Kendra, Trivandrum.

An international Conference on "Infermetrics" was organised by DRTC, Bangalore Centre at Ashoka Radisson during 9-12 August '91. 102 participants from different parts of the world attended the Conference. The Conference was sponsored by Indian Statistical Institute, Indian Council of Social Science Research (ICSSR), New Delhi, CSIR (INSDOC), New Delhi, Sarada Ranganathan Endowment for Library Science, Bangalore and National Information system for Science and Technology (NISSAT), New Delhi. 27 papers were presented in the Conference. Most of the authors were of international reputation.

A Workshop on "Information Retrieval" was organised by DRTC Centre during 5-7 February '92. The resource person in the Workshop was the Visiting Professor Abraham Bookstein of the Centre for Information and Language Studies, University of Chicago, USA. Professor G. Bhattacharyay and Professor A. Neelameghan were the guest speakers. All the faculty members of DRTC presented papers in the Workshop.

#### *Lectures and Seminars*

The following lectures/seminars were arranged during period :

#### **Theoretical Statistics and Mathematics Division**

#### *Theoretical Statistics and Mathematics Unit, (Calcutta).*

Professor S. K. Chatterjee, Department of Statistics, Calcutta University (8.4.91) : A Naive Look at Problems of Decision Making and Inference.

Dr. Sanjub Basu, Purdue University, USA (3.6.91) : On the coverage probability of standard confidence intervals under departure from normality.

Professor S. Ramanan, School of Mathematics, TIFR (9.7.91) : Linear Systems on Abelian Varieties.

Professor J. Sethuraman, Florida State University, Tallahassee, USA (31.12.91) : Constructing Dirichlet Priors.

Professor K. B. Athreya, Iowa State University, Ames, Iowa, USA (20.1.92) : Large deviation results for branching processes.

Dr. Arunava Mukherjee, University of South Florida, USA (23.3.92) : A law of large numbers for random affine maps on  $\mathbb{R}^d$ .

#### *Theoretical Statistics and Mathematics (Delhi)*

Dr. Rahul Roy ISI, Delhi. (7.5.91) : Mandelbort Percolation.

Dr. Ashish Das ISI, Calcutta (17.5.91) : Model Robust Optimal Designs.

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- P. Sastry (2.7.91) : The Riemann-Roch Theorem on Riemann Surfaces.
- Shalaja D. Sharma, IIT Bombay (24.7.91) : Some classes of additive 2-Adjugate Ternary designs.
- Tilak Bhattacharya (12.8.91) : A new Poincare inequality and its application to the regularity theory of minimizers.
- K. Ravishankar, SUNY, New Paltz (19.8.91) : Stationary measures, hydrodynamical limit and the existence of a microscopic interface in asymmetric exclusion automata.
- Siddharth Sahi, Princeton University (20.8.91) : Unitary representations of semi-simple Lie groups.
- Abhay G. Bhatt, ISI, Delhi (29.8.91) : Invariant measures for Markov processes characterised by martingale problems.
- S. K. Jain, Ohio University (4.9.91) : Partial order on the semigroup of matrices.
- Subhash Kochar, ISI Delhi (11.9.91) : Testing Exponentiality against INMRL Distributions with unknown change point.
- K. R. Parthasarathy, ISI Delhi (18.9.91) : Probability theory—Some Historical Glimpses.
- Heeralal Janwa, University of Bombay (19.9.91) : Error correcting codes from Algebraic Geometry.
- A. Dey, ISI, Delhi (25.9.91) : Robustness of Block Designs against missing data.
- Avinash C. Singh, STATISTICS, CANADA (13.12.91) : Time series approaches to small area estimation for Survey Data.
- Hilmar Drygas, University of Kassel (18.12.91) : Minique theory and linear sufficiency in linear models.
- M. B. Priestley, Univ. of Manchester Inst. of Science and Technology UK (19/12.91) : Recent developments in time series analysis.
- H. L. Koul, Michigan State Univ. (20.12.91) : A weak convergence results useful in Auto-regression.
- Franco Parlamento, (31.12.91) : Codel's theorem and decidability for fragments of set theory.
- P. K. Sen, Univ. of North Carolina Chapel Hill (8.1.92) : Jackknifing Vs. Bootstrapping.
- T. Bhattacharya (14.1.92) : Joint Spectrum of commuting operators.

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M. L. Aggarwal, Delhi University (22.1.92) : Designs balanced for residual treatment effects.

Amit Bhaya, Federal University of Rio de Janeiro (28.1.92) : Discrete time matrix stability.

A. Mohari, ISI, Delhi (4.2.92) : Minimal quantum dynamical semigroups and its dilations.

Robert J. Aumann, Hebrew Univ. (5.2.92) : Building Trust.

B. Misra (13.2.92) : Internal time for relativistic equation and Chronon.

Vasant Bhaskar, Univ. of Kentucky (19.2.92) : Sufficiency for parameters of interest and generalized Fisher information.

R. Bhatia, ISI, Delhi (25.2.92) : Perturbation of the unitary parts in the polar and the QR decompositions of a matrix.

S. Levi Univ. of Milan (26.2.92) : Hyperspace topologies.

W. Von Waldenfels, Univ. of Heidelberg (27.2.92) : Existence of moments in the problem of inverse oscillators.

Vijay Wazirani, IIT Delhi (3.3.92) : Matching is as easy as matrix inversion.

Robin J. Wilson, Open Univ., UK (20.3.92) : Eigenvalues of Graphs.

Arusharka Sen, ISI Delhi (26.3.91) : Limit distributions of conditional u-statistics.

*Theoretical Statistics and Mathematics (Bangalore)*

Dr. S. Srinivas Rau, ISI Bangalore (18.04.91) : Isospectral manifolds.

Dr. H. J. Vaman, Bangalore University (6.6.91) : Optimality results for change-point detection.

Dr. Alok Goswami ISI, Calcutta (13.6.91) : Characterisation of the uniform distribution.

Dr. R. L. Karandikar ISI, Delhi (14.6.91) : Probabilistic approach to Boltzmann's equation.

Dr. H. N. Nagaraja, Ohio State University (27.6.91) : Distribution theory for some point process record models.

Dr. P. A. V. B. Swamy, Federal Reserve Board, Washington DC (28.6.91) : Discriminating between random walk and regression models.

Dr. A. Mukherjee, ISI, Calcutta (17.7.91) : Equivariant finiteness obstruction.

Dr. R. Shankar, Yale University, (16.8.91) : A primer on statistical Mechanics.

Dr. S. Kesavan, TIFR, Bangalore, (5.9.91) : Symmetrization and Sobolev embeddings.

Dr. Anurag Kumar I.I.Sc, Bangalore (3.10.91) : Control and scheduling problems arising out of Communication Networks.

Dr. V. S. Borkar, I.I.Sc., Bangalore, (28.11.91) : Simulated annealing.

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Dr. Avinash Singh, Statistics Canada, (6.12.91) : Time series approach to small area sampling.

Dr. T. Parthasarathy, ISI, Delhi, (18.12.91) : Q-matrices.

Dr. B. Uma, Indore University, (24.12.91) : The Arithmetic-Geometric Mean.

Prof. K. B. Athreya, Iowa State University, (6.1.92) : Fractional moments of non-negative random variables and some applications.

M. S. Ramanujan, University of Michigan, (5.2.92) : Frechet spaces between which continuous linear maps are compact.

M. A. Sofi, University of Kashmir, (13.2.92) : Complemented subspace problem in nuclear Frechet spaces.

N. G. N. Prasad, University of Alberta, (18.2.92) : Small Area Estimation.

Balakrishna Hosmane, Northern Illinois University, (27.2.92) : The weighted least-squares approach to the analysis of grouped survival data using logistic regression.

In addition there were numerous colloquium lectures delivered by the members of the Stat-Math Unit of ISI, Bangalore, as indicated below :

S. Srinivas Rau, (18.4.91) : Isospectral Manifolds.

N. S. N. Sastry, (17.6.91) : On some finite simple groups.

K. Manjunath Prasad (11.7.91) : G-inverses over commutative rings.

K. P. S. Bhaskar Rao (18.7.91) : Group-valued charges and infinite chinese Remainder Theorem.

Bhaskar Bagchi, (25.7.91) : A substitute for Hasse-Minkowski theory in combinatorial non-existence results.

--- (19.9.91) : Universality of the Riemann zeta function.

--- (30.1.92) : On the nine-vertex complex projective plane.

S. P. Adhikari, (8.8.91) : Rational points on cubics over  $F_p$ .

Uma Krishnan, (16.8.91) : On subfactors and commuting squares.

S. Balaji, (22.8.91 and 23.8.91) : Brownian motion in two dimensions and holomorphic functions.

Sunanda Bagchi, (16.9.91) : Optimality in Block Designs—a review.

V. S. Sunder, (10.10.91) : Distance between unitary orbits of self-adjoint elements.

Gadadhar Mitra, (31.10.91) : De Brange's proof of the Bieberbach conjecture.

Alladi Sitarum, (5.12.91) : Fourier analysis and shapes of closed curves.

Hemant Bhat, (12.12.91) : Multi-dimensional inverse scattering.

T. S. S. R. K. Rao, (19.2.92) : Geometry of operator spaces.

Mohan Delampady, (20.2.92) : Splines and Bayesian non-parametrics.

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*Applied Statistics Survey and Computing*

Forty-eight departmental Seminars were arranged by the faculty members of the Division during the year.

Physical and Earth Sciences Division

*Electronics Unit*

(A) *Digital Systems Research*

Satyajit Roy, (11.4.91) : Automatic extraction in a fingerprint image.

Subhas C. Nandy, (30.5.91) : A review on range tree for multidimensional searching problem.

Debasish Bhattacharyay, (13.6.91) : Parallel concurrent fault simulation.

Pratik Pal, (01.7.91) : A discussion on features extraction from 2-D shapes.

Srijit Majumder, (04.7.91) : Mathematical morphology and its application in image analysis.

Sajal Das, (22.7.91) : Cost-optimal parallel algorithms traversing trees.

(B) *Theoretical Physics*

C. Sivaram, (03.1.92) : Some aspects of the unification of gravity with electro-weak strong interaction.

(C) *Fluid Mechanical/Applied Mathematics*

S. K. Venkatesan, ISI, Calcutta (2.4.91, 9.4.91, 16.4.91) : PDE in complex variable.

— (4.2.92) : Uniqueness of 2D Water Wave potential.

B. N. Mandal, ISI, Calcutta (18.6.91, 25.6.91, 2.7.91, 9.7.91, 17.9.91, 1.10.91, 8.10.91, 29.10.91) : Probability theory and Stochastic Process I.

— (12.11.91, 19.11.91, 14.1.92, 21.1.92) : Stochastic Process.

— (18.2.92) : Diffraction of interface waves by a bottom deformation in two superposed fluids.

— (31.3.92) : Oblique interface-wave diffraction a small bottom deformation in two superposed fluids.

Naba K. Ghosh, Rabindra Mahavidyalaya, Hooghly (28.11.91, 3.12.91, 10.12.91) : Cylindrical Wavemaker Problems in the theory of water waves—I, II, III.

B. S. Dandapat, ISI, Calcutta (17.12.91) : Development of thin film on a cold/hot rotating disk.

— (31.12.91) : Thermosolutal convection in presence of a deformable free surface.

— (7.1.92) : Thermosolutal convection in presence of a deformable free surface—II.

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B. S. Majumder, ISI, Calcutta (28.1.92) : Dispersion of contaminant in Oscillatory flows.

— — — ISI, Calcutta (11.2.92) : Effect of boundary absorption on solute dispersion in steady and Oscillatory flows.

John S. A., Green School of Environmental Sciences, University, East Anglia, U.K. (25.2.92) : Transfer of dissolved gases across the surface of the sea.

N. G. Mondal, ISI, Calcutta (3.3.92) : Integral expansion of functions.

M. K. Guha, Director, Indian Meteorological Department, Calcutta Airport, Dum Dum (24.3.92) : On cyclonic Structure.

#### Social Sciences Division

##### *Economic Research Unit*

Kaushik Bhattacharya ISI, Calcutta (3.5.91) : Effect of Employment and Demographic Variables on Expenditure Patterns.

Manjuri Chattopadhyay, ISI, Calcutta (10.5.91) : Causality between Wages and Inflation : An Indian Case Study.

Arpita Dhar ISI, Calcutta (17.5.91) : A Two Sector Model of Disequilibrium Growth.

Malabika Ghosh ISI, Calcutta (24.5.91) : Subcontracting and Market Uncertainty.

Anil Kumar Bera University of Illinois, Urbana Champaign, (27.5.91) : Rao's Score Test in Econometrics.

R. Kavita Rao, ISI, Calcutta (31.5.91) : Determinants of Industrial Growth : Some Preliminary Results.

Meenakshi Mishra, ISI, Calcutta (7.6.91) : Role and Structure of trading posts associated with a competitive system with a perfectly functioning auctioneer.

Sugata Marjit, Jadavpur University, (19.6.91) : Incentives for cooperative and Non-Cooperative R and D in Duopoly.

Suchismita Ghosh, ISI, Calcutta (5.7.91) : Engel Elasticities for Clothings and Other Items.

Debasis Bandyopadhyay, University of Minnesota (8.7.91) : Income Inequality and Endogenous Growth.

Udayan Ray, Stony Brook (31.7.91) : Product Differential and the Pattern of Trade.

Abhijit V. Banerjee, Princeton University, (21.8.91) : Occupational Choice and the Process of Development.

Banudev Chaudhuri, University of Paris, (04.9.91) : Theory of Interest Groups and Endogenous Government in Indian Economic Policy.

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Jayasri Ray Chandhuri, Cambridge University, (10.9.91) : Urban Linkages in terms of Remittances : Case Study of Durgapur.

Shantanu Mitra, Presidency College, Calcutta, (18.9.91) : Growth of the Handloom Industry—The Technological Impediment.

Tamil Dutta Chaudhuri, I R B I, (25.9.91) : Industrial Sickness.

Sanjay Banerjee, Jadavpur University, (19.2.92) : Limited Liability and Transfer of Collateral.

Arun K. Sengupta, ISI, Calcutta (12.3.92) : Resource Allocation and Semi Input-Output.

*Economic Analysis Unit (Bangalore)*

Dr. Balakrishnan, ISI, Bangalore (October-November '91) : Tea lectures on the short and long-run dynamics of capitalist economics.

Dr. N. S. Iyengar, ISI, Bangalore (October '91) : Finite sample properties of a Multicollinearity Measure.

*Linguistic Research Unit*

Dr. Aloknanda Mitter, ISI, Calcutta (9.12.91) : Seminar on "Common Articulatory Disorders in school-going children".

Debabrass Bandopadhyay, ISI, Calcutta (31.1.92) : Seminar on "The story of North Kolkata Dialect and Kolkata standard".

Mousumi Majumder, ISI, Calcutta (24.2.92) : Seminar on "Kostic Methodology for Evaluation of speech sounds with special reference to hearing impaired Children".

*Population Studies Unit*

Dr. Tim Dyson, London School of Economics (19.9.91) : Demography of Indian Femines.

Mr. Shantanu Mukherjee, Research Scholar, ISI, Calcutta (30.12.91) : A distribution for last closed birth interval and its application.

*Psychometric Research and Services Unit*

S. N. Banerjee, ISI, Calcutta (11.5.91) : Rorschach Psychogram.

Rumki Gupta, ISI, Calcutta (26.8.91) : Effect of prolonged deprivation upon Intelligence level of school-going adolescents.

D. Dutta Roy, ISI, Calcutta (26.10.91) : In search of Organizational Health.

D. Dutta Roy and A. Chatterjee, ISI, Calcutta (10-12 July 1991, 4.10.91) : Organizational Health and Life satisfaction.

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### Statistical Quality Control and Operations Research Division

- Shri S. K. Chowdhury, (25-28.3.91) : Five lectures on 'Statistical Methods in Medical Research at the University of Calcutta.
- (18.6.91-27.7.91) "Quality cost, Analysis and Control, Quality circle and Industrial Experimentation" at Indian Institute of Management, Calcutta.
- (16-21.9.91) "Process Improvement, Quality of design and Industrial Experiments in a Quality Management" at the IAPQR, Calcutta.
- (5-8.10.91) "Industrial Experimentation to identify optimum condition of production in Metallurgical Industry" at the Silver Jubilee Seminar on Modernisation of Metallurgical Industries, Met. Eng. Deptt, Jadavpur University.
- (14-18.10.91) "QIS, Quality cost etc. Management Development Program", organised by Indian Institute of Management, Calcutta in Nepal.
- (14.11.91) : "Taguchi's idea of robustness". In the seminar on 'World Quality day', at IAPQR.
- (28.12.91) "Some Case Studies in Cast Iron Foundry in Pursult of TQC" in the Seminar of Indian Institute of Foundrymen, Calcutta.
- and Shri Anurag Sekaria : A series of lecture as outside faculty to teach Statistical Methods in Industrial Engineering to the B. E. (Industrial Engineering) students of Vishwakarma Institute of Technology, Pune.
- Shri V. Narayan (14.4.91) : "Quality Circles" in the Seminar of Rotary Club, Ramanthapur.
- (25.4.91) "QC Tools." at the Engineering Staff College of India.
- (5.7.91) : "Total Quality Management" at Administrative Staff College of India.
- (22.8.91) : "Statistical Tolerancing" at Engineering Staff College of India.
- (12.10.91 and 27.10.91) : "ISO good standards" as HMT Limited, Hyderabad.
- (27.11.91) : "SQC Techniques in process Control" at Institute of Public Enterprise, Hyderabad.
- (19.2.92) : "Problem solving Tools" at Quality circle forum of India.
- (12.3.92) : "T Q M" at J. K. Synthetics, Kola.
- Shri N. R. Sarkar (5.6.91) : "Company side Quality Control" at Quality circle Forum of India, Baroda.
- (20.12.91) : "Manufacturing Process Control" at Engineering Staff College of India, Hyderabad.
- Shri J. Venkatappiah (30.4.91) : An invited lecture on the occasion of Quality Month inauguration at Hindustan Cables Ltd.
- Shri K. M. Dala (13.5.91) : "ISO 9000 series Quality System" (invited lecture) at the Institute of Indian Foundrymen., Pune.



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- Shri Y. R. Rau, V. Narayan and A. L. N. Murthy (16.7.91) : Lectures on "Preliminary Survey report and proposals for service" at S.P.S. Ltd.
- Shri T. K. Chakraborty (20.8.91) : "Designing Sampling inspection plans in a Fuzzy Environment" at Computer Science Unit, ISI.
- Shri N. T. V. Ranga Rau (21.8.91) : "Vendor Quality Management" at NISIET.
- (17.1.92) : "QC—How to organise in SRI" at Shriram Refrigeration Industries, Hyderabad.
- Shri Y. R. Rau (7.9.91) : "Statistical Quality Control" at Research Development Training Centre, Panchayotra.
- Shri V. Gopalan (9.11.91) : "Statistical Techniques in Quality Management" at Federation of Productivity Council of Tamilnadu.
- (16.2.92) : "Reliability—III" Contact Programme at Federation of Productivity Council of Tamilnadu.
- Shri Pathik Mondal (21.1.92) : "SQC in Plastics" at Central Institute of Plastics Engineering and Technology (CIPET).
- Shri C. Y. Krishnamurti : "TQM, Design of Experiments and ISO 9000 implementation" at Indian Ceramic Society.
- Scientific Staff of SQC and OR Unit, Madras have handled sessions on topics relating to SQC and OR at National productivity council during the month of July, September and November 1991.

Library, Documentation and Information Sciences

*DRTC (Bangalore)*

A seminar on "Information series for Exports" was organised by DRTC, Bangalore Centre on 14 June '91. The leading presentation was made by Shri N. V. Satyanarayan, Managing Director, Informatics India (P) Ltd., Bangalore. Dr. G. Bhattacharyay presided over the seminar.

A seminar on "Role of classification in modern Information Processing" was held on 1 July '91. The leading presentation were made by Professor A. Neelamegham, Professor G. Bhattacharyay and Professor M. A. Gopinath. About 40 participants attended the seminar.

In collaboration with Sarada Ranganathan Endowment for Library Science, DRTC organised lectures on the occasion of Professor Ranganathan's birthday during 9-12, August '91 at Hotel Ashoka Radisson, Bangalore. Professor (Dr.) (Mrs.) Jea Tague-Sutcliffe, Dean School of Library and Information Science, University of Western Ontario, Canada was invited to deliver lectures on the theme "Measures in information science". About 150 participants attended the lectures. The lectures were held along with the 3rd International Conference on "Informetrics".

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A special seminar on "Latest Trends in Research of subject indexing" was organised on 27 September '91 for the participants from Afro-Asian countries who attended a short term international course on "Information storage and Retrieval" conducted by the National Institute for Small Industries Extension Training (NISSET), during their visit to DRTC for study tour. Professor G. Bhattacharyay made the leading presentation. About 40 participants attended the seminar.

Every year, DRTC organises five law lectures series on the date of death of Professor S. R. Ranganathan i.e. 27 September in 1991, Dr. S. G. Mahajan, Professor and Head, Department of Library and Information series, University of Poona, Pune was invited to deliver this year's lecture on the theme "Legal Aspects in University Library Management". Professor G. Bhattacharyay presided over the function. About 60 participants attended the lecture.

A seminar on "National Information Policy" was held on 4 October '91. The leading presentation was made by Professor S. Parthasarathy, Hon'ble Director, Institute of Information Studies, Madras. Professor G. Bhattacharyay, presided over the seminar. About 30 participants attended the seminar.

A special seminar was organised to mark the birth centenary of Professor S. R. Ranganathan on 9 November '91 at DRTC, Bangalore Centre. Professor G. Bhattacharya, Shri K. N. Vasudeva Rao, Dr. I. K. Ravichandra Rao and N. V. Satyanarayana made leading presentations. Topics covered were Five laws of Library Satyanarayana made leading presentations. Topics covered were Five laws of Library Science, the NISSAT Centers, Information Technology and Information Entrepreneurship. About 45 participants attended the seminar.

A seminar on "Informal Look at Networking and its Current Trends" was held on 13 November '91 at DRTC, Bangalore Centre. Dr. Hari Areti, Fermi National Laboratory, Batavia, Illinois (USA) made leading presentation and Professor G. Bhattacharyay presided over the seminar. About 25 participants attended the seminar.

DRTC, Bangalore Centre in collaboration with Sarada Ranganathan Endowment for Library Science organised the "Ranganathan Memorial Lectures" during 25-27 November '91 at the Institute of Information Studies, Bangalore. Professor F. W. Lancaster, Graduate School of Library and Information Science, University of Illinois, USA delivered the course of lectures on the theme "Bibliometric Methods in Assessing Productivity and Impact of Research". Professor M. A. Gopinath presided over the function. About 70 participants attended the lecture daily.

## 5. PUBLICATIONS

The following publications were brought out in 1991-92.

1 (i) *Sankhyā* : The Indian Journal of Statistics and the official organ of the Indian Statistical Institute.

*Sankhyā* Series A : Vol. 53, Parts 2,3.

*Sankhyā* Series A : Vol. 54, Part 1.

*Sankhyā* Series B : Vol. 53, Parts 1,2,3.

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(ii) *Technical Reports* : Twenty Three technical reports from the Statistics-Mathematics Division were registered during the year.

(iii) A special volume of *Sankhya* in memory of Late Professor Raj Chandra Bose is nearly ready.

6. SCIENTIFIC PAPERS AND PUBLICATIONS

SCIENTIFIC PAPERS PUBLISHED

Theoretical Statistics and Mathematics Division

Calcutta Unit

1. Barua, R. (1991) : On generalized automata, *Fundamenta Informaticae* 14, 313-322.
2. Bose, A. (with Babu, G. J.) (1991) : Accuracy of the bootstrap approximation, *Probability Theory and Related Fields* 90, 301-316.
3. Bhandari, S. K. (with Mukherjee, Rahul) (1992) : Two and multi-stage selection procedure for Weibull populations, *Jour. Stat. Plann. & Inf.*
4. Chaudhuri, P. (1991) : Nonparametric estimates of regression quantiles and their local Bahadur representation, *Annals of Statistics* 19, 2, 760-777.
5. --- (1991) : Global nonparametric estimation of conditional quantile functions and their derivatives, *Jour. Mult. Anal.* 39, 246-269.
6. Das, Ashish (with Kageyama, S.) (1991) : A characterization of generalized binary proper efficiency—balanced designs, *Bull. Fac. School, Ed. Hiroshima Univ.* 13, 17-20.
7. --- (with Gupta, V. K. and Dey, A.) (1991) : Universal optimality of block designs with unequal block sizes, *Stat. Prob. Lett.* 11, 177-180.
8. --- (with Dey, A.) (1991) : Optimal variance—and efficiency—balanced designs for one- and two-way elimination of heterogeneity, *Metrika* 38, 227-238.
9. --- (with Kageyama, S.) (1991) : A class of E-optimal efficiency—balanced designs, *Biometrika*, 78, 693-696.
10. Ghosh, J. K. (1991) : Higher order asymptotics for the likelihood ratio, Rao's and Wald's tests, *Stat. Prob. Lett.* 12, 505-509.
11. --- (with Mukerjee, R.) (1991) : Improvement in Stein's procedure using a random confidence coefficient, *Cal. Stat. Assn. Bull.* 40, (Hari Kinkar Nandi Memorial Volume), 157-160, 145-152.
12. --- (with Mukerjee, R.) (1991) : Characterization of priors under which Bayesian and frequentist Bartlett corrections are equivalent in the multiparameter case, *Jour. of Mult. Anal.* 38, 2, 385-393.
13. --- (with Bhattacharyya, G. K.) (1991) : On reliability growth models, *Jour. Stat. Prob. and Inf.*
14. --- (with Bhanja, J.) (1992) : Efficiency estimation with many nuisance parameters, *Sankhya* 54(A), Part I, 1-39.

15. Goswami, A. (with Rao, B. V.) (1991) : On filtrations of Brownian polynomials, *Seminaire de Probabilités*, XXV, (Ed. Azema, J., Meyer, P. A., and Yor, M.), Springer LNM 1485.
16. ——— (with Rao, B. V.) (1991) : Conditional expectation of odd class given even, *Stochastics and Stochastic Reports*, 35, (Ed. M. H. A. Davis).
17. Muzumder, B. S. (1991) : An exact solution of oscillatory Couette flow in rotating system transfer, *ASME, Jour. of Applied Mech.* 58, 1104-1107.
18. ——— (with Das, S. K.) (1992) : Effect of boundary reaction on solute dispersion in pulsatile flow through a tube, *Jour. Fluid. Mech.* 239, 523-549.
19. Purkayastha, S. (with Mukerjee, R.) (1992) : Maximum likelihood characterization of the von Mises Fisher-matrix distribution, *Sankhya*, Ser. A, 54, 123-127.
20. Raha, A. R. (1991) : Abundance of spaces akin to  $S_n$ , *Topology and its Applications*, 39, 205-210.
21. ——— (1992) : An example of a regular space that is not completely regular, *Jour. Ind. Math. Soc., TIFR*, Bombay.
22. Rao T. J. (1991) : On certain Methods of Improving Ratio and Regression Estimators, *Comm. in Stat. A* 20, 3325-3340.
23. ——— (with Sengupta, S. and Sinha, B. K.) (1991) : Some Order Relations Between Selection and Inclusion Probabilities for PPSWOR Sampling Scheme, *Metrika*, 38, 335-344.
24. ——— (with Reddy, V. N.) (1991) : On the estimation of population Total of bottom (top) p-percentiles of a finite population, *Metron*, 42, 290-298.
25. Saha, G. M. (with Mitra, B. K.) (1991) : A note on analysis of balanced incomplete multiresponse designs, *Jour. Ind. Soc. Agric. Stat.*, 43, 1-8.
26. Saha Roy, Rita (with Jacroux, Mile) (1991) : Run orders of trend resistant 2-level factorial design, *Sankhya* (B) 53, pt. 2, 202-212.
27. Sengupta, Debapriya (1991) : On shrinkage towards an arbitrary estimator, *Statistics and Decisions*, 9, 82-105.
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1. Banerjee, D. K. (with Chakraborty, B. and Dutta Majumder, D.) : Detection of corners in digital images. *Proc. 9th Koba Int. Symp. on Electronics and Information Sciences*, Tokyo, Japan, 1991.
2. Banerjee, D. K. (with Deb, S. and Dutta Majumder, D.) : A robot vision algorithm for manipulating objects in a clustered environment. *Proc. Int. Symp. of Intelligent Robotics*, Bangalore, 1991.
3. ——— : EMFO-An algorithm for fast matching for Robotic Tasks, *IEEE Int. Conf. on Intelligent Robotics and Systems*, North Carolina, USA, 1991.
4. Basak, J. (with Chanda, B. and Dutta Majumder, D.) : An edge linking methodology by edge induction based on neural network model. *Neuro Nimes 91*, Nimes, France, 1991.
5. ——— : An approach to line linking based on Neural network model. *Neuro Nimes*, France, 1991.
6. Basak, J. (with Murthy, C. A., Chaudhury, S. and Dutta Majumder, D.) : A connectionist network for simultaneous perception of multcategories, *11th IAPR Conf. on Pattern Recognition*, The Hague, The Netherlands, 1992.
7. Chaudhuri, B. B. : Optimal circular fit in digital image and multidimensional point data. *Digital image Computations Techniques and Applications*, Melbourne, 1991.
8. Dan, T. K. (with Dutta, A. K.) : Speech synthesis—A time domain model. *Proc. Intl. Workshop on Recent Trends in Speech, Music and Allied Signal Processing*, Delhi, 1991.
9. Das, J. (with De, A. K. and Ganguli, N. R.) : Acoustic screening for prediction of monsoon activities. *Proc. NSA-1991, NPL*, Delhi, 1991.
10. Datta, A. K.—Temporal location of stress cue and its nature, *Proc. XIIth Intl. Congress of Phonetic Science*, France, 1991.
11. ——— : Time domain analysis of speech sounds. *Proc. XIIth Intl. Congress of Phonetic Science*, France, 1991.
12. ——— : Speech synthesis using signal concatenation procedure. *Miniworkshop on Signal Processing*, Universita Deali Studi Di Roma 'La Sapienza' Rome, Italy, 1991.
13. Datta, A. K. (with Ganguli, N. R. and Mukherjee, B.) : Nasalisation in Bengali speech sounds—Acoustic phonetic study, *Proc. Euro. Conf. on Speech Communication and Techno.*, Genoa, Italy, 1991.
14. ——— (with Kundu, R.) : A psycho-perceptual hypothesis for Indian musical scale. *Proc. Intl. Workshop on Recent Trends in Speech Music and Allied Signal Processing*, Delhi, 1991.

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15. De, A. K. (with Das, J.) : Acoustic sounding for air pollution meteorology studies, 6th Indian Engineering Congress, Institute of Engineers, Pune, 21-24 December, 1991.
16. --- (with Ganguli, A. and Das, J.) : Identification of acoustic sounder echograms of lower atmospheric boundary layer, *Proc. NSA-1991*, Delhi, 1991.
17. Datta Majumder, D. : Man-computer interaction by speech and vision (invited paper). *Proc. IEEE Tencon 1991*. New Delhi, 1991.
18. --- (with Das, J. and De, A. K.) : Studies of tropical boundary layer meteorology at Deoras (invited talk). *DST Monitoring Workshop on Scientific Results of MONTBLEX*, Bangalore, 1992.
19. Ganguli, N. R. : Vowel formant distribution of major Indian Languages, *Proc. Euro. Conf. Speech Communication and Techno.*, Genoa, Italy, 1991.
20. --- (with Datta, A. K.) : Status report on Speech research at ISI. *Proc. Intl. Workshop on Recent Trends in Speech, Music, and Allied Signal Processing*, New Delhi, 1991.
21. Gupta, A. (with Weymouth, T. E. and Jain, R.) : Object oriented data model for large image bases. *Proc. LSD-91, Intl. Conf. on Large Spatial Databases*, 1991.
22. --- : Semantic queries with pictures—the VIMSY model. *Proc. VLDB-91, Intl. Conf. on Very Large Databases*, 1991.
23. --- (with Bagchi, A.) : An OODB approach towards creating a model base of visual objects. *COMAD-92*, 1992.
24. Kundu, M. K. (with Pal, S. K.) : Selection of mapping function for optimal contrast enhancement using fuzzy set theoretic measures. *Proc. IEEE Conf. Tencon 1991*. New Delhi, 1991.
25. Majumder, S. (with Datta, A. K.) : Development of a system for reservation and enquiry using speech mode interaction (RESMI). *Proc. Intl. Workshop on Recent Trends in Speech Music and Allied Signal Processing*, Delhi, 1991.
26. Mitra, S. (with Pal, S. K.) : Layered neural net as a fuzzy classifier. *Proc. 4th Intl. Conf. Industrial and Engineering Applications of Artificial Intelligence and Expert System*, Kausi, Hawaii, 1991.
27. Pal, S. K. : Fuzzy geometry, entropy, and image information, (Invited talk), *NASA Conf. Publication 10061 (Proc. 2nd Jt. Technology Workshop on Neural Network and Fuzzy Logic)*, Texas, USA, 1991.
28. --- : Fuzzy sets in image processing and recognition (Invited paper), *Proc. FUZZY-IEEE 1992*, San Diego, USA, 1991.
29. --- (with Wang, L.) : Fuzzy medial axis transformation (PAIAT)—Redundancy, approximation and computational aspects. *Proc. IFSA 1991, Congress*, Brussels, 1991.

#### INDIAN STATISTICAL INSTITUTE

30. Parui, B. K. (with Chaudhuri, B. B.) : On the shape of a set of discrete planar points. *National Seminar on Theoretical Computer Science*, ISI-Calcutta, 1992.
31. Sengupta, P. (with Chaudhuri, B. B.) : Certain theoretical issues on natural language processing of Indian Languages (with Bengali as a case study). *Proc. 7th National Convention of Computer Engg.*, Pune, 1991.
32. ——— : A lexical representation system for efficient wordform analysis and lexical projection in inflectional languages (with Bengali as a case study). *2nd Regional Workshop on Computer Processing of Asian Languages*, Kanpur, March, 1992.
33. Wang, L. (with Pal, S. K.) : Perspective view of fuzzy medial axis transformation (FMAT). *Proc. NAFIPS 1991*, Columbia, 1991.

#### Geological Studies Unit

1. Bandopadhyay, S. : The age of Kota Formation. *39th Symp. of Vertebrate Palaeontology and Comparative Anatomy*, Oxford, 23-27, September, 1991.
2. ——— : Mesozoic Gondwana vertebrates from Pranhita-Godavari Valley. *Geology Seminar*, University of Bristol, 15 October, 1991.
3. Chakraborty, T. : Fluvial-neolian interactions in a proterozoic alluvial plain—example from the Mancheril Quartzite, Pranhita-Godavari Valley, India. *Conf. on 'Dynamics and Environmental context of Aeolian Sedimentary Systems'*; London, 22-23 October, 1991.
4. ——— : Sedimentology of the Mancheril Quartzite—an example of the proterozoic braided fluvial deposit. *Seminar, Postgraduate Research Institute for Sedimentology*, University of Reading, England, 29 October, 1991.

#### Physics Unit

1. Gangopadhyay, S. (with Datta, K. B.) : Identification of MIMO system from input-output data. *IEEE TENCON*, 1991, New Delhi, 1991.

#### Biological Sciences Division

##### Agricultural Sciences Unit

1. Banik, P., Adhikary, S. and Bagchi, D. K. : Evaluation of paddy-legume intercropping on mid-upland situation in Bihar Plateau. *79th Indian Science Congress*, Baroda, 1992.
2. Das, S. and Ghosh, M. : Morphology of stomata and leaf hairs of some mangroves from Sundarbans, West Bengal. *79th Indian Science Congress*, Baroda, 1992.
3. Ghoshal, P., Sarkar, B., Maitra, N., Gaunis, P., Bhattacharyay, B. and Bagchi, D. K. : Residual effect of phosphori fertilizer on paddy and follow up maize crop grown in Eastern India. *79th Indian Science Congress*, Baroda, 1992.

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*Anthropometry and Human Genetics Unit*

1. Basu, A. Environment and population in the Himalaya : Notes on some findings and research priorities (Invited paper). *The Seminar on Science and Technology for Development of West Bengal*, West Bengal Academy of Science and Technology, Calcutta, 13-15 November, 1991.
2. Karmakar, H. : Association between toe and finger patterns among five populations of West Bengal. *79th Indian Science Congress*, Baroda, 3-8 January, 1992.
3. Majumder, P. P. : Mapping a Multilocus Recessive Disease (Invited Talk). *Conference on "Statistical Methods for Gene Mapping"*, Nemasolin (U.S.A.), 4-6 October, 1991.
4. --- : Vitiligo : Results of a Family Study and Genetic Analysis. *8th International Congress of Human Genetics*, Washington D. C. (USA), 1991.
5. --- : Statistical approaches to gene mapping with reference to prelingual deafness (Invited Talk). *Indo-US Workshop on Mapping Genes for Deafness*, New Delhi, 8-9 January, 1992.
6. --- : Gene Mapping (Invited talk). *XVII Annual Conference of the Indian Society of Human Genetics*, 22-25 January, 1992.
7. Reidly, U. M. : Genetic Load : Theory and empirical experience. *XVII Annual Conf. of the Indian Society of Human Genetics*, Dept. Anthropology, Utkal University, Bhubaneswar, 22-25, January, 1992.

*Embryology Unit*

1. Saha, A. K. : A stochastic Reaction-Diffusion Model of the Epigenetic System : Study of Localized fluctuations. *8th Mathematical Conf. of Bangalore Mathematical Society*, Chittagong University, Bangladesh, 1991.
2. Tapaswi, P. K. : (i) Pattern Formation and Morphogenesis and (ii) Biological order Through Fluctuations. *Seminar, Orsted Institute*, University of Copenhagen, Denmark, August, 1991.

*Bio-Chemistry Unit*

1. Ghosh, B. B. : Cytotoxicity of organotin chloride on human lymphocytes *in vitro*. *16th Annual Conf., Environmental Mutagen Society of India*, Calcutta, 1991.

*Social Sciences Division*

*Economic Research Unit*

1. Bhattacharyya, N. : Income and Expenditure Survey : The Indian Experience. *48th Session of the International Institute*, Cairo, 9-17 September, 1991.

#### INDIAN STATISTICAL INSTITUTE

2. Chattopadhyay, Manjushree and Sarkar N. : Causality between Wages and Prices : The Indian Case, 28th Conference of the Indian Econometric Society, North Bengal University, 29-31 October, 1991.
3. Coondoo, D., Maiti, P., Sarkar, N. and Neogi, C. : A Model for Forecasting Denominational Requirement of Currency in India, 28th Conference of the Indian Econometric Society, North Bengal University, 29-31 October, 1991.
4. Neogi, C. : Technology Intensive Industrialisation in LDCs : An experience of Indian Industries. 28th Indian Econometric Conference, North Bengal University, Siliguri, 29-31 October, 1991.

#### Planning Unit (Delhi)

1. Sarma, Atul : Fiscal Federalism in India—Case for Fresh Review. *Seminar on Indian Constitution as an Instrument of Change, School of Social Sciences, I. N. U., New Delhi, 20-22, March 1992.*
2. --- (with Prodhon, B. K.) : Background note on the Indian Tax system. *Int. Seminar on Reforms of the Tax Systems of Developing Countries*, sponsored by IDRC, Ottawa, Canada held in Bogota, Columbia, 20-22, February, 1992.
3. --- (with Saluja, M. R.) : State I-O Tables Sources and Methods. *Conf. Indian Association for Research in National Income and Wealth, IGIDR, Bombay, 15-18 February, 1991.*

#### Population Studies Unit

1. Deb Roy, R. : A note on the micro-regional statistical surveys in India, *Proc. of the Seminar on Archival Statistics* Italy, 1991.
2. Bhattacharyas, B. N., et al. : A Probability distribution for closed birth interval. *Third Canadian Conference in Applied Statistics*, Concordia University, 23-25 May, 1991.

#### Sociological Research Unit

1. Bandopadhyay, Suraj : Conservation and use of resources—Not by democratic rights alone (Invited panel speaker). *Netaji Institute of Asian Studies Symposium* : 1992, Calcutta, 24 January, 1992.
2. --- : Methodological problems in studying an emerging process of social change—some examples from case studies in east India plateau region (invited talk). *79th Annual Session of Indian Science Congress*, Baroda, 3-8 January, 1992.
3. --- : Methodological issues in the study of emerging process, Indian Statistical Institute, Calcutta, 7 February, 1992.
4. Maiti, Asok K. : Methodology of Evaluation of Farmer's participatory project, *Seminar at Centre for Development Studies*, University of East Anglia, Norwich, United Kingdom, 24 July, 1991.

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5. ——— : Participatory development process—an attitude or a technique, *Seminar in North Bengal University (sponsored by IBRAD & NBU) on problems & prospects on participatory community development, North Bengal University, 11-13 September, 1991.*
6. ——— (with Bagchi, D. K. and Bandopadhyay, S.) : Dynamics of Traditional Agriculture—Emerging Trends, *IAREPISASE Conf., Stockholm School of Economics, Sweden, 16-19 July, 1991.*
7. ——— (with Bagchi, D. K. and Bandopadhyay, S.) : Innovation and Entrepreneurial Behaviour at the Grass-roots—A social Network Analysis. *IAREPISASE Conf., Stockholm School of Economics, Sweden, 16-19, July 1991.*

Statistical Quality Control and Operations Research Division

1. Shri A. R. Mukherjee : Evaluation of representativeness of measurements on one metre sample in respect of diameter and elongation of telecom conductor wire. *Proc. National Conf. on Quantitative Approach to TQM, 30-31 August, 1991.*
2. Shri A. Das : A study on production scheduling of electric resistors to minimise the number to colour disc. change. *Proc. National Conf. on Quantitative approach to TQM, Jamshedpur, ORSI, 30-31 August, 1991.*
3. Shri S. P. Mukherjee : Comparison of Relative merits of different strategizing in charging of crystallisers. *Int. conf. on Industrial and Applied Mathematics, Washington D. C., USA, 1991.*
4. Shri S. P. Mukherjee : Optimum Investment in Drilling out of return from Mining. *Int. conf. on Industries and Applied Mathematics, Washington DC, USA, 8-12 July, 1991.*
5. Shri D. T. Ghosh : The Optimum continuous sampling plan CS P-3 with  $k=1$  and  $k=2$ , *Int. conference on Industrial and Applied Mathematics (IOI AM 91), Washington DC, USA, 8-12 July, 1991.*
6. Shri C. Y. Krishna Murti : QC Circle—An Experience, *International convention on QC circles, Bali, Indonesia.*
7. Shri Anurag Seksaria : Inspection capability evaluation—An important aid to effective implementation of Quality Improvement programmes.

Library, Documentation and Information Sciences Division

1. Gopinath, M. A. : Descriptors and their role in Information Retrieval. *Workshop on Information Retrieval, DRTC, Bangalore, 5-7 February, 1992.*
2. ——— : Object  $\alpha$ -Modelling in Information Retrieval, *Workshop on Information Retrieval, DRTC, Bangalore, 5-7, February, 1992.*
3. Prasad A. H. D. : Natural language Processing and its applications in Information Retrieval, *Workshop on Information Retrieval, DRTC, 5-7, February, 1992.*

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4. Ravichandra Rao, I. K. : A description of common communication Format. *Unesco Seminar on Cultural Heritage*, INCCA, 22-25 October, 1991.
5. --- : Information Retrieval System : Design and development. *DRTC Workshop on Information Retrieval*, Bangalore, 5-7 February, 1992.
6. Ravichandra Rao, I. K. and Meera B. M. : Growth and obsolescence of literature—An empirical study. *Third Int Conf on Informetrics*, DRTC, Bangalore, 9-12 August, 1991.
7. Seetharama, S. : Performance Standards in Health Science Libraries. *Medical Lib. Association of Indian Conf*, Jaipur, 1991.
8. Seetharama, S. : Towards accreditation in Library and Information Science Education. *IATLIS Workshop on "Standards in Library and Information Science Education"*, Andhra University, Visakhapatnam, 1991.
9. --- : Evaluation of Information Retrieval Systems. *DRTC Workshop on Information Retrieval*, Bangalore, 5-7, February, 1992.

#### PROJECT REPORTS

##### Physical and Earth Sciences Division

###### *Electronics Unit*

1. Mandal, B. N. : "On some problems in the linearised theory of water waves", submitted to the Third World Academy of Sciences, International Centre for Theoretical Physics, Trieste through Calcutta Mathematical Society.

##### Social Sciences Division

###### *Planning Unit (Delhi)*

1. Mukherjee, P. N. : Social Constraints of Rural Labour Published in the Report of the National Commission on Rural Labour Vol. II NCRL, Govt. of India, Ministry of Labour, Delhi.

###### *Sociological Research Unit*

1. Chakrabarti, Prafulla : Pre-pilot study of the project "The Aged : Study of the Contemporary Conditions of the Rural Elderly in Eastern India"—A Report (Mimeographed).
2. --- : Report of the Feasibility Study Relating to the Project, "The Aged : Study of Contemporary Conditions of Rural Elderly Persons in Eastern India". (Mimeographed).
3. --- : "Perception of Old Age Problem in Some Nadia Villages" (Mimeographed).



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TECHNICAL REPORTS

Theoretical Statistics and Mathematics Division  
Calcutta Unit

1. Barua, Rana : Additive Cellular Automata and Matrices over Finite Fields. *Tech. Report No. 17/91.*
2. Bose, Mausumi : Optimal repeated measurements designs under non-additive mixed effects models. *Tech. Report No. 6/91.*
3. --- (with Bhandari, S. K.) : Selecting the  $t$ -best cells of a multinomial distribution. *Tech. Report No. 18/91.*
4. Bose, Arup (with Dasgupta, Ratan) : Speed of convergence of estimators in autoregressive models. *Tech. Report No. 11/91.*
5. --- (with Sengupta, Debapriya) : Asymptotic properties of maximum likelihood and least squares estimates in nonlinear and generalized regression models. *Tech. Report No. 20/91.*
6. --- (with Chandra, T. K.) : A note on SLLNs. *Tech. Report No. 21/91.*
7. --- (with Chaudhuri, Probal) : On the dispersion of multivariate median. *Tech. Report No. 23/91.*
8. --- (with Mukhopadhyay, Nitis) : Sequential Estimation via Replicated Piecewise Stopping Number in a Two-parameter Exponential Family of Distributions. *Tech. Report No. 3/92.*
9. --- : Sequential Estimation by Accelerated Stopping Times in a Two-parameter Exponential Family of Distributions. *Tech. Report No. 4/92.*
10. Chakraborty, S. R. (with Chattopadhyay, A. K.) : On Testing Homogeneity of Variances of Correlated Variables with Incomplete Data. *Tech. Report No. No. 14/91.*
11. Chattopadhyay, A. K. (with Chakravarti, S. R.) : Non-null Distribution of Bartlett's Test Statistic for Testing Homogeneity of Variances. *Tech. Report No. 19/91.*
12. Chaudhuri, P. (with Sengupta, D.) : Sign Tests in Multidimension : Inference Based on the Geometry of the Data Cloud. *Tech. Report No. 15/91.*
13. --- (with Dewanji, Anup) : Likelihood based nonparametrics kernel smoothing and cross-validation in generalized regression. *Tech. Report No. 22/91.*
14. Kundu, S. (with Okuyama, A.) : Complete Duals of  $C^*(X)$ . *Tech. Report No. 12/91.*
15. Mukherjee, Kalyan : Combinatorics of the Antipodal Map. *Tech. Report No. 9/91.*
16. Raha, A. B. (with Kundu, S. and McCoy, R. A.) : Topologies Between Compact and Uniform Convergence on Function Spaces—II. *Tech. Report No. 13/91.*
17. Rajeev, B. (with Yor, M.) : Local times and almost sure convergence of Semimartingales. *Tech. Report No. 16/91.*

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18. Rao, S. B. (with Mohanty, S. P. and Panda, B. S.) : Chordal Graphs with Specified Perfect Elimination Orderings. Tech. Report No. 10/91.
19. SahaRay, S. : Optimal row-column designs with unequal row and column sizes. Tech. Report No. 7/91.
20. --- : E-optimal row-column designs with row-column incidence structure as J-I. Tech. Report No. 24/91.
21. Sengupta, D. : Adjusting for auxiliary information in estimation problems—the regression estimator. Tech. Report No. 1/92.
22. Sinha, Bikas K. (with Das, Kalyan and Sinha, Bimal K.) : Variance components estimation—on the status of GRUBB's estimators. Tech. Report No. 2/92.
23. Tripathi, T. P. : Estimation of several domain proportions using inverse SRSWOR. Tech. Report No. 5/91.
24. --- : Estimation of Domain Parameters Using Partial Stratification and Inverse Sampling. Tech. Report No. 8/91.

Applied Statistics, Surveys and Computing Division

Computer Science Unit

1. Bandyopadhyay, Sibdas (1992) : Rigging the estimated values by the product method. Tech. Report No. ASC/92/3.
2. Basu, Tapas Kumar (with S. K. Basu S. K. Sarkar and S. Ganguly) (1991) : On the velocity and acceleration of day-by-day increment of length of two major Indian carps, *L. rohita* and *C. catla* reared in cemented hatchery and improvised pits. Tech. Report No. ASC/91/8.
3. Chaudhuri, Arijit (with Joydip Mitra) (1991) : Non-negative estimation of variance by Horvitz-Thompson estimator. Tech. Report No. ASC/91/5.
4. ---, (with Joydip Mitra) (1991) : Variance estimation for OR-prediction. Tech. Report No. ASC/91/6.
5. ---, (with Debesh Roy) (1991) : Mean square error estimation in survey Sampling—an asymptotic design model approach. Tech. Report No. ASC/91/11.
6. ---, (-----) (1991) : Estimating variance of an estimator of distribution function of a survey population by asymptotic design model approach. Tech. Report No. ASC/91/12.
7. Mukherjee, B. N. (with S. S. Maity) (1991) : ML estimation of partially structured covariance matrices. Tech. Report No. ASC/91/10.

Physical and Earth Sciences Division

Electronics and Communication Sciences Unit

1. Banerjee, D. K. (with Parui, S. K. and Dutta Majumder, D.) : Shape and symmetry in 3 dimensions.
2. Basak, J. (with Chando, B. and Dutta Majumder, D.) : Application of binary mathematical morphology to separate overlapped objects.

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3. --- : A connectionist model for detecting lines in gray-level images. Tech. Report No. KBCS/4/91.
4. --- : A connectionist model for edge detection. Tech. Report No. KBCS/5/91.
5. Bhai, N. B. (with Kundu, M. K.) : Extraction and authentication of edges in a vision system. Tech. Report No. TR/ECSU/0004/91.
6. Chanda, B. : GUSPIN—A guiding system for development of PCB inspection program. Tech. Report No. TR/KBCS/11/91.
7. --- : A new prediction/verification algorithm for line detection. Tech. Report No. KBCS/3/91.
8. --- : Application of binary mathematical morphology to separate overlapped objects. Tech. Report No. KBCS/7/91.
9. Chaudhuri, B. B. : Problem of computer parsing of Bangla verbs.
10. Datta, Amitava, (with Parui, S. K. and Dutta Majumder, D.) : A handwritten numerical recognition scheme using a skeletal decomposition technique. Tech. Report No. ECSU/KBCS.
11. Koundinya, K. N. V. L. N. (with Chanda, B.) : On detection of lines in gray level image using search techniques. Tech. Report No. KBCS/10/91.
12. Kundu, M. K. (with Bhai, N. B.) : Development of image printing software on LNO3 laser printer in microwave cluster working under ULTRIX-3.2. Tech. Report No. TR/ECSU/0003/91.
13. --- (with Ray, S.) : Automatic extraction of characteristic features for fingerprint identification. Tech. Report No. TR/ECSU/0005/91.
14. Mukherjee, D. P. (with Banerjee, D. K., Uma Shankar, B. and Dutta Majumder, D.) : A coal micrograph image understanding system. Tech. Report No. R/KBCS/12/91.
15. Parui, S. K. (with Datta Amitava)—Decomposition of 3-D objects.
16. --- (with Uma Shankar, B. and Dutta Majumder, D.)—Extraction of linear features from IRS images.
17. Saha, P. K. (with Chanda, B. and Dutta Majumder, D)—A single scan boundary removal/thinning algorithm for 2-D binary object. Tech. Report No. KBCS/1/91.
18. --- : Principles and algorithms for 2-D and 3-D shrinking. Tech. Report No. KBCS/2/91.

*Physics Unit*

1. Das P. K. : A note on the Cohomology Quantum flows. Tech. Report No. 2/92.
2. Gangopadhyay S. : Coprime matrix fraction description via sylvester's resultant matrix. Tech. Report No. 1/92.

**Biological Sciences Division**

*Agricultural Sciences Unit,*

1. Basik, P. (with Adhikary, S., Ghosal, P., Sarkar, B., Gaunia, P. and Begchi, D. K.) Studies on the performance of four winter crops under low external input level. Tech. Report No. Ag/115/2/91, Sept. 1991.

INDIAN STATISTICAL INSTITUTE

Social Sciences Division

*Economic Research Unit*

1. M. Pal : A Note on Lower Bound of  $\beta_1$  when there are Odd Number of Observations. Tech. Report No. ERU/2/91, dt. 1.4.91.
2. D. Coondoo, P. Maiti, N. Sarkar and C. Neogi : A Model for Forecasting Denominational Requirements of Currency in India. Tech. Report No. ERU/3/91, dt. 2.5.91.
3. D. Coondoo, C. Neogi and B. Ghosh : Technology Intensive Industrialization in LDCs : An Experience of Indian Industries, ERU/4/91. Tech. Report No. ERU/4/91 dt. 25.6.91.
4. Manjushree Chattopadhyay and N. Sarkar : Causality between Wages and Prices—The Indian Case. Tech. Report No. ERU/5/91, dt. 10.7.91.
5. M. Pal and P. Maiti : Optimum Stratified Random Sampling Under a Given Ordering of Stratum Variances. Tech. Report No. ERU/6/91, dt. 9.9.91.
6. A. Sarkar : On the Formation of Agricultural Prices. Tech. Report No. ERU/7/91, dt. 4.10.91.
7. M. Pal and Pulakesh Maiti : On Minimax Allocation of Sample Size to Different Strata under a given ordering of Stratum Variances. Tech. Report No. ERU/1/92, dt. 17.3.92.
8. M. Pal, C. Neogi and B. Ghosh : On the Solution of Minimum Absolute Deviations Frontier Production Function. Tech. Report No. ERU/2/92, dt. 28.3.92.

*Planning Unit (Delhi)*

1. Mookherjee, Dilip (with Das, Arindam and Panta, D. P.) : Completed a report on "Income Tax Enforcement in India, A Preliminary Analysis". (submitted to the Tax Reforms Committee, chaired by Dr. R. J. Chelliah for the project sponsored and funded by the National Institute of Public Finance and Policy, New Delhi.).
2. Saluja, M. R. (with Raveendran, G.) : The Economic Impact of Tourism in India. (submitted to ESCAP, Department of Tourism, December, 1991).
3. Ramaswamy, Bharat : "The Effect of the Crop Insurance on Input use : A Decomposition into Risk Reduction and Moral Hazard Effects", Mimeo, November, 1991.
4. Kansal, S. M. : "An Evaluation of the Contribution of 'Other services' sector to the Gross Domestic Production in India.

*Linguistic Research and Services Unit*

1. Bandopadhyay, D. (1992) : Crippled Creativity. Tech. Report No. LRU/DB/1/92.
2. Chowdhury, Amitava (1991) : The Ernakulam Model. Tech. Report No. LRU/AC/3/92.
8. ——— (1991) : Total Literacy : The Kerala Experience. Tech. Report No. LRU/AC/4/91.

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4. --- (1992) : Social, economic and political factors responsible for the success or failure of literacy campaigns : The Case of India. Tech Report No. LRU/AC/1/92.
5. Nitter, Alokannanda and Majumder, Mousumi (1992) : Koatic Methodology for Evaluation of Speech Sounds. Tech. Report No. LRU/2.1/1/92.

*Population Studies Unit*

1. Guha Roy, S., et al. (1991) : A report on a preliminary study on infant mortality and its major components in a health centre in Singur.

*Psychometric Research and Services Unit*

1. Dutta Roy, D. : A report on team-building programme for SQC & OR division. Report submitted to Head of SQC & OR division on July, 1991.
2. --- : Evaluation of Training Programme on Behavioural Science. Report submitted to the Head of SQC & OR division on October 13, 1991.

*Sociological Research Unit*

1. Bandopadhyay, Suraj and Duttagupta, C. : "Maintaining Quality of Research : Dilemma of Democratisation" (on an invitation from the Indian Institute of Management at Ahmedabad, the theme paper was prepared for research).
2. Bandopadhyay, Suraj, Bagchi Dipak K., and Maiti Asok K. : "Assessment of human carrying capacity of land in a village using survey data" (Mimeo.).

*Statistical Quality Control and Operations Research Division*

1. Shri A. Das : 'Optimisation of process parameters for piston machining operations'.
2. Shri P. K. Mandal : 'Testing homogeneity of subgroups in  $\bar{x}$  R chart type of data'.
3. Shri A. K. Biswas and Shri D. K. Manna : 'A renewal theoretic look at spares consumption process'.
4. Shri G. S. R. Murthy and Shri D. K. Manna : 'Critical value for process capability in den'.
5. Shri A. K. Chakraborty and Shri T. S. Arthanari : 'A new formulation of the software testing problem—A oil exploration paradigm'.
6. Shri G. S. R. Murthy : 'A note on sufficient condition for  $o_n$  and  $Q-P$  matrices'.
7. Shri D. T. Ghosh : 'The optimum plan for two level continuous sampling plan as introduced by Liberman and Solomon'.
8. --- : 'Analytic expressions of  $pt$  (%) for CS p-1, CSP-2, and CSP-3 plans.
9. --- : 'The study of stochastic behaviour of two level CSP plan to find  $pe$  (%)
10. --- : 'The optimum CSP-1 with LTPD restriction'.

**Part II. Convocation, Visiting Scientists, Honours and Awards, Scientific  
Tours and Assignments**

**7. TWENTYSIXTH CONVOCATION**

The Indian Statistical Institute held its Twentysixth Convocation for awarding the Ph.D., M.Tech. (Computer Science), M.Stat. and B.Stat. (Hons.) degrees, Post-Graduate Diplomas in Applied Statistics and Diploma in Statistics on 6 March, 1992. Prof. M. G. K. Menon, President of the Institute, presided over the Convocation function. Professor N. Bhattacharyya, Director of the Institute, welcomed the guests and presented the annual review of research, teaching and training activities of the Institute. Prof. C. N. R. Rao, F.R.S., Director, Indian Institute of Science and President, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore delivered the Convocation Address entitled, "Three Exciting Areas of Experimental Physical Sciences: High-temperature superconductors, metal clusters and super molecules of Carbon".

The number of candidates who were awarded degrees and diplomas at this Convocation is given below.

Degree/Diploma	Number of candidates
Doctor of Philosophy (Ph.D.)	4
Master of Technology (M.Tech.) in Computer Science	15
Master of Technology (M.Tech.) in Quality, Reliability and Operations Research	14
Master of Statistics (M.Stat.)	22
Bachelor of Statistics (Honours) (B.Stat. (Hons.))	10
Post-graduate Diplomas in Applied Statistics :	
Post-graduate diploma in Statistical Quality Control and Operations Research, Delhi	1
Part-time diploma in Statistical Quality Control and Operations Research, Madras	6
Diploma on Operation and Programming of Automatic Data Processing Equipment	17
Associateship in Documentation and Information Science, Bangalore	8
Professional Examinations in Statistics :	
Senior Diploma in Statistics	1
Junior Diploma in Statistics	5
<b>Total :</b>	<b>103</b>

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### 8. VISITING SCIENTISTS

A number of distinguished scientists from abroad and India participated in the research, training and other scientific activities to the Institute during the year. Some of them came to the Institute on invitation and spent fairly long periods at the Institute to assist in the regular research and teaching programme while others came for short periods and gave lectures and seminars. Most of them were available for consultations by the faculty members of the Institute.

1. Dr. Amritesw Sinha, Department of Mathematics, NEHU, Shillong visited the Institute (27.5.91—13.6.91) and had research discussions with Dr. A. B. Baha.
2. Dr. Anirban Dasgupta, Purdue University, USA visited the Institute (20.6.91—27.6.91) and delivered a lecture entitled "Bayesian Inference : New Thoughts".
3. Professor Masay Ghosh, University of Florida, Gainesville, USA (8.7.11.7 and 13.7.91) delivered three lectures on "Empirical and Hierarchical Bayes Methods in Statistics with Applications".
4. Professor M. G. Nandkarni, Bombay University, Vidyanageri, Bombay visited the Institute (11.7.91—12.7.91) and delivered a lecture entitled "Orbit Equivalence of Borel Automorphisms".
5. Professor Rahul Mukherjee, Indian Institute of Management, Calcutta is continuing to be a Visiting Scientist of the Institute. He delivered a lecture "Second-order Pitman Closeness" on 26.8.91.
6. Professor P. K. Banerjee, University of New Brunswick, Fredericton, Canada (1.8.91-31.1.1992) visited the Institute and participated in teaching besides delivering a few lectures.
7. Professor Dipak K. Dey, University of Connecticut, USA visited the Institute (3.10.91-2.12.91) and delivered a lecture to "Robust Bayesian analysis using entropy and divergence measures".
8. Professor G. J. Babu, Pennsylvania State University, University Park, USA visited the Institute (3.10.91-1.1.92) and had discussions with the scientists. He also delivered lectures : (i) Small sample asymptotics, (ii) Edgeworth expansions for errors in variables.
9. Dr. Gopal Chaudhuri, Department of Statistics, University of Poona visited the Institute (7.11.91-12.11.91) and delivered a lecture "Bhattacharyya distance—based on linear discrimination".
10. Professor Bimal K. Sinha, Department of Statistics, University of Maryland, Catonsville, USA visited the Institute (11.10.91-31.12.91) and delivered a series of lecture besides research discussions.

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11. Professor M. M. Ali, Jahangirnagar University, Savar, Bangladesh visited the Institute (25.11.91- 28.11.91) and delivered a lecture on "Statistical Inference based on order statistics".
12. Professor R. N. Bhattacharyya, Dept. of Math., Indiana University, Bloomington, USA visited the Institute (17.12.91-11.1.92) and delivered lectures on "Introduction to dynamical systems and chaos" and "Dynamical systems and Markov processes".
13. Professor F. Parlamento, University of Udine, Udine, Italy visited the Institute (28.12.91-20.1.92) and delivered lectures on (i) Introduction to the foundations of logic programming and (ii) Decidability and undecidability of fragments of Set Theory".
14. Professor N. Mukhopadhyay, University of Connecticut, USA visited the Institute (1.1.92-15.4.92) and assisted in teaching besides giving a lecture on "On selecting the best treatment : two parameter exponential case".
15. Professor A. P. Basu, Univ. of Missouri, Columbia, USA visited the Division (10.2.92-25.2.92) and had research discussions.
16. Professor Kesar Singh, Rutgers University, USA visited the Institute (11.3.92-18.3.92) and delivered a lecture on "A matter of definition in robustness".
17. Professor S. Levi, University of Milano, Italy visited the Institute (17.3.92-3.4.92) and delivered a lecture on "Hyperspace Topologie".
18. Dr. Basudeb Dutta visited ISI, Bangalore for the entire year.
19. Dr. Cherien Varghese visited ISI, Bangalore for the entire year.
20. Dr. Srinivas Rau visited ISI, Bangalore during July, 1991—January, 1992.
21. Dr. S. Somsundaram visited, ISI, Bangalore until June, 1991.
22. Dr. Hemant Bhatte visited ISI, Bangalore for two months (late October to late December in 1991).
23. Dr. S. D. Ahikari visited, ISI, Bangalore for a week in June, 1991 and gave two lectures on 'Average of Arithmetic Functions'.
24. Dr. M. M. Rao visited ISI, Bangalore for a few days in August, 1991 and gave two lectures on 'Harmonizable Processes' and 'A Unified approach to Stochastic Integration' respectively.
25. Dr. P. Sastry visited ISI, Bangalore for a few days in October, 1991 and gave a lecture on 'Residues and Duality'.



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26. Dr. Franco Parlamento visited ISI, Bangalore for a few days in January, 1991 and gave a lecture on 'Godel's incompleteness theorem in the Set-theoretic framework.
27. Dr. M. A. Sofi visited ISI, Bangalore during January, 1992-February, 1992.
28. Dr. Balakrishna Hosmane continuing to visit since late January, 1992.
29. Prof. D. P. Agrawal, North Carolina State University, USA during his visit from 10.7.91 to 22.7.91 gave a Lecture on Parallel Processing Algorithm and Architecture.
30. Prof. G. V. Volkenburgh of Canada visited the Nodal Centre of KBCS and delivered a series of lectures on KBCS Programme during 10 days in August 1991.
31. Prof. W. M. Hartmann, Michigan State University, USA gave an invited lecture on 16.12.91 on Space Localization through auditory perception.
32. Dr. Debajyoti Mukhopadhyaya of Bell Telephone, USA gave an invited talk on Distributed Computing on 30.12.91.
33. Harr P. Gais of GSF Institute für Strahlenschutz, Germany visited from 10-16 Dec. 1991 in connection with the programme of System development for Oncological Research.
34. Dr. H. Hamann of International Büro, Munich, Germany visited the Institute on 25-26 Dec. 1991 in connection with the Joint Collaborative Indo-German Project.
35. Professor Jose F. Bonaparte, University and Museo Argentino de Ciencias, Argentina, visited Geological Studies Unit (4.6.91 to 12.6.91). He also delivered two lectures, entitled (i) Triassic fauna of South America (7.6.91) and (ii) Late Cretaceous dinosaur fauna from South America (11.6.91).
36. Professor R. W. Willey (Agronomist), East Anglia University, U.K. and consultant of Overseas Development Group visited and gave a seminar talk on "Intercropping System Evaluation" on 10 June, 1991.
37. Dr. Anthony Barnett (Resource management expert) as consultant of Overseas Development Group, U.K. visited ISI, Calcutta and Giridih during 17-24 November, 1991 and held a series of discussion on 'Rainfed Farming Project'.
38. Dr. Richard Palmer Jones (Agric. Economist) as consultant of Overseas Development Group, U.K. visited ISI, Calcutta and Giridih during 17-24 November, 1991 and held a series of discussion on 'Rainfed Farming Project'.
39. Dr. (Mrs.) Erica Wheeler (Nutritionist) as consultant of Overseas Development Group, U.K. visited ISI, Calcutta and Giridih during 17-24 November, 1991 and held a series of discussion on 'Rainfed Farming Project'.
40. Dr. P. Chengal Reddy, Reader, Department of Anthropology, Sri Venkateswara University, Tirupati visited ISI, Calcutta during 15 August-25 August, 1991 in connection with a collaborative project.
41. Professor Madhav Gadgil, Professor and Convener, Centre for Ecological Sciences, Indian Institute of Science, Bangalore visited ISI, Calcutta during 15 July-17 July, 1991 in connection with collaborative project.

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42. Professor Amitava Bose, IIM, Calcutta continued as a Visiting Professor and actively participated in the research activities in Economic Research Unit.
43. Professor Ashok Rudra, honorary Visiting Professor of the Institute, regularly visited the Institute in connection with ICSSR project on Biography of Professor P. C. Mahalanobis.
44. Dr. D. S. P. Rao, Department of Econometrics, University of New England, Armidale, NSW, Australia visited ISI, Calcutta during 11 February-3 May, 1991. He collaborated with scientists of ERU in research work and delivered seminars on Theory of Index Number.
45. Professor Anil Kr. Bera, Department of Economics, University of Illinois, at Urbana-Champaign, USA visited ISI, Calcutta during 9 May-9 June, 1991 and delivered a seminar on Econometric Methods in the Institute during the visit.
46. Dr. Nripesh Poddar, University of New South Wales, Sydney, Australia, visited ISI, Calcutta during October, 1991 and delivered two seminars on Economic Inequality in the Institute during the visit.
47. Professor Massimo Ricottelli of University of Bologna, Italy visited ISI, Calcutta during 2-4 December, 1991 and delivered a seminar on Development theory during the visit. He also discussed with the scientists of this Institute about the issues of economic policy changes in India.
48. Professor Gianni Vaggi of Pavia University, Italy visited ISI, Calcutta during 2-4 December, 1991 and discussed with the scientists of this Institute about the issues of economic changes in India.
49. Professor R. W. Willey, Distinguished Agronomist, Overseas Development Group, University of East Anglia at Norwich, United Kingdom, visited ISI, Calcutta during 8-12 June, 1991 and discussed with the faculty members of this Institute regarding 'Rainfed Farming Project' and delivered a talk entitled, "Evaluation of inter-cropping systems" at ISI on 10 June, 1991.
50. Professor Richard Palmer Jones, Agricultural Economist, Overseas Development Group, University of East Anglia at Norwich, U.K. visited ISI, Calcutta during 16-22 November, 1991 in connection with collaborative project.
51. Professor Anthony Barnett, Social Anthropologist, Overseas Development Group, University of East Anglia at Norwich, U.K. visited ISI, Calcutta during 16-22 November, 1991 in connection with collaborative project.
52. Professor Erica Wheeler, Nutritionist, Overseas Development Group, University of East Anglia at Norwich, U.K. visited ISI, Calcutta during 16-22 November, 1991 in connection with collaborative project.
53. Professor F. W. Lancaster, Library and Information science, University of Illinois, Urbana-Champaign visited ISI, Bangalore during 31 July-28 November, 1991 to carry out research project on "Curriculum on Library and Information science for Developing Countries". He also took regular classes on (i) Thesaurus Construction and (ii) Evaluation of Information Systems.
54. Dr. Abraham Bookstein, University of Chicago visited ISI, Calcutta during December, 1991-February, 1992 and conducted classes on "INFORMETRICS" for the students and faculty members of DRTC. He also conducted a special workshop on Information Retrieval during his stay.

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### 9. HONOURS, AWARDS AND SPECIAL ASSIGNMENTS

Professor S. Dasgupta (Stat-Math) has been elected a Fellow of the Indian National Science Academy, Delhi.

Professor A. K. Roy (Stat-Math) has been invited, under the U.G.C. Scheme, to spend a month at the Department of Mathematics, Sambalpur University, as a Visiting Fellow.

Professor S. B. Rao (Stat-Math) delivered a series of lectures as U.G.C. Professor at the Department of Mathematics, Sambalpur University, Orissa. He has also been appointed as (i) Editor of the Ramanujan Mathematical Society (Combinatorial Section) and Orissa Mathematical Society Journal. (ii) The Regional Coordinator of Indian National Mathematical Olympiad, 1992 for the West Bengal Region.

Dr. R. Bhatia (Stat-Math) elected as (i) Member, Editorial Board, *Linear Algebra and Applications*, (ii) Member, Editorial Board, *Linear and Multilinear Algebra*, (iii) Member, Advisory Board, *Indian Journal of Pure and Applied Mathematics*.

Prof. B. L. S. Prakasa Rao (Stat-Math) (i) Appointed as a Distinguished Scientist at ISI with effect from 1.1.92, (ii) Elected as a Fellow of Indian Academy of Sciences with effect from 1.1.92. He also visited University of Hyderabad on special invitation as Jawaharlal Nehru Centenary Chair Professor.

Prof. K. B. Sinha (Stat-Math) elected as a member of the Council and Convener, Sectional Committee of Mathematical Sciences of the Indian Academy of Sciences, Bangalore.

Professor V. S. Sunder (Stat-Math) elected as a Fellow of the Indian Academy of Sciences.

Dr. Ashis Sengupta (Applied Statistics, Surveys and Computing) (i) Invited, being supported by a grant from the University of California, to be a Chairman for the Ph.D. Degree Examination of Mr. H. Chang at the University of California—Santa Barbara U.S.A. in 1991, (ii) Recipient of International Travel Award for Chairing Ph.D. defence examination of H. Chang, University of California—Santa Barbara, U.S.A. from NBHM, Department of Atomic Energy, Government of India, July, 1991, (iii) Recipient of Grant (jointly with Professor S. R. Jammalamadaka) for writing the monograph "On the foundations of Statistical inference for directional data", from University of California—Santa Barbara, U.S.A., 1990-1991 renewed to 1991-1992.

Prof. Sisir Roy (Electronics) was appointed as a referee to evaluate the Scientific achievements of Professor Kh. Namsrai as a Fellow of Third World Academy of Sciences (Trieste, ICTP). Third World Academy of Science (ICTP) made the request to evaluate. He was also invited to participate in the felicitation function in honour of Professor Abdus Salam at New Delhi as an Indian Member of ICTP in 1992.

Prof. B. N. Mandal (Electronics) elected as (i) Member of the University Grants Commission Panel in Mathematical Sciences, (ii) Member of Ph.D. Committee in Applied Mathematics, University of Calcutta, (iii) Secretary, Calcutta Mathematical Society.

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Prof. B. B. Chaudhuri (Electronics and communication Sciences) received M. N. Saha Memorial award 1989 from the Institute of Electronics and Telecommunication Engineers for the best Applications Oriented paper published in their Journal. The award was announced and delivered in 1991.

Mr. Narayan Chandra Deb (Electronics and Communication Sciences) represented ISI in 11th Indian Scientific Expedition to Antarctica during 27 Nov. 1991-24 March, 1992. The objective of this expedition was to observe and study the atmospheric condition of Antarctica since it plays a key role to global climatic change. He has been associated with computerisation of automatic weather station and Sodar system for collection of data to study ABL/PGL of Antarctica. He also set up an experiment for direct measurement of sodar radiation by UV-B photo meter and Spectro photometer in estimating stratospheric ozone layer depletion at Antarctica.

Mr. Ashis Ghosh and Mr. Deba Prasad Mondal (Electronics and Communication Sciences) individually received Young Scientist's award in Computer Science from 79th Indian Science Congress at Baroda during 3-8 January 1992 for their respective work as indicated below :

- (i) A Ghosh : A self-organising multilayer neural network.
- (ii) D. P. Mondal : Performance of a multi-valued recognition system.

Prof. Sankar K. Pal (Electronics and Communication Sciences) selected as an Associate Editor of the Int. J. Approximate Reasoning North Holland. He also acting as Expert Committee member of the CSIR, New Delhi. He also served as a member of Organizing Committee/Advisory Committee of (i) IJZUKA '92 Int. Workshop on Fuzzy Logic and Neural Networks, Fukuoka, Japan. (ii) Fuzz-IEEE '92 1st IEEE Int. on fuzzy systems, San Diego, March 1992. (iii) NAFFPS '92 Int. Conf. of the North American Fuzzy Information Processing Soc. Puerto Vallarta, Mexico, 1992.

Professor A. B. Gupta (Physics) re-elected as a member of CEI (Confederation of Engineering Industry), National Technical Committee on Engineering Education.

Professor A. Basu (Anthropometry and Human Genetics) acted as (i) Examiner-cum-paper setter in Anthropology in (a) Punjabi University, Patiala, (b) Gauhati University, (c) Utkal University, (d) Vidyasagar University ; (ii) Ph.D. examiner in Anthropology in (a) Punjabi University, Patiala, (b) Gauhati University, (c) Utkal University ; (iii) Member, various committees in ISI and other Universities and Institutions ; (iv) Associate Editor, Foreign Editor in several National and International journals. He was also appointed Foundation Fellow, West Bengal Academy of Science and Technology.

Dr. R. Gupta (Anthropometry and Human Genetics) had teaching assignment in the Department of Anthropology, Vidyasagar University. He also acted as examiner cum paper setter in Anthropology in (a) Vidyasagar University, (b) North Bengal University, (c) North Eastern Hill University.

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Dr. B. Mukhopadhyay (Anthropometry and Human Genetics) had teaching assignment in the Department of Anthropology, Vidyasagar University. He also acted as examiner-cum-paper setter in Anthropology in Vidyasagar University.

Dr. Beni Bandana Ganguly (Biochemistry) received "Dr. A. R. Gopal—Ayenger young scientist award—1992", from Indian Association for Radiation protection, Bhabha Atomic Research Centre on March, 3, 1992.

P. N. Mukherjee (Planning) acted as Member of (i) Coordinating Committee of the Working Group on Social Classes and Social Movements, International Sociological Associations, 1991, (ii) Standing Committee on publications Grants IGSSR, 1991.

Shri C. Y. Krishna Murli (SQC & OR) acted as a Judge in QR circle Regional competition of confederation of Engineering Industry (CEI).

Shri A. Rajgopal (SQC & OR) attended an exhibition organised by Fortune International Limited at Australia and gave a series of lectures at Shrilanka in May 1991. He also attended an International Textile Machinery Exhibition at Hannover during September—October, 1991.

Shri T. K. Dutta/D. Roychowdhury/D. T. Ghosh/A. Mazumdar/S. Adhikari and A. Bandopadhyay (SQC & OR) attended lecture demonstrations at Dunlop (Sahagang), Siemens (Joka), CEI (Jamshedpur) and Tinplate India Ltd. (Jamshedpur) on software development.

Shri K. M. Data (SQC & OR) was appointed in the Board of Studies in Statistics, University of Poona for a three year period 1991-93.

Dr. R. J. Pandey (SQC & OR) acted as a member of (i) sectional committee on sampling inspection Bureau of Indian Standards, (ii) Board of studies of IAPQR, (iii) J. B. S. Haldane centenary committee, Indian Statistical Institute. He also represented ISI as a member of the Governing Body of Calcutta Productivity Council.

Shri D. T. Ghosh (SQC & OR) acted as a member of the Board of Studies of IAPQR.

Professor N. T. V. Ranga Rao (SQC & OR) has been awarded Third Prize in the OSHIKAWA essay competition. He was awarded this prize for the second time.

Professor B. K. Pal (SQC & OR) became a member of the World Academy of Quality.

Prof. K. G. Ramamurthy, (SQC & OR) who turned sixty one, was felicitated during four day meet of researchers from various units at Calcutta during February 1992. He has been made honorary Visiting Professor attached to Bangalore Centre of ISI.

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### 10. SCIENTIFIC TOURS AND ASSIGNMENTS ABROAD

Prof. J. K. Ghosh (Stat-Math) visited the Purdue University from August, 1991 to January, 1992 and delivered a series of lectures. He also visited the University of North Carolina, U.S.A. and gave a series of special lectures.

Prof. S. Dasgupta (Stat-Math) attended the International Symposium on Multivariate Analysis at Hong Kong in March, 1992 as an invited speaker. He also attended the Workshop on Multivariate Analysis of General populations at Zhoushan University, Guangzhou, P.R.C. in March, 1992 and presented an invited talk. He was also invited by the Dept. of Mathematica, National University of Singapore, where he presented a seminar talk in March, 1992.

Prof. B. K. Sinha (Stat-Math) worked on a funded project for EPA, being attached to the University of Maryland, U.S.A., in April–May 1991. He also worked as a consultant Expert for United Nations on a Workshop on Sampling for Portuguese speaking countries of West Africa in June, 1991 while he was at Guinea Bissau. He prepared a training manual for UNO on the above topic.

Dr. B. S. Majumder (Stat-Math) was in the Illinois State Water Survey, University of Illinois, U.S.A. on a special assignment upto October, 1991. He attended the ASCE National Conference on Hydraulic Research of Nashville, Tennessee, U.S.A. during July–August, 1991.

Professor B. Ramachandran (Stat-Math) visited Japan under the INSA–JSPS Cultural Programme during the period May 29–June 12, 1991 and mostly spent at the Institute of Statistical Mathematics, Tokyo. He also visited the Statistical Institute for Asia and the Pacific, Tokyo.

Professor K. Balasubramaniam (Stat-Math) visited McMaster University and University of Guelph in Canada during May 3–July 26, 1991.

Dr. S. C. Kochar (Stat-Math) visited University of Alberta, Edmonton, Canada, University of Iowa, USA, Northern Illinois University, DeKalb, Florida University, USA during the period May 8–August 10, 1991 and gave Seminar Talks at these places to continue collaboration work.

Professor K. B. Sinha (Stat-Math) visited the University of Aarhus, Denmark and participated in the workshop on Schrodinger Operators during May–July, 1991. In between, he visited the Department of Mathematics, University of Nottingham, UK in May, 1991. He was an invited speaker at the Mini-meeting on Quantum Probability at the University of Heidelberg, Germany in July, 1991 and also attended 2nd Wigner Conference held at Gaislar, Germany in July, 1991. He also acted as visiting Professor at the University of Trento, Italy and visited Universities of Geneva, Rome, Udine. During December 16–21, 1991, he attended a conference on Quantum Probability and Applications at Oberwolfach Institute of Mathematics, Germany and delivered an invited talk on "Solution of g.s.d.e. with time dependent operator coefficients".

Professor T. Parthasarathy (Stat-Math) visited Portugal during July 28–August 1, 1991 and attended a Conference on "Large Scale Optimization" at University of Coimbra, Portugal presenting a talk on "N-matrices and Linear Complementarity Problem". He also visited the Netherlands during August 1–31, 1991 under the

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Exchange Programme between INSA and the Netherlands Academy of Arts and Sciences. During his stay in Netherlands, he visited Trente University (August 1-4), University of Amsterdam (August 5-9), Catholic University of Barban, Tilburg (August 10-15) and Royal University of Limburg (August 16-31) in connection with Collaborative Work.

Dr. Rahul Roy (Stat-Math) visited (i) University of Antonoms of Barcelona, Spain during September 4-30, 1991 and (ii) Technical University of Delft, Netherlands during October 1-24, 1991.

Dr. Bhatia R. (Stat-Math) visited the University of Toronto, Canada during September 15-October 15, 1991 to continue Collaborative Work.

Professor K. R. Parthasarathy (Stat-Math) visited (i) University of Strasbourg during November 17-23, 1991 and (ii) University of Heidelberg during November 24-December 13, 1991. He also attended Conferences on Quantenstochastik and Soderforschungsbereich at Oberwolfach, Germany during December 14-21, 1991 and organised a session on "Classical Processes und Quantum Probability" presenting a paper.

Professor V. S. Sunder (Stat-Math) visited and gave several lectures in the Universities of Genoa and Roma 11 in Italy, Universities of Cambridge and Nottingham in England and the Universities of Aarhus, Odense and Copenhagen in Denmark during April-May, 1991.

Professor K. P. S. Bhaskar Rao (Stat-Math) was a visiting Professor at Wesleyan University at Middletown, U.S.A., until June 1991.

Dr. V. Pati (Stat-Math) attended a three week 'College on Singularity Theory' held at the International Centre for Theoretical Physics at Trieste, Italy in August 1991.

Dr. Srikanth Joshi (Stat-Math) has taken up a visiting position with Ohio State University at Columbus, U.S.A. since September 1991.

Professor Alladi Sitaram (Stat-Math) was a visiting Professor at the University of Washington at Seattle, U.S.A. up to August '91. He then visited Maharishi International University at Fairfield, Iowa and the University of California at Berkeley, California in September 1991. He also visited the University of New South Wales Sydney, Australia during September-October 1991. He gave several lectures at the various Universities he visited.

Professor T. S. S. R. K. Rao (Stat-Math) was on a visiting position with Freie Universitat at Berlin, Germany up to January 1992.

Dr. Gadadhar Misra (Stat-Math) visited the Mittag Leffler Institute at Stockholm, Sweden from early February to mid-March 1992 during its special Year on Operator Theory and Complex Analysis and gave a lecture there during his visit.

Dr. A. K. Adhikari (Applied Statistics, Surveys and Computing) acted as UN Consultant to Central Statistical Office, Hanoi, Vietnam during 8 June to 29 June 1991 and to National Statistical Office, Seoul, Korea during August 4-24, 1991.

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Dr. T. Mitra (Applied Statistics, Surveys and Computing) acted as Consultant on behalf of International Labour Organisation, Department of Labour, Government of Union Myanmar during June–August, 1991.

Dr. Parimal Mukhopadhyay (Applied Statistics, Surveys and Computing) acted as Visiting Scientist, Department of Statistics, University of Calcutta, during May 16–August 19, 1991.

Dr. Ashis Sengupta (Applied, Statistics, Surveys and Computing) acted as Chairman, Ph.D. Defence Committee, Department of Statistics and Applied Probability, University of California—Santa Barbara, USA 1991. He also acted as Visiting Associate Professor at the University of California, Santa Barbara, USA, 1992.

Mrs. S. Sur-Kolay (Electronics) attended the IEEE International Conference on Computer Design (ICCD) at Cambridge, Massachusetts, USA during October 14-16, 1991 and presented a research paper titled "The Cycle structure of Channel graphs". She has joined the Department of Computer Science, University of Nebraska, USA as a Visiting Research Associate from February, 1992.

Professor Sisir Roy (Electronics) acted as a Visiting Professor at the Einstein Laboratory for Theoretical Physics, Potsdam during July 8-16, 1991 and at the Department of Physics, University of Rome during July 20–August 7, 1991. He also attended II International Wigner Symposium, Goslar, Germany during July 16-20, 1991 and read a paper at the Conference.

Professor A. K. Datta (Electronics and Communication Sciences) attended the following Conference/Workshop/Seminars abroad (i) European Conference on speech and Technology (Eurospeech)—1991 during September 24-26, 1991 Genoa, Italy, (ii) Informal Miniworkshop on signal Processing on 27 September, 1991, Università Degli Di Roma 'La sapienza' Roma, Italy, (iii) ICDAR 91 during 30 September—2 October, 1991 at St. Malo, (iv) International Workshop on Multimodal Dialogue, St. Maratea, Italy during September 16-21, 1991. He also visited GSP Inst. Germany, November 26, 1991 in connection with the Indo-German Collaborative project.

Professor S. K. Pal (Electronics and Communication Sciences) attended (i) The NAPIPS 891 Conference at the University of Missouri, Columbus May 14-17, 1991 to present a paper of Fuzzy medial axis transformation, (ii) The fourth Int. Conf. on Genetic Algorithms, University of California, San Diego, July 13-16, 1991, (iii) The AAAI-91, Ninth National Conf. on Artificial Intelligence, California, July 17-19, 1991, (iv) The Fuzzy-IEEE 1992, 1st IEEE Int. Conf. on fuzzy systems San Diego, March 1992 as a speaker of an invited talk (on fuzzy sets in image processing and recognition) and a contributed paper (on fuzzy Multilayer perception).

He also worked at the NASA Johnson Space Centre, Houston Texas as a 'Guest Investigator' (NRC—NASA, Senior Research Awardee) from January 1990 to March 1992. He was engaged in research and development work on application of fuzzy logic in space autonomous research problems and delivered a series of lectures on fuzzy set theoretic approach for management of uncertainty in pattern recognition and image processing.

Dr. B. Chouda, Dr. N. R. Pal, Mr. P. K. Saha, Mr. D. P. Mukherjee and Mr. D. K. Banerjee (Electronics and Communication Sciences/NCKBCS) attended the Summer School of Computer Vision at CIMPA, NICE, France.



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Dr. N. R. Pal (Electronics and Communication Sciences) visited University of Florida, USA on post Doctoral Fellowship for the period from 29.8.91 to 31.8.92.

Dr. S. Ray (Electronics and Communication Sciences) visited Department of Computer Sciences, Monash University, Australia throughout the year.

Mr. J. Basak, S. Deb, S. E. Sharma and Dr. C. A. Murthy (Electronics and Communication Sciences/NCKBCS) completed six months training course sponsored jointly by Department of Electronics, Government of India and UNDP at Carnegie Mellon University, Stanford University, Massachusetts Institute of Technology, respectively in USA.

Dr. (Mrs.) S. Bandopadhyay (Geological Studies) visited the United Kingdom as an elected Visiting Fellow at the University of Oxford from 6th August, 1991 to 18th October, 1991. She carried out research on the corcodile collection at the Oxford University Museum and also carried out current literature survey.

Shri T. Chakraborty (Geological Studies) visited the United Kingdom to attend a conference on "Dynamics and environmental context of aeolian sedimentary systems", held at London on 22-23rd October, 1991. The organiser was Geological Society of London. He contributed a poster presentation titled "Fluvial-aeolian interactions in proterozoic alluvial plain : example from the Mancheril Quartzite, P.G. valley, India". He also visited the Post-Graduate Research Institute for sedimentology, University of Reading, England during October 24-30, 1991 and gave a seminar on "Sedimentology of the Mancheril Quartzite : an example of the proterozoic braided fluvial deposition". He also attended a field trip near Rosson-Wyte. Shri Chakraborty visited the Department of Geology, University of Keel, Staffordshire, England during October 30-November 3, 1991. Besides discussions with the faculty staff, he attended a field trip on the Permo-Carboniferous aeolian deposit of the Cheshire Basin of North England.

Dr. D. K. Bagchi (Agricultural Sciences) attended International Symposium on "Multidisciplinary Approach to the study of Economic Problems" organised by SASE/ IAREP at Stockholm, Sweden, during 16-19 1991 and presented two papers. On being invited by Overseas Development Agency, U. K., he visited different Universities of U.K. during June 20-30, 1991 and gave seminar talks and discussed research topics on rainfed farming with the scientists of relevant disciplines.

Dr. Partha P. Majumder (Anthropometry and Human Genetics) visited University of Pittsburgh USA during October–November, 1991 and worked on two collaborative research projects on "Genetics of Substance Abuse" and "Genetics of Abdominal Aortic Aneurysm". He also visited National Institute of Genetics, Japan during December 1-14, 1991 and delivered an invited talk on "Gene Mapping for complex Traits" and held discussions on population genetics.

Professor K. C. Malhotra (Anthropometry and Human Genetics) attended (i) Int. Cong. on small scale peasant Forestry during August 31–September 9, 1991 at Freiburg, Germany and Hamburg, (ii) Int. Conf. on Food and Nutrition in Tropical Forests during September 10-14, 1991 held in Paris. He also delivered invited lectures at (i) Massachusetts, Cornell and Temple Universities, (ii) Sloan-Kettering Cancer Res. Inst., New York, during September –15, October, 1991.

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Dr. P. K. Tapaswi (Embryology) visited H. C. Orsted Institute, University of Copenhagen, Denmark as a visiting Professor and worked there for one month from August 1, 1991 to August 31, 1991.

Smt. M. Poddar Sarkar (Embryology) visited the University of Pennsylvania, Philadelphia, U.S.A. and New York State University, Syracuse, U.S.A. and delivered two lectures on June 17 and July 5, 1991 respectively.

Dr. D. Coondoo (Economic Research) taught and directed the one-month Country Course on Statistical Operations and Procedures organised jointly by the Statistical Institute for Asia and the Pacific (SIAP) and the South Pacific Commission (SPC) held at Suva, Fiji Islands during 27 May-24 June 1991 and at Port Vila, Vanuatu during 20 January-14 February, 1992.

Professor Robin Mukherjee (Economic Research) visited the University of Trondheim, Norway, during 28 March to 5 April 1992 to formulate a collaborative project proposed to be taken up by the Institute.

Dr. N. Bhattacharya (Economic Research) taught and directed the following courses at the invitation of ESCAP, Bangkok and the Statistical Institute for Asia and the Pacific (SIAP), Tokyo : (i) Advanced Course on Sampling at ESCAP, Bangkok, during 3-17 May 1991 and (ii) Country Course on Sampling at Vientianne, Laos, during 27 May-14 June 1991. He also attended the 48th Session of the International Statistical Institute held at Cairo during 3-17 September 1991. .

Dr. Atul Sarma (Planning) participated in the International Seminar Reforms of the Tax Systems of Developing Countries held in Bogota, Colombia during February 20-22, 1992 under the sponsorship of IDRC. He also participated in the XVI Indian Social Science Congress held in Rome during December 20-24, 1991.

Professor Dilip Mookherjee (Planning) participated (i) 1st Annual Conference on Law and Economics, organised by the American Law and Economics Association at the University of Illinois at Urbana Champaign, (ii) Conference on Political Economy of Institutions during June at the Graduate School of Business, Stanford University. He also visited the Center for Economic Research, Tilburg University, Netherlands, from 23 September till 11 October, 1991. While visiting Boston University and University of California at Berkeley in October 1991, he gave Seminars.

Dr. C. R. Malakar (Population Studies) visited North Korea during 7 October 1991-6 January, 1992 as an UNDP consultant.

Shri Amitav Choudhury (Linguistic Research and Services) visited Department of Language and Linguistic Science, University of York, U.K., in April 1991 and March 1992 and delivered (i) A series of lectures to the participants of ESOL Easter Schools and (ii) A talk on "Language Attitudes of the Bengali minority in Hyderabad" on April 14, 1991.

Dr. Asok K. Maliti (Sociological Research) visited Sweden and United Kingdom during July 14-26, 1991 for attending International Conference of LAREP and SASE, Stockholm School of Economics, Sweden and Centre for Development Studies, University of East Anglia, Norwich, United Kingdom respectively.

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SCIENTIFIC ASSIGNMENTS IN INDIA

Dr. S. C. Bagchi (Stat-Math) presented a lecture entitled "Cyclic vectors for Translator Operators" in Groups and Semigroups at the Discussion Meeting on Harmonic Analysis, held at I.I.Sc., Bangalore in March, 1992.

Dr. R. Borus (Stat-Math) attended the National Seminar on Theoretical Computer Science, held at Inst. of Mat. Sc., Madras in July, 1991 and presented a paper. He also attended the State of the Art Seminar on Formal Descriptions of Programming Concepts at T.I.F.R., Bombay in February, 1992.

Dr. A. Bose (Stat-Math) attended the Discussion Meeting on Stochastic Differential Equations, at I.I.Sc., Bangalore, in June 1991. He also attended the 79th Session of Indian Science Congress Assoc. at Baroda in January, 1992, as an invited speaker.

Dr. A. Das (Stat-Math) presented a paper on Binary Designs at the First International Triennial Calcutta Symposium on Probability and Statistics at Calcutta University.

Prof. S. Dasgupta (Stat-Math) presented an invited talk on "Teaching of Statistics" at the First International Triennial Calcutta Symposium on Probability and Statistics at Calcutta University. He also gave an invited address on "Unimodal Functions" at the Conference held under the auspices of Cal. Math. Soc. to honour the memory of Rev. F. Goreux.

Dr. A. Goswami (Stat-Math) attended the Discussion Meeting on Stochastic Differential Equations at I.I.Sc., Bangalore and presented an invited paper entitled "Filtrations of the Ito Integrals."

Dr. J. Mathew (Stat-Math) presented the paper entitled "Measure-free proof of Birkhoff's ergodic theorem" by V. V. Srinivasa and M. G. Nadkarni at the Discussion Meeting on Harmonic Analysis held at I.I.Sc., Bangalore in March, 1992.

Prof. S. B. Rao (Stat-Math) delivered an invited address at the National Conference in Group theory and Combinatorics held at Cochin University in May, 1991. He delivered a series of lectures on "Graph theory and its applications" at Sambalpur University, Orissa, as UGC Professor. He also delivered an invited address at the Annual Conference of Orissa Mat. Soc. held at Bhubaneswar in February, 1992.

Prof. A. K. Roy (Stat-Math) presented an expository paper on "Tensor Products of Banach Spaces" in the Conference organized under the auspices of Cal. Math. Soc. to honour the memory of Rev. F. Goreux, S.J., D.Sc. and he chaired a session in a subsequent conference.

Dr. T. P. Tripathi (Stat-Math) presented a paper entitled "Estimation of Domain Parameters using Partial Stratification and Inverse Sampling" at the First International Triennial Calcutta Symposium on Probability and Statistics at Calcutta University. He also gave a lecture on "Multivariate estimation for finite populations" at AMU, Aligarh in January, 1992, and another lecture on "Some recent methods in sample survey for socio-economic research" at Manipur University in March, 1992.

Dr. Shildas Bandopadhyay (Applied Statistics, Surveys and Computing) acted as a resource person in the Ford Foundation supported workshop on computer-aided data analysis (of on-farm research data). 21-30 January 1992, N.D.U.A.T, Faizabad.

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Prof. Arijit Chaudhuri (Applied Statistics, Surveys and Computing) gave an invited lecture entitled "Small Statistics : A Revue" at the Indian Science Congress, Indore.

Prof. B. N. Mukherjee (Applied Statistics, Surveys and Computing) acted as a member of the (i) Scientific advisory committee of Institute for Research in Medical Statistics, Delhi and Madras chapters, (ii) Technical Advisory Committee of Centre for Applied Statistics, North Eastern Hill, Shillong, (iii) ERIC subcommittee on project screening, NCERT, New Delhi. He also attended a meeting on Stochastic Differential Equations at Bangalore during June 10-12, 1991 and spent a week in University of Poona, collaborating with Professor J. V. Deshpande during August 10-18, 1991. He had the distinction to direct a workshop on "population projection and water management" sponsored by programme support Unit, Indo-Dutch development cooperation programme in rural water supply and Jal-Nigam, Government of Uttar Pradesh held at Lucknow during October 8-9, 1991.

Professor P. Bandopadhyay, (Electronics) acted as (i) Editor of the New International Journal 'Communications in Theoretical Physics' published by the Allahabad Mathematical Society, (ii) An expert of C.S.I.R. and U.G.C., in various committee meetings held in Delhi, (iii) An expert for certain projects submitted to the Department of Science and Technology. He also attended an International Symposium on 'Quantum Field Theory and Statistical Mechanics' at the Institute in collaboration with S. N. Bose National Centre for Basic Sciences, Calcutta, during the period January 27-31, 1992 and delivered a series of lectures at the Academic Staff College, Gauhati University from February 3-7, 1992.

B. N. Mandal (Electronics) visited Indian Institute of Science, Bangalore during 26-31 August, 1991 and delivered a special lecture on 'Mathematical techniques in water wave problems' in the Department of Mathematics on August 24, 1991.

Prof. J. Das (Electronics and Communication Sciences) attended National Symposium on Acoustics during Oct. 30-31 and Nov. 1, 1991 at NPL, Delhi. He also delivered an invited talk and presented two joint papers.

Prof. A. K. Datta (Electronics and Communication Sciences) attended Int. Workshop on Recent Trends in Speech, Music and Allied Signal Processing during Dec. 9-11, 1991 at ISI, Delhi. He chaired a session, delivered invited talk, and presented papers along with his co-workers Prof. N. R. Ganguli, Mr. R. Kundu and research scholars.

Prof. S. K. Pal (Electronics and Communication Sciences) attended National Seminar on Fuzzy Math. and Application (Nov. 1991) at Univ of Tripura, Agartala as a session chairman and invited speaker.

Mr. A. K. De (Electronics and Communication Sciences) attended IV Indian Engineering Congress, Institute of Engineers during Dec. 21-24, 1991 at Pune and presented a paper. He also attended Workshop on Preliminary, Scientific Results of MONTBLES, DST during Jan. 16-17, 1992 at IISc, Bangalore, and presented an invited paper. He (as Team-leader) along with Mr. N. C. Deb, Mr. T. Bhattacharyya and Mr. D. Shaw went to Benaras Hindu University, Varanasi to inspect the operation

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of Sodar (installed by ISI under MONTBLEX Programme) for collecting data during monsoon period and necessary discussion with the scientists, research scholars attached in the concerned field of work.

Shri T. Chakraborty (Geological Studies) contributed a paper entitled "Bedform climbing and origin of flat-bedded scolion strata" at the International Symposium on "Evolution of Deserts" at Ahmedabad in February, 1992, organised by the Physical Research Laboratory, Ahmedabad and others.

Professor T. Roy Chowdhury (Geological Studies) participated in the Symposium on Geology Education in India held at Presidency College, Calcutta (18 July 1991) and contributed one invited paper in the round table discussion (18th July 1991) preceding the Symposium. He was also invited to the Professor Birbal Sahni Centenary International Conference (13-16 November, 1991), organised by the University of Allahabad and contributed a paper for the session on "Utility of Teaching Palaeobiology". He also participated in the seminar on "Recent Trends of Research in Earth Sciences" (13-14 January, 1992) held at Presidency College, Calcutta and chaired a session.

Dr. D. Saha (Geological Studies) participated in a short field work and discussion at Ilkal (Hospet, Bangalore) in connection with the collaborating Granite Project with M/s. Salem Dolerite Limited, Salem, Tamil Nadu in the last week of August, 1991.

Dr. D. K. Rudra (Geological Studies) participated in a short field work and discussion at Ilkal (Hospet, Bangalore) in connection with the collaborating Granite Project with M/s. Solem Dolerite Limited, Salem, Tamil Nadu during the period February 3-8, 1992.

Professor A. Basu (Anthropometry and Human Genetics) presented an invited paper entitled (i) 'Sex differentials in nutritional status and child mortality: Some results from micro-level studies' at the 11th Annual Conference on 'Health of the Youth and Female Child', Indian Society of Health Administrators, Madras, 18-20 April, 1991, (ii) 'Environment and population in the Himalaya: Notes on some findings and research priorities' at the Seminar on 'Science and Technology for Development of West Bengal', West Bengal Academy of Science and Technology, Calcutta, 13-15 November 1991, (iii) 'Nutrition and Health of women and children: Reexamination of some common notions' at 'Professor J. B. S. Haldane Birth Centenary Symposium and 27th Annual Conference of Indian Society of Human Genetics', Indian Society of Human Genetics, Bhubaneswar, January 22-25, 1992.

Dr. Subrata K. Roy, (Anthropometry and Human Genetics) presented an invited paper entitled 'Health Status of Oron tea garden labourers' at the 'Second National Seminar on Health of the Tribal People', Indian Society of Health Administrators in collaboration with Vivekananda Gurjuna Kalyana Kendra, B. R. Hills, Mysore, November 28-30, 1991.

B. Karmakar, (Anthropometry and Human Genetics) attended 79th Indian Science Congress, M. S. University of Baroda, Gujarat, from 3-8 January, 1992. He was in the Organising committee of M. S. University and Science Congress association.

Professor K. C. Malhotra (Anthropometry and Human Genetics) attended

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(i) One-week Capable Course in Wildlife Management for All India Services and Central Services, 25-29 November, 1991 at Dehra Dun as a resource person, (ii) Compulsory course in wildlife management for IFS officers, 18-20 October 1991 at Dehra Dun as a resource person, (iii) Annual meeting of the Indian Academy of Sciences, 7-11 November, 1991 at Pune, (iv) Workshop on Forest Regeneration, 24-26 August at Calcutta and Kharagpur, (v) Monitoring Workshop of DST, 28-30 August, 1991 at Cochin, (vi) Workshop on People of India, 7-10 December at Bangalore, (vii) Workshop on South Asian Perspectives on Global Environmental Change, 10 August, 1991 in New Delhi, (viii) Workshop on Western Ghats, Max Mueller Bhawan, 11-12 November in Pune and Bombay.

Jaysri Das Sarma, JRF (Biochemistry) attended a training programme on various laboratory techniques at the National Institute of Nutrition at Hyderabad in February, 1992.

Dr. D. Coondoo (Economic Research) participated in a two-day workshop on Human Development Organised by the National Council of Applied Economic Research (NCAER), Delhi held during 30 September and 1 October 1991.

Dr. M. N. Pal (Economic Research) has been appointed the Chairman for a Technical Committee on Foreign Trade Statistics of the Ministry of Commerce, Govt. of India, which has started work from September 1991.

Dr. N. Sarkar (Economic Research) attended the 28th Conference of the Indian Econometric Society held at the North Bengal University during 29-31 October 1991.

Dr. C. Neogi (Economic Research) attended the 28th Conference of the Indian Econometric Society held at the North Bengal University during 29-31 October, 1991.

Dr. Pradip Malli (Economic Research) served as an external expert in the Selection Committee Meeting of the Nabakrishna Choudhury Centre for Development Studies, Bhubaneswar, Orissa held on 16 August 1991 for selection of a Reader in Social Statistics. Dr. Malli also delivered a series of special lectures on (i) 'Studies on Poverty in India' at the Department of Economics, Vidyasagar University, Midnapore, West Bengal during 2-5 April 1991, (ii) 'National Income Accounting, Phillips Curve and Rational Expectations' in the Refresher Course for teachers of Economics in colleges organized by the Academic Staff Colleges of Calcutta University in July 1991.

Sri Biswanath Roy (Economic Research) participated at the Twelfth Annual Conference of Bangiya Arthaniti Parishad at St. Xavier's College, Calcutta during February 22-23, 1992.

Dr. Palspre Balakrishnan (Economic Analysis) served as a member of Panel of Economists to advise the Governor, Reserve Bank of India and spent six months with the Department of Economic Analysis and Policy, RBI and prepared an important technical paper entitled "Monetary policy, inflation and activity in the Indian economy", released as an RBI Paper (April 7, 1991). The same paper was presented to the RBI Governor at a Seminar in Bombay. Dr. Balakrishnan was appointed as a Member, Working Group on Financial Companies by RBI, an important assignment in the present context.

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M. R. Saluja (Planning) attended conference of IARNIW, held at IGIDR, Bombay, February 15-18, 1992.

P. N. Mukherji (Planning) participated in the (i) Seminar on the Present Economic Situation in India : Policy Alternatives, Joshi-Adhikary Institute of Social Studies, New Delhi during September 14-15, 1991, (ii) Experts Group meeting to consider the All India Report on Land Reforms in India, National Institute of Rural Development, Hyderabad during February 12-13, 1992, (iii) Workshop of Land Reforms in Rajasthan, HCM Rajasthan Institute of public Administration, Rajasthan during February 4-5, 1992, (iv) Seminar on Theoretical and Methodological problems in the study of state and society in the Third World, Nehru Memorial and Library, New Delhi during November 25-28, 1991, (v) Grass Books Politics Colloquium on Development Programmes and people's Response, University of Delhi during 8-9 February, 1992.

Dr. Atul Srma (Planning) participated in the (i) Seminar on Nation Building, Development Process and Communication, (ii) ICSSR sponsored colloquium on the Issue of Federalism and Centre-State Relations on January 21, 1992, (iii) Seminar on the world Development Report organised by Institute of Economic Growth on September 17, 1991, (iv) Deliberations of an Expert Group on 'Fertilizer Pricing : An Aspect on Public Policy' organised by Institute of Development Studies during September 30—October 2, 1991, (v) Seminar on Zonal Planning on North Eastern and Eastern Zone organised by Economic Affairs Group, IIC on October 26, 1991. He also Chaired a Session on (i) Indo-German Symposium on quality of life in the Metropolises, organised by School of Planning and Architecture and Max Mueller Bhawan during March 17-21, 1992, (ii) 28th Annual Conference of the Indian Econometric Society held during October 29-31, 1991 at the University of North Bengal.

Shri Sukhesh Deb Nath (Linguistics Research and Services) attended a Workshop on "Behaviour Modification" on 11-13 November 1991 at P.R.S.U., Indian Statistical Institute, Calcutta.

Dr. Alokannanda Mitter, Ms. Madhabi Indu and Shri Debesprasad Bandyopadhyay (Linguistic Research and Services) invited to attend a special function in commemoration of World Disabled Day organised by the Welfare Society for the Deaf and Mentally Retarded, Uttarpara, West Bengal on 21 March 1992. Dr. Mitter delivered a short lecture on "Latest trends in diagnosis and habilitation of hearing impairment, even in the pre-natal stage". Shri Bandyopadhyay delivered a lecture on "Ecological imbalance and the problem of impairment". Smt. Indu conducted an informal discussion with parents of hearing impaired children on the inadequacies of hearing aids and the necessity for adequate amplification. She stressed the need for improved education and information of parents regarding the requirements of their handicapped children.

Dr. Surej Bandyopadhyay (Sociological Research) attended 79th Annual Session of Indian Science Congress held at Baroda during 5-8 January 1992 and delivered a 'Special Lecture' in the Section of Statistics. He also attended Netaji Institute of Asian Studies Symposium—1992 as a Panel Speaker at Calcutta on 24 January, 1992.

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Dr. Asok K. Maiti (Sociological Research) attended the Seminar on "Problems and Prospects of Participatory Community Development" during 11-13 September, 1991 at North Bengal University (sponsored by IBRAD and North Bengal University).

Shri S. M. Sundara Raju, Dr. T. S. Arthanari, Shri C. Y. Krishna Murti and Shri P. Lakshminan (SQC and OR) participated in the 4-day meet on "TQM and ISO 9000" organised by SQC and OR Division at Bangalore during October, 1991.

Dr. R. J. Pandey, Shri D. T. Ghosh, Shri T. K. Chakraborty, Dr. S. P. Mukherjee (SQC and OR) acted as (i) Paper setters and examiners of Universities like Calcutta, North Bengal, Midnapore and Ravishankar, (ii) Referees to various journals including Sankhya, Operations Research etc.

Dr. S. Seetharama (DRTC) visited Department of Library and Information Science of the Puna University from 9 to 13 December 1991 to deliver special lectures in "Management Techniques for Libraries and Information Centers". He was also invited as a Visiting Fellow by the Department of Library and Information Sciences of the Marathwada University, Aurangabad during January 16-30, 1992 to deliver a special lecture on Personnel Management, Financial Management, Information Economics and Network Techniques. He also visited Department of Library and Information Science of the Nagpur University during 12-27 March, 1992 to deliver lecture on Personnel and Financial Management, Evaluation of IRS and system analysis.

Dr. I. K. Ravichandra Rao (DRTC) visited INSDOC, New Delhi from 30 September to 1st October, 1991, to deliver two lectures on "Historical Development and Applications of Bibliometrics". He participated in the UGC meeting on "Curriculum Development" held at New Delhi on 10-11 October '91 and at Poona University in January 1992. He also participated in the UNESCO meeting of Member Countries of South and South East Asian Region for "Networking of Information Systems on Cultural Heritage. Presented a paper at Indira Gandhi National Centre for Arts (INGCA), Delhi 22-25 October 1991. He visited Department of Library and Information Sciences, Osmania University, Hyderabad, on 7 December, 1991 to deliver lectures on : (i) Informetrics and its applications and (ii) Library Automation : Recent trends. He also visited Manipal Industrial Trust at Manipal to organize a workshop on Design and Development of Village Information Industries Systems, 23-27 March, 1991. He Delivered a series of lectures on design and development, and information systems and CDS/ISIS.

Mr. A. R. D. Prasad visited the Academic Staff College, Visakhapatnam to deliver lecture on Expert Systems during 2-6 March 1991. He also participated in the ILA-NISSAT workshop on 'Computer Application to LIS work', Eluru, Andhra Pradesh on 8-11 October 1991 as a resource person. He also visited Department of Library and Information Sciences, Marathwada University, Aurangabad on 25th February to 10th March 1992 to deliver a series of lectures on computer applications. Mr Prasad was invited by the Academic Staff College, Karnataka University, Dharwad on 11-13 March, 1992 to deliver a few lectures on recent trends in computer applications, for the participants of UGC Refresher Course.



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12. NINETYEIGHTH BIRTH ANNIVERSARY OF  
LATE PROFESSOR P. C. MAHALANOBIS

The ninetyeighth birth anniversary of late Professor P. C. Mahalanobis, founder of the Institute, was jointly observed with ISIWO and ISI club in the Auditorium of the Institute at Calcutta on June 29, 1991 at 11.00 a.m. A large number of students and workers of ISI and guests assembled to commemorate the birth day function. Dr. J. K. Ghosh, Director of the Institute welcomed the distinguished guests and all those who attended the function.

Professor S. K. Mukherjee, distinguished academician addressed the gathering by delivering a lecture on 'Works and Life of the late Professor P. C. Mahalanobis'.

On this occasion, Professor Amit Bhaduri, renowned economist also delivered a lecture entitled 'state sponsored industrialisation and the Mahalanobis Model: some lessons from experience' at the main building of ISI, Calcutta at 2-30 p.m. on the same day.

The ninetyeighth birth anniversary of the late Professor was also celebrated by the workers in Delhi and Bangalore Centres and all outstation SQC Units all over India.

### **Part III. Administration and Office Bearers**

#### **13. GENERAL ADMINISTRATION**

##### **ADMINISTRATIVE SERVICES DIVISION**

The Administrative Services Division caters to the various needs of scientific workers of the Institute and provides necessary infrastructural facilities to enable them to carry out their research and academic activities. The Division has different Units in Calcutta as mentioned below :

*Personnel Unit* : The Personnel Unit deals with all service matters like appointments, promotions, transfers, disciplinary action, retirement etc. in respect of all the workers of the Institute and maintains all the necessary service records. The Retirement Benefit Cell attached to the Unit deals with the admissibility and arranges payment of retirement benefit of workers like pension, death-cum-retirement gratuity etc.

*Accounts Section* : The Accounts Section along with Provident Fund Unit keeps the accounts of all financial transactions made by the Institute and is responsible for final closure of accounts and preparation of Income and Expenditure account and Balance sheet at the end of each financial year. The Provident Fund Unit maintains the account of provident fund of all workers of the Institute and deals with PF loan and withdrawals and final payments of PF balance.

*Estate Office* : The Institute is having quite a big area of land and several buildings situated within its campus. The Estate Office looks after all the estates and properties of the Institute and also maintains regular conservancy services.

*Engineering & Electrical Maintenance Unit* : The Institute is having several buildings and sheds and also staff quarters in its various campuses. This Unit looks after the regular day to day maintenance and ensure supply of electricity and water in the buildings. This unit also take up new constructions.

*Medical Welfare and Reimbursement Units* : The Medical Reimbursement Unit is entrusted with checking of all medical claims submitted by the workers as per CSMA Rules and it arranges payment thereof. The Medical Welfare Unit is keeping a small dispensary with facilities of consulting general physicians, specialists and free supply of medicine for the members of the Medical welfare unit. At present, there are three regular doctors and several parttime specialist doctors attached to the Medical Welfare Unit.

*Transport Unit* : The Unit is responsible for running of Institute vehicles and regular maintenance thereof. The Institute has two buses for transporting its workers coming from distant parts of the city. It has also an ambulance to transport the ailing workers to the Govt. Hospitals for emergency treatment on the recommendation of the doctors attached to Medical Welfare Unit.

*Central Stores Unit* : This Unit is responsible for procuring all the stationary and stores articles including furniture and materials required for day to day maintenance of building and water supply and electrical equipments etc. A small Tailoring Unit is attached to it.

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*Binding Unit :* The Institute is having a very big Library and the books are required to be bound from time to time which is done by the Binding Unit of the Institute. Further, the Binding Unit undertakes the jobs for bindery as required by the various scientific and administrative units of the Institute.

*Security Unit :* As mentioned earlier, the Institute is having a vast campus and several buildings and sheds. Maintenance of security of these buildings are of utmost importance. The Security Unit looks after the entire security of the Institute property.

*Director's Office and CAO's Office :* These two offices maintain the various important and confidential records, arrange to issue various circulars and administrative orders and cater to the needs of Director and the Chief Administrative Officer respectively on all matters. These units also keep liaison with other scientific and administrative units in the headquarters and also with the outlying centres and branches of the Institute.

*Central Office :* The Central Office is incharge of receipts and despatch/distribution of all correspondence, circulars, office order etc., of the Institute. Servicing and maintenance of all typewriters and Duplicators of the Institute are centrally looked after by this Office.

*Public Relations Unit :* The Unit takes care all sorts of Public Relations activities on behalf of the Institute. The Unit played a key role in organising media meet in connection with the Convocation of the Institute and International Statistical Education Centre (ISEC) held on 6 March '92 and 30 March '92 respectively. The Unit also arranged exclusive coverage of Radio, T.V. and Press on Regional Mathematical Olympiad. The Unit also started releasing Press Releases in connection with some important events/achievements in order to highlight Institute's activities. At the same time the Unit arranged 'City-Tour' on 15 December '92 for the participants of the short term courses of the Institute as well as trainees of International Statistical Education Centre (ISEC). Another important job of this Unit is to prepare and publish the Annual Report of the Institute each and every year.

*Council Section :* The Institute is a registered society and there are quite a large number of Ordinary and Life members interested in the objectives and activities of the Institute. The Council section maintains liaison with the members and keeps them posted with all current information, arranges despatch of the current issues of Sankhyā, the journal of Statistics published by the Institute. The Council section also arranges for holding various meetings of the General Body and also of the Council and Finance Committee of the Institute. This section is attached to CAO's office.

*Publication and Printing Unit :* The Unit was formed in August 1991 when the Statistical Publishing Society was formally taken over by the Institute. The Unit is engaged with printing of all materials including Sankhyā as required by the Institute. The Unit also accepts small quantity of work from outside agencies.

Apart from the Units mentioned above, there are some small cells like Import Cell, Travell Cell and HBA Cell to take care of the specific needs of the Institute.

The Administrative Services Division also looks after running of Hostels for students, Research Scholars and ISEC trainees and also running of Canteen for the workers and students of the Institute. It also maintains Guest House to accommodate

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scientists and academicians, both from inside and outside the country, who visit the Institute for various academic pursuits. The Division has two main Centres located at Delhi and Bangalore. The other outlying Units numbering eight are controlled directly by the Headquarter at Calcutta. The Administrative Services Division takes the responsibility for all the new construction activity of the Institute at its Headquarters and also at outlying centres/branches. A brief report on the construction activity in the current year is indicated in para 4 below.

The activities of the Administrative Services in the two Centres namely Delhi and Bangalore and in other Outlying Branches of the Institute are more or less the same but on a much smaller scale. Depending on the needs of the Branches/Centres the number of Units have been truncated and merged in to a fewer Units.

### 2. Institute Staff

The need for the supporting staff for various scientific division as also of the general administrative staff has increased tremendously with the increase in research activity of the Institute. The increased number of staff is also needed as a result of new construction activities of various buildings like Senior Students' Hostel, Composite Library Building etc at the Headquarter and also academic blocks at Bangalore and Hyderabad. So long the Institute had to observe a complete ban on recruitment of administrative staff as per the Govt. directive which had resulted in reduction in number of staff on account of retirement, death etc. Although the Govt. had recently finalized the pay structure for the existing employees of the Institute, it has still not cleared the pay scales which will be applicable for the new entrants in various administrative cadres. The Govt. has also asked the Institute not to recruit workers from outside till the pay scales for the new entrants are finalised. With the depletion of staff and ban on recruitment of staff, it has become extremely difficult for the Administrative Services Division to man the important positions in Security, conservancy, maintenance services and in Hostels and Guest House.

The following senior members of the staff worked in the posts indicated against their names during the year.

1. Professor J. K. Ghosh, PNA, Director (up to 12 July 91).  
Professor N. Bhattacharya, Director (From 13 July 91).
2. Dr. A. B. Gupta, Dean of Studies.
3. Professor Parkash Chander, Head, Delhi Centre (up to 30 June 91).  
Professor B. L. S. Prakasa Rao, Head, Delhi Centre (from 1 July to 31 December, 91).  
Professor Bhaskar Dutta, Head, Delhi Centre (from 1 January, 92).
4. Professor M. A. Gopinath, In-charge (Admn. & Accounts), Bangalore Centre.
5. Shri P. K. Bandyopadhyay, Chief Administrative Officer.

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*New Appointments :*

List of the following workers (Scientific/Technical/Administrative) joined the Institute during the year :

1. Shri M. Krishnamurty, Assistant Librarian (1.4.91)
2. Dr. Barun Mukhopadhyay, Lecturer (5.4.91)
3. Shri Srimanta Pal, System Analyst Gr. II (26.6.91)
4. Dr. C. A. Murthy, Programmer (1.7.91)
5. Shri Dipok Roy, Assistant Librarian (1.7.91)
6. Shri Arup Kumar Das, Technical Officer Gr. III (19.7.91)
7. Shri N. V. Asoken, Technical Officer Gr. III (25.7.91)
8. Shri Pradip Roy, Executive Officer (31.7.91)
9. Shri Prabir Kumar Bose, Administrative Officer (1.8.91)
10. Shri Asoke Sarkar, Technical Officer Gr. III (1.8.91)
11. Smt. Sushama Bendre, Lecturer (1.10.91)
12. Shri Ramesh Chandra Satiya, System Analyst Gr. II (7.10.91)
13. Shri Partha Pratim Pramanik, System Analyst Gr. II (29.10.91)
14. Shri Subrata Kumar Roy, Lecturer (31.10.01)
15. Dr. Asit Kumar Saha, Lecturer (31.10.91)
16. Dr. Parasmoni Dasgupta, Lecturer (1.11.91)
17. Smt. Susmita Mitra, Lecturer (1.11.91)
18. Dr. Sanjib Kumar Gupta, Lecturer (8.11.91)
19. Shri Pinaki Roy, Lecturer (11.11.91)
20. Shri Amiya Kumar Das, EDPM supervisor (28.11.91)
21. Dr. Mohan Dalampady, Associate Professor (19.12.91)
22. Dr. B. Rajeev, Lecturer (1.1.92)
23. Dr. Rana Barua, Lecturer (1.1.92)
24. Dr. Bhabatosh Chanda, Associate Professor (1.1.92)
25. Dr. Anjali Ghosh, Lecturer (29.1.92)
26. Shri Sunil Kumar Muzhib, Assistant Librarian (15.1.92)
27. Dr. Sampangi Raman, Technical Officer Gr. III (4.3.92)

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### Retirement :

List of the following workers (Scientific/Technical/Administrative) retired from the service of the Institute during the year :

1. Dr. Sohan Lal Jain, Professor (31.7.91)
2. Smt. C. Jugal, Lecturer (31.7.91)
3. Shri M. N. Sapre, Technical Officer (31.7.91)
4. Dr. F. J. Devadasan, Associate Professor (56.8.91)
5. Shri A. Mohan, Technical Officer (15.9.91)
6. Shri C. S. Rama Krishnan, Lecturer (Senior Grade) (30.9.91)
7. Shri Ashok Ranjan Dasgupta, Research Assistant (30.9.91)
8. Shri Ranjit Kanta Lahiri, Associate Professor (30.9.91)
9. Shri Dipak Kumar Roy, Assistant Librarian (1.10.91)
10. Dr. Ashok Mitra, Professor (20.12.91)
11. Dr. Ganesh Bhatnacharyay, Professor (31.12.91)
12. Shri R. L. Brahmachary, Professor (31.12.91)
13. Dr. Sujit Kumar Mitra, Distinguished Scientist (31.12.91)
14. Dr. Satyendra Lal Dey, Research Assistant (31.12.91)
15. Shri Manish Chandra De Amin, Executive Officer (31.12.91)
16. Shri Sallil Dasgupta, Executive Officer (31.12.91)
17. Dr. Dwijesh Dutta Majumder, Professor (28.2.92)

Workers position as on 31st March 1992 :

(i) Scientific and Technical Group	—	541
(ii) Non-Scientific Group	—	1037
Total	—	1578

### 3. Budget and Finance :

For the year 1991-92, the Institute projected Rs. 994.45 lakhs and Rs. 718.26 lakhs towards Non-Plan and Plan budget respectively in its Budget Estimate stage. The Govt. after considering the report of the Section 3(1) Committee approved a sum of Rs. 975 lakhs (including internal receipts) and Rs. 343.00 lakhs respectively in Non-Plan and Plan Budget Estimates. At the Revised Estimate stage, the Institute sought for a grant of Rs. 1150.00 lakhs and Rs. 343 lakhs respectively in Non-Plan and Plan Estimates. The Govt. while considering the additional increase at RE stage diverted some amount from Plan to give some increase in the Non-Plan in view of tight financial position of the Government. Thus the final grant for Non-Plan was Rs. 1084.55 lakh (including internal receipts of Rs. 25.55 lakhs) and Rs. 170 Lakhs in Plan Estimates. The Institute in the face of high rate of inflation could not contain its expenditure within the reduced amount allotted by the Govt. which resulted in excess of expenditure over income both in Non-Plan and Plan Estimates. The Audited Annual Accounts of the Institute for the year 1991-92 have been furnished in part IV of this report.

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### 4. Land and Construction

#### Calcutta

The following major works were undertaken by the Institute for the period 1991-92.

#### Composite Library Building :

Sanitary works for 7th, 8th & 9th floor of Library Building have already been completed and total value comes to Rs. 3,48,419.50 against our tender amount of Rs. 3,67,703.10.

#### Installation of tubewell at 205 B. T. Road :

Sinking of deep tubewell was commenced during this year and a substantial part of the said work has been completed. The work is likely to be completed during the early part of 1992-93. Expenditure comes to Rs. 3,20,435.60 against tender value of Rs. 3,44,171.64.

#### Sr. Boy's Hostel :

Electrical installation work was completed in all respects during last financial year. The expenditure comes to Rs. 2,45,266.08 against the tender of Rs. 2,68,698.50.

#### Restoration of R. T. S. Building :

Renovation work commenced during the financial year. During the progress of work, it was found both by Institute and Architect that some modification in existing structure and soil line were required to be done. Accordingly, a revised estimate has been proposed as follows :

Tendered amount	14.28	lakhs
Supplementary item of work	3.27	..
Extra items of work	3.22	..
Cantilever portion	3.00	..
Electrical installation	3.50	..
Total	27.27	lakhs

Total work involved for this year became Rs. 13,42,102.72 out of which Rs. 8,50,378.26 is excess/additional works.

#### Guest House at 205 B. T. Road :

Work order for civil, sanitary and electrical work has been issued in this year. Tender value for the same is Rs. 73,20,655.00.

#### Master Plan

M/s. D.C.L. was engaged for preparation of master plan for Baranagar campus. Consultants have submitted final layout drawing relating to building disposition in several campus of I.S.I. Professional fees for rendering their services paid so far is Rs. 1,00,000.00. Balance work are in progress.

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'D' type quarter at Deluxe Garden :

M/s. Ghosh & Bose & Associates (P) Ltd. was engaged for preparation of plan etc. for staff IV quarters at Deluxe Garden.

After approval of final layout plan, soil test at two spots were done. Final expenditure of Rs. 10,850.00 was made. Based on soil report, consultant advised to go for piling and accordingly work order issued to M/s. R. Chatterjee & Co. to this current year for Rs. 7,10,363.00.

### *Delhi*

There were no proposal for any major construction work at Delhi during the year 1991-92. Only a Stores Shed, Pump Room some renovation of Staff Qrs. etc. were taken up.

### *Bangalore*

The Centre could not take up the construction of one more floor on the Academic Block due to fund constraint. The entire amount for Plan construction was diverted to Non-Plan.

### *Madras*

As stated in the previous year, the land could not be got vacated by the local Govt. who expressed various difficulties and were considering allotment of another plot of land at some other places in the City. Meanwhile, a proposal for acquiring floor space for office at a newly constructed building in a good locality in the City was considered by the Council and action had been taken in this regard. All the formalities, and payments (which would be made out of the SQC Development Fund) would be completed in the next financial year.

### *Hyderabad*

There was no construction activities at the Hyderabad Branch during the financial year.

### *5. Take over of Statistical Publishing Society*

In the Annual Report for 1990-91, it was reported that the take over of the Statistical Publishing Society will be completed during the current year. In fact, the SPS was formally taken over by the ISI with effect from 1 August 1991 and a new Unit was formed namely "Publication & Printing Unit". It may be reported that the Committee constituted by the Govt. recommended staff strength of 78 (industrial 64 administrative 14). The remaining 11 workers had to be absorbed in the ISI. Since there was some difference between the pay scales pattern approved by the Govt. Committee and those prevailing in ISI, the surplus workers were immediately absorbed on ad hoc pay. The Council of the Institute had constituted a Committee to look into the problem and formulate suitable pay structure for all the workers of the erstwhile SPS. On the basis of the recommendation of the Committee, the pay structure of all these workers will be finalised.



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### SOCIETY TYPE ACTIVITIES

*Membership :* During the period from April 1991 to March 1992, 78 persons were elected as Ordinary Members of the Institute and 38 Ordinary Members became Life Members. As per information received 2 Ordinary Members expired during the period.

The membership position as on 31st March 1992 is as follows :

Ordinary Members	—	859
Life Members	—	321
Institutional Members	—	15
Total :	—	1195

During the period the following meetings of the statutory bodies were held :

*Finance Committee Meeting :* 3 meetings of the Finance Committee were held during the year on 12 July 1991, 25 October 1991 and 10 January 1992. In the meeting of 12 July 1991, the committee recommended the RE 1991-92 and BE 1992-93 to the Council. The committee in its meeting on 25 October 1991 discussed and recommended to the Council the 8th Plan Proposals (1992-97) and the Revised Annual Plan for 1992-93. The Audited statement of Accounts for 1990-91 was considered and approved in the meeting of 10 January 1992.

*Council Meeting :* 4 meetings of the Council of the Institute were held during the year on 28 May 1991, 13 July 1991, 26 October 1991 and 13 January 1992 and various important decisions on both Administrative and Academic matters were taken. In the meeting of 13 July 1991, the Council approved the RE 1991-92 and BE 1992-93 in respect of both Plan and Non-Plan Estimates. The 8th Plan Proposals (1992-97) for a total sum of Rs. 51.23 crores were finalised in the Council meeting of 26 October 1991 and the revised Annual Plan for 1992-93 was also approved. In the same meeting the Council took note of the formal take over of the SPS by the Institute with effect from 1 August 1991. In the next meeting of the Council held on 13 January 1992, the audited statement of accounts for 1990-91 was adopted. The Council, based on the recommendation of the Selection Committee, appointed Professor B. L. S. Prakasa Rao as the new Director of the Institute on expiry of the term of Professor J. K. Ghosh.

*Annual General Meeting :* 2 Annual General Meetings were held on 28 January 1992 and 8 March 1992. In the meeting of 28 January 1992, the Annual Report together with Audited Statement of Accounts for the year 1990-91 were considered and adopted by the general body. In the next meeting of 8 March 1992, the general body approved the changes of 29 clauses (out of total 32) in Regulations of the Memorandum of Association of the Institute which received the approval of the three-fourth of the members voting.

#### 14. LIST CONTAINING THE NAMES OF THE MEMBERS OF ACADEMIC COUNCIL AND MEMBERS OF DIFFERENT COMMITTEES OF THE INSTITUTE AS ON 31 MARCH 1992.

1. Dr. N. Bhattacharyya, Director—Chairman
2. Dr. A. B. Gupte, Dean of Studies—Convener

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### *Theoretical Statistics and Mathematics Division*

3. Dr. Somesh Das Gupta, 4. Dr. A. K. Roy, 5. Dr. T. J. Rao, 6. Dr. S. B. Rao, 7. Dr. B. V. Rao (on leave), 8. Dr. Bikash Sinha, 9. Dr. A. R. Rao, 10. Dr. G. M. Saha, 11. Dr. Rahul Mukherjee (on leave), 12. Dr. J. K. Ghosh, 13. Dr. H. Sarbadhikari\*, 14. Dr. B. Ramachandran, 15. Dr. K. R. Parthasarathy, 16. Dr. Sujit K. Mitra, 17. Dr. T. Parthasarathy, 18. Dr. B. L. S. P. Rao (on leave), 19. Dr. K. B. Sinha, 20. Dr. R. Bhatia, 21. Dr. Aloke De, 22. Dr. A. Sitaram, 23. Dr. K. P. S. B. Rao, 24. Dr. V. S. Sunder, 25. Dr. V. R. Padmawar,\* 26. Dr. T. V. Hanurav.

### *Applied Statistics, Surveys and Computing Division*

27. Dr. Ajay Kr. Adhikari, 28. Dr. Arijit Chaudhuri, 28. Prof. B. N. Mukherjee, 30. Dr. S. K. Pal, 31. Dr. T. Krishnan, 32. Dr. Shibdas Bandopadhyay, 33. Dr. A. C. Mukhopadhyay, 34. Dr. Tares Maitra, 35. Dr. P. Bhimsankaram.

### *The Computer and Statistical Service Centre (CSSC)*

36. Dr. S. C. Kundu, 37. Dr. B. K. Sengupta, 38. Dr. Aditya Bagchi.

### *Physical and Earth Sciences Division*

39. Dr. Ambarish Ghosh, 40. Professor P. Bandopadhyay, 41. Dr. Raj Kumar Roychowdhury, 42. Dr. B. N. Mandal, 43. Dr. M. K. Chakrabarti, 44. Dr. B. P. Saha, 45. Dr. Ashis Sen (on leave), 46. Dr. B. B. Bhattacharyya\*, 47. Dr. D. Dutta Majumder, 48. Dr. Asoke Dutta, 49. Dr. J. Das, 50. Dr. B. B. Chaudhuri, 51. Dr. S. K. Pal, 52. Dr. T. Roychowdhury, 53. Dr. A. K. Chaudhuri, 54. Dr. S. N. Sarkar\*, 55. Dr. D. N. Ghosal.

### *Biological Sciences Division*

56. Dr. A. Basu, 57. Dr. K. C. Malhotra, 58. Professor R. L. Brahmachari, 59. Dr. S. Maiti, 60. Dr. M. Ghosh\*, 61. Dr. C. Dutta Gupta\*.

### *Social Sciences Division*

62. Dr. D. Dasgupta (on leave), 63. Dr. Rabin Mukherjee, 64. Dr. M. N. Pal, 65. Dr. D. Coondoo, 66. Dr. Pradip Maiti, 67. Dr. M. Chattopadhyay\*, 68. Dr. Biswanath Bhattacharyay, 69. Dr. C. R. Malakar, 70. Dr. S. Guba Roy, 71. Dr. M. Mukherjee, 72. Dr. P. Chakrabarti\*, 73. Dr. Parkash Chander, 74. Dr. Atul Sarna, 75. Dr. P. N. Mukherjee, 76. Dr. Bhaskar Datta, 77. Dr. Dilip Mukherjee, 78. Dr. Debraj Roy, 79. Dr. N. S. Iyengar, 80. Dr. N. S. S. Narayan, 81. Dr. S. Seetharama, 82. Dr. Sanjit Bose.

### *Statistical Quality Control and Operations Research Division*

83. Dr. R. J. Pandey, 84. Dr. D. T. Ghosh, 85. Dr. S. P. Mukherjee, 86. Dr. S. Sengupta, 87. Dr. Anup Majumder, 88. Dr. B. K. Pal, 89. Dr. C. A. Setty, 90. Dr. K. N. Anand, 91. Dr. A. K. Chaudhuri, 92. Dr. A. N. Nankana, 93. Dr. S. R. Mohan, 94. Dr. V. Narayana, 95. Dr. Y. R. Rao, 96. Dr. N. T. V. Ranga Rao, 37. Dr. J. Venkatappiah, 98. Dr. S. M. Sundara Raju, 99. Dr. C. Y. Krishnamurthy, 100. Dr. T. S. Arthanari, 101. Dr. P. Lakshmanan, 102. Dr. N. R. Sarkar, 103. Dr. K. M. Date\*, 104. Dr. V. Gopalan, .

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\* Representative selected by the Divisional Committee of Scientists Workers.

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*Library, Documentation and Information Sciences Division*

105. Dr. J. Mishra, 106. Dr. M. A. Gopinath, 107. Dr. I. K. Ravichandra Rao.

*Member-Secretary, ISEC*

108. Dr. A. B. Raha.

*Head, SQC, T and P. Unit*

109. Dr. T. K. Chakraborty.

*Secretary, Examination Committee*

110. Dr. P. Bhimsankaram.

**List of Members of Different Committees of the Institute**

**(A) Finance Committee**

1. Director (Ex-officio Chairman), 2. Dr. D. K. Bose, 3. Dr. P. N. Roy, 4. Dr. P. K. Bose, 5. Dr. S. B. Rao, 6. Dr. Rabhn Mukherjee, 7. Dr. D. Dutta Majumder, 8. Shri A. K. Ahikari, 9. Dr. T. S. Arthanari Head, SQC & OR Division, 10. Head, Delhi Centre or his nominee, 11. Prof. M. A. Gopinath, 12. Govt. Representative (Dept. of Statistics), 13. Govt. Representative (Ministry of Finance), 14. Shri P. K. Ranyopadhyay, 15. Shri P. K. Chatterjee, 16. Shri Dilip Sengupta, 17. Shri S. S. Panja (Non-Member Secretary).

**(B) Journal Committee**

*Editors : Sankhyā A and B*

Dr. J. K. Ghosh, Dr. S. K. Mitra, Dr. C. R. Rao, Dr. G. Kallianpur,  
Dr. K. R. Parthasarathy, Dr. B. L. S. Prakasa Rao.

*Co-Editors : Sankhyā A*

Dr. G. Jogesh Babu, Dr. K. K. Roy, Dr. Bimal Kr. Sinha,

*Co-Editors : Sankhyā B*

Dr. Arijit Chaudhuri, Dr. Dipankar Coondoo, Dr. T. S. Arthanari,  
Dr. Bikas Kumar Sinha.

*Members of the Journal Committee :* 1. Prof. R. R. Bahadur, 2. Prof. D. Basu,  
3. Prof. N. Bhattacharya, 4. Prof. S. K. Chatterjee, 5. Prof. D. Dasgupta, 6. Prof. Malay  
Ghosh, 7. Prof. M. N. Murthy, 8. Prof. M. N. Pal, 9. Prof. R. P. Pakshirajan, 10. Prof.  
T. J. Rao, 11. Prof. J. Roy, 12. Prof. J. Sethuraman, 13. Prof. S. S. Shrikhande, 14. Prof.  
Aman Ullah, 15. Prof. S. R. S. Varadhan.

*Editorial Secretary :* Dr. Pulakesh Maji.

**(C) Examination Committee :**

1. Prof. S. P. Mukherjee, (Chairman), 2. Dean of Studies, 3. Dr. S. Dasgupta,  
4. Dr. C. R. Malakar, 5. Shri A. K. Ahikari, 6. Officer-in-Charge, Training Division,  
CSO, 7. Prof. S. K. Chatterjee, 8. Dr. B. K. Sinha, 9. Dr. T. V. Hanurav, 10. Dr. D.  
Coondoo, 11. Dr. A. M. Goon, 12. Dr. P. Bhimasankaram (Secretary-Convenor).