ANNUAL REPORT

1992-93

INSTITUTE OF ADVANCED STUDY IN
SCIENCE AND TECHNOLOGY
Jawaharnagar, Khanapara,
Guwahati - 781022

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Compiled & Edited by :
Dr. M.K. Kalita
Secretary & Administrative Officer

Assisted by :
Shri M.C. Baruah
Shri P.K. Deka

Photographs by :
Shri Tarini Barman

Cover by :
Shri Bhabani Kanta Sarma

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Contents

FOREWORD

It is a great pleasure to present the Annual report of the Institute of the Advance Study in Science and Technology (IASST) for the year 1992 - 93.

The progress of the different projects, undertaken in the preceding year (1991 - 92), is quite satisfactory and the works in the IASST, in general, have been well recognised both in the national and international levels. A total number of 39 orginal research papers has either been published or accepted for in the national and international journals, the break up of the papers is 18 from Plasma Physic Division, ten from Life Science Division and 4 from Resource Managment and Environment Division. This is not a minor achievement considering the infrastructural facilities available and the conditions in which the Scientists of the IASST are working, Scientists of the IASST have attended many national and international Seminers / Conferences / workshops and actively participated by presenting research papers in all these.

During the year, the Mathematical and Statistical Science Division has been started, experienced and widely recognised personnels have joined the Division; the post of Asst. Professor has been filled up by recruiting a freshly returned candidate from Oxford University,U.K.

The financial position of the Institute has some what been improved due to the financial assistance from the Department of Science, Techonology, and Environment, Government of Assam and Government of India under some research projects, and the IASST has been able to place order for Atomic absorption Spectrophotometer. Addition of GLC procured last year and the Atomic absorption Spectrophotometre will remove many bottlenecks in research projects. Projects for development of the different Divisions of IASST have been submitted to the DST, Ministry of Environment and Forest, Government of India and Indian Council of Medical Research as per the decision of interministerial meeting organised by DST, Government of India on November 4, 1991 and it is hoped that favourable response from the concerned Deptts. will be forthcoming to the IASST, the only such research organisation in the whole of the North Eastern Region, the most negleted region of the country.

Our sincere thanks to the Minister and all members of the Deptt. of Science, Technology and Environment, Government of Assam, the State Planning and Development Department, Assam and the Planning Commission, Government of India, the members of the Council of IASST for the constant and active co-operation rendered for the development of the IASST.

Guwahati
30th Sept'93

Dr. P. Goswami
Director

INTRODUCTION

The Scientific Community of Assam has long been demanding institutional facitities for generating and sustaining high quality research in emerging areas of basic and applied science and technology which are having significant bearing on the socio-economic development of the NE region in particular and the country in general. In order to materialise the rational aspiration of the Scientific Community of Assam, a humble beginning was made by the Assam Science Society, the premier scientific academy of the N.E. region, with the setting up of a research institute named 'Institute of Advanced Study in Science and Technology' in Guwahati in 1979. The idea of setting up a Research Institute by the Assam Science Society was approved by the Government of Assam. The Institute was graciously inaugurated by the Professor Dorothy C. Hodgkin, the Nobel Laureate, on 3rd November, 1979. However, formal research activities in the Institute have been initiated since 1984.

The Government of Assam has been providing nominal financial assistance since its inception through the Department of Education. The Department of Science, Technology and Environment, Government of Assam was kind enough to include the Institute under its plan budget during the year 1991-92. On considering the expanding activities of the Assam science Society and the Institute of Advanced Study in Science and Technology, the Assam Science Society and the well-wishers of the Institute expressed the desire that the Institute be registered separately as an autonomous organisation to attain its desired goal. The Institute was, accordingly, registered in February, 1992 under Societies registration Act. of 1860.

The Institute is presently housed in the rented buildings of the Assam Science Society at Khanapara, Guwahati and some individuals. The Revenue Department of the Government of Assam, has recently, allotted to the Institute of Advanced Study in Science and Technology a plot of land measuring 20 acres in Pashim Boragaon area of greater Guwahati to generate its infrastructure including the buildings. The authority of the Institute is contemplating to start the construction of the buildings of the Institute during the year 1994. The preparation of the Master Plan of the Institute is in progress. The Institute has been striding to explore fund for the construction of its building from different sources including the State Government of Assam and the Government of India.

RESEARCH & DEVELOPMENT ACTIVITIES

Plasma Physics :

The Institute has been carrying out research both in theoretical and experimental Plasma Physics since 1984. A well-equipped laboratory for studying nonlinear phenomena in Plasmas has been set up with the joint financial assistance of the Department of science, technology and environment, Government of Assam and the Department of Science and Technology, Government of India and the generous donation of sophisticated scientific equipments from the Institute of Space and Astronautical Science, Japan through the international collaboration of Prof Y. Nakamura of the said Institute.

Experimental Research in Plasma Physics :

The vacuum system consisting of a rotary pump, diffusion pump with a liquid nitrogen trap and stainless steel chamber of 125 cm long and 30 cm diameter has been installed. The system can be evacuated upto 5 X 10^{-7} Torr. A double plasma device where multidipole magnets are used for surface plasma confinement is separated into a source (driver) and a target section by a biased grid which is made of a mesh with 80% transparency. The cathodes are tungsten filaments of 0.1mm diameter placed 6 cm apart from the surface anode of both the chambers. Argon gas is introduced into the chamber to maintain the pressure at (1-4) x 10^{-4} Torr, under continuous evacuating state. The argon plasma is produced by the DC discharge between the filaments and anode of the source and target chamber. The plasma potential of the source chamber is kept at higher potential by applying a DC bias. The external signal is applied to the source anode. To measure the plasma parameters Langmuir probe and Retarding energy analyser are used. Typical plasma Parameters are n=10^{8}-10^{9} cm^{-3}, Te= 2-3 eV where n and Te are the plasma density and temperature respectively.

The double plasma device for ion-beam plasma system was set up for ion-beam plasma system and parametrisation of the chaotic system. The chaotic roots in externally driven ion-beam plasmas were observed with different plasma parameters like density, grid voltage, different ratios of negative to positive ion and data were analysed with the help of different methods.

It has been found that mode-mode coupling leads to periodic bifurcation when an external sinusodial signal of frequency close to the frequency of the internal oscillation is applied to the source anode and the amplitude to the external signal is varied slowly. This periodic bifurcation leads to chaotic instability within the suppression range to the internal oscillation. Some other phenomena like period tripling, periodic windows and period subtracting have also been observed within some other parameter range of the system. The direct observation of the phase space trajectories in X(t)-X(t) plane at each bifurcation along with their poincare sections using a specially adapted differential circuit to the system has been made. Poincare sections reveal the structure characteristics of the phase space trajectories of the bifurcation and chaos showing finite number of dots for periodic

orbits and strange attractors for chaotic orbits consisting of infinite number of layers.

It was found that chaotic threshold in multicomponent plasmas increases with the increasing ratio of negative ion to positive ion, but after a critical ratio it becomes saturated. The sheath instability in multicomponent plasmas has also been studied.

Theoretical Research in Plasma Physics :

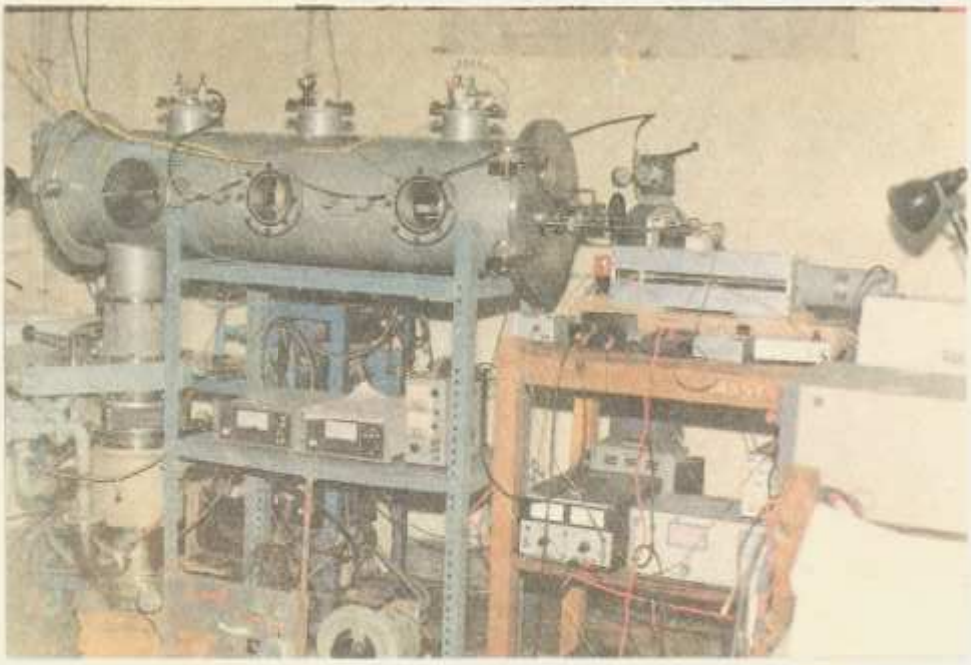
In the present decades, though many observations on wave dynamics in plasmas were made but so far it could cratch its surface especially in bridging between the theory and experiments. To support the experimentalist community and to find the inherent salient features of the plasma dynamics, we consider generally multi-component plasmas conceive of several charges of different kinds. Our aim though made theoretically and observed new areas in plasmas and attributed many uneven competition between theory and experiments but still many of the results are awaiting to be realizable in laboratory plasmas.

An attempt has been made to study the propagation of multi-dimensional ion-acoustic waves in multicomponent plasmas that include the negative ions by the augmentation of Kadomtsev-Petviashvili (K-P) equation. It is observed that the interaction of negative ions in Soliton-Propogation plays pioneer role in plasma dynamics and many of the observations for unidirection soliton are proven experimentaly by the scientific community. The observations in multi-dimensional soliton propagation awaiting various features for the interest of laboratory plasmas. The negative ions, as expected, introduce the precursor of the main soliton propagation and the K-P equation describes the existence of compressive and rarefactive soliton. But because of the singularity in soliton propagation, the K-P equation needs further modification with higher order nonlinearity. Most of its characteristics resembles the unidirectional soliton propagation exhibited by K-dV equation, but still needs to make it realisable.

Soliton propagations are studied in a relativistic multicomponent ion-beam plasmas through the derivation of K-dV equation. The soliton behaviours deriving at the critical density of negative ions, at which the soliton observes singularity, show that all the salient features of soliton can not be discussed, rather, the theoretical develop- ment needs to consider higher order nonli- nearity in the dynamics. An evolution equation of the modified K-dV soliton propa- gation and their validity on evolution is discussed by deriving the Sagdeev Potential. Parallel discussion on various soliton propa- gation to support the experimentalists is also discussed elaborately.

An attempt has been made to study the transient features of solitons in a multicomponent plasma with negative ions through the derivation of Kadomtsev- Petviashvili (K-P) by using the reductive perturbation method. It has been shown similar to the case of unidirectional soliton, the negative ions could integrate the formations of precursor and are prone to overturning as well as breaking up the main soliton into many more soliton humps. But, because of the limitations in mathematical development, the elaborate discussions on the soliton properties are made by the augmentation of K-dV equations. Parallel to earlier observations various solitons are discussed with the consideration of higher order nonlinearity in the plasma dynamics and more precisely results are discussed in relation to the laboratory plasmas.

Director engaged in discussion with the Secretary and the Finance Officer on the development programme of the IASST.



Plasma Physics Laboratory, IASST

By employing the reductive perturbation technique, the Kadomtsev-Petviashvili (K-P) equation of the various forms are discussed in plasmas. It is found some times that the occurrence of Zeros in nonlinear coefficient fails to exhibit the K-P solitions and leads to modify the derivation of K-P equation. Due to singularily, the question of instability thought might arise, but it is proven the existence of stable soliton in plasma dynamics. The appearance of compressive & rarefactive solitons, which are primarily observed experimentally by fewer experimentalists, but still awaits further development and many of the salient features, are discussed.

Kinetic analysis of an acoustic-like mode (ALM) in a plasma with hot and cold ion components has been carried out. Under the short wavelength approximation ($k \lambda_{De} >> 1$), electrons are assumed to form a dynamic neutralising background and their contribution to the perturbation is neglected. The significant role of the hot ions to the Landu damping of the ALM is highlighted and a novel concept of plasma experiment is suggested.

Plasma instability at the inner edge of the accretion disk-I and disk-II has been investigated. The analytical and numerical results of the stability analysis of the accretion disk at the inner boundary are presented. Including the effect on finite conductivity in the disk dynamics, a simple calculation considering only the radial perturbation has been carried out. Within local approximation, it is concluded that the disk is stable to Kelvin-Helmholtz and resistive electromagnetic modes whereas the magnetosonic mode can destabilise the disk structure.

A two-dimentional instability analysis for a magneto-keplerian disk flow around a compact object is presented. Using the eigenvalue technique, linearly coupled perturbed equations have been numerically solved within the local approximation. It is concluded that Kelvin-Helmboltz, magnetosonic (fast & slow) and resistive electromagnetic modes exist. However, only the magnetosonic mode can destabilise the disk structure. Further, the properties of different modes as a function of disk parameters have been discussed.

Life Science :

Presently, research activities in the fields of Bio-chemistry, Oncology, and Muga Silk worm are being carried out in the Life Science Division.

Bio-chemistry and oncology :

During 1992-93, the study on the medicinal and aromatic plants is being continued in the life science division of the IASST. More numbers of plants with probable pharmaceutical properties on the basis of folklore utilization, have been included for the study of phytochemical properties and biological activities. The aqueous extracts have been concentrated under reduced pressure in the rotary vacuum ovaparator and the active princple of the aqueous extracts of the plants has been separated using TC, column chromatographic technique. The components so obtained resubjected to U.V., I.R. and NMR spectral analysis along with the melting points of each component. Few of the components showed UV absorption maxima at λ_{max} 669, 473, 445, 411, nm and IR band at ν_{max}^{KBr} 3400, (br), 3170, 1670, 1527, 1305, 1263, 843 cm^{-1}. However, the identity of the components is yet to be definitely established, but likely to contain glycosides unsaturated carbonyl moiety and other UV sensitive functionalities; One of the fractions of a plant of our interest contains triacontane

along with other hydrocarbon mixture as evident from G.C.

For determination of the structure, the components have been sent to other laboratories for percentage calculation of Carbon, Hydrogen and Nitrogen.

The aqua of the plants have been administered orally to experimental animals (albino rats) for studying the biological activities more specifically the hypolipidaemic and hepatoprotective effects. Emphasis has also been laid to investigate the effects on some of the enzyme systems of the blood and the tissue and on the circulating insulin.

The possible effects of the active principles of the plant extracts on the microbiological systems are being investigated, preliminary but not confirmatory results have been noted, further works about the synergic action with antibiotics of the plant extracts have been already been started.

The role of enzyme system with particular reference to alkaline phosphatase in the processes of atherosclerosis and lipidogenesis is being investigated.

Muga Silk Worm :

The technique of indoor rearing of Muga Silk worms evolved by the Scientists was made public in a meeting held on June 6, 1992. The meeting was attended by the personalities like Dr. N. K. Choudhury, V.C., Gauhati University and Shri J.P. Rajkhowa, IAS, the then commissioner of Sericulture Department, Govt. of Assam and the distinguished Scientists from the Central Silk Board, State Sericulture Department and the Institute of Advanced Study in Science and Technology. The technique would be a 'turning point' to bring about revolution to muga silk industry and a 'break through' in the silk industry in Assam as opined by Dr. Choudhury and Shri Rajkhowa.

The Scientists have presently been studying the problems of cross infection of 'Pebrine' disease of one type of Silk Worm to another type, Viability of 'Pebrine' germ and emergence behaviour of silk worm moths, some experiments were designed and conducted. Confirmatory results are, however, yet to be achieved due to some unavoidable difficulties, viz, nonavailability of free eggs and causative organisms of 'Pebrine' disease of silk worm in fresh condition etc came on the way of desired progress of the experiments. The results of some of the experiments had to be discarded at the fag end of the experiments as the specimens of the controlled groups were unexpectedly found to be diseased, while they should have been disease free. Fresh experiments are being conducted by collecting disease free specimens and materials.

Mathematical and Statistical Science

In the Mathematical and Statistical Science Division, the Scientists are engaged in carring out research activities in Statistics and Mathematics.

Statistics :

Availability of Scientific and Technological manpower of requisite skill in required magnitude at the required time is the key to sustained economic growth. Manpower planning on this consideration, has to be directed at forecasting the longterm requirements with a view to planning the required educational and training programmes in advance to produce the required manpower.

For a realistic planning of manpower in Assam the Institute has taken up a scheme titled "Study of Availability and requirements of Science & Technology manpower in the next 20 years" which is being implemented under the guidance of Dr. J. Mehdi, Professor Emeritus, Gauhati University and Honouray Professor of the IASST.

The study seeks to provide the estimates of the current stock of high level and intermediary Scientific and Technological manpower in Assam, projects the requirement of such manpower during the next 20 years in the perspective of economic development, provides the estimates of supply of S&T manpower during the next 20 years from current available infrastructure and makes an analytical study of the match between supply and demand.

The Principal Investigator of the Project took up the Job in June '92 and started preliminary work including recruitment of personnels. The Chief Statistician and one Investigator joined in August '92 and work on the preparatory phase started thereafter in full swing. The preparatory works Consisted of (i) exploring the existing data base available with various organisations/bodies, (ii) Preparation of the Study design, (iii) Collection of enterprise list from various sources like the Employment Exchanges, Inspector of Factories, Registrar of Societies, Firms, Directorate of Industries, Registrar of, Companies, records of local bodies etc. Satisfactory Progress could be achieved on these spheres by mid-November '93.

The first meeting of the Project Advisory Committee was held on November 27th, 1992 to Consider the details of the Study design and work programmes proposed for implementation of the Project. The draft of the Schedule/ Questionnaires for data Collection were thereafter prepared keeping in view, the suggestion of the PAC and these were circulated to the members of the PAC for Comments. Simultaneously these were also tested in the field. These Schedule/Questionnaire were then finalised and printed by the middle of March '93. Mailing of the Schedules/Questionnaire to the Selected establishments has been made.

Mathematics :

Since the classification of the finite simple groups was completed in 1980, the focus of group theorists all over the world has been shifted to the study of infinite groups. Infinite groups are very abstract in concept and very difficult to work with. Hence the emphasis of researchers have been to use techniques from other branches of mathematics, like topology, graph theory and measure theory to gain an understanding of such groups.

As such, much research is being done in various specific aspects of this gigantic and diverse field at different centres in the world. A few important ones are the analysis of p-adic analytic groups and profinite groups, the use of varieties of groups as a method of classification relying on Lie algebra techniques, the study of automorphism groups of combinatorial trees and other structures. An alternative approach seems the construction of bigger groups from smaller ones using standard techniques like wreath products, group amalgamations and inverse limits.

Research work has been conducted in the following areas applying the techniques of group theory, graph theory, topology & measure theory.

Amalgamated free products of groups :

Effort has been directed towards constructing an infinite family of finitely presented infinite groups which are free products of two free groups of finite rank amalgamating subgroups of finite index in them which are as close to being simple as possible. The scientists have succeeded in constructing an infinite family of such groups which are nearly simple' in the sense that

(i) they have no non-trivial finite quotients and (2) any normal subgroup either acts trivially or is dense in the action of the groups on thier natural trees (Cf. Bass-Serve theory).

Profinite groups, wreath products and measure theory :

The following results have been obtained during the course of study of inverse limits of wreath products of groups.

Theorem 1 'Almost all' κ-tuples in an inverse limit of wreath products groups generate free subgroups of rank κ, where 'almost all' is used to imply a dense subset whose complement is meagre.

Theorem 2 'Almost all' κ-tuples in certain profinite groups generate free subgroups of rank k, where 'almost all' is used in the sense of the natural Haar measure on such groups.

Theorem 3 The probability of (topologically) generating an inverse limit of wreath product of finite alternating groups by two elements is strictly positive and tends to 1 as the degree of the first factor tends to infinity.

Graph theory and automorphism group of trees :

Groups acting on graphs can be considered to be subgroups of the full automorphism groups of such graphs.Inverse limits of wreath products of groups can be considered to be groups of automorphisms of rooted trees while finitely presented amalgamated free products are automorphism groups of two coloured semi-regular trees. As such, graph theoretic techniques prove to be a very powerful tool in studying both these kinds of groups. The Bass-Serve theory on group actions on graphs as well as the classification of the automorphisms groups of trees due to Bass are applied fruitfully in the analysis of our infinite groups.

Resource Management and Environment :

It has been widely reported that the oil exploration activities of the ONGC and the oil India Ltd. are causing extensive damage to the standing crops in the fields of their operation. The air, water and soil quality of Sibsagar and Jorhat Districts of Assam are reported to be polluted by their oil exploration activities.

Presently, an extensive investigation on the impact of oil exploration on the native microflora of rice fields of this region is being carried out. During the year 1992-93 the soil samples from the oil fields of Geleki and Barholla have been collected and analysed. The parameters like P^H, conductivity, organic matters, organic carbon contents, nitrogen, water holding capacity of soil samples have been worked out. The experiments on the determination of other parameters namely exchangeable ions, hydroulic conductivity, oil and grease are in progress.

Both qualitative and quanitative estimation of bacterial and fungal population using dilution technique of the collected samples have been carried out. The quantification of microorganism responsible for carrying out various soil process such as nitrofication, ammonification, nitrogen fixation by free living micro-organisms are in progress. The experiments on microbiological aspects with respect to oil concentration in the rice field soil in pots in relation to plant growth parameters and grain quality under laboratory condition have been completed and the analysis of grain quality is on progress.

Animal experiment in the Life Science Division in Progress

Muga Silk Worms reared indoors

MANPOWER DEVELOPMENT PROGRAMME

Computer Science and Technology :

The Computer Science Division of the Institute since its inception, has been generating manpower in Computer Science and application besides providing in house facilities to the research workers of the Institute and those of the neighbouring organisations like A.A. U, Cotton College, Guwahati, Neurological research centre etc. The research activities on Computer Science & Technology are to be initiated during the next financial year.

Training Programme :

The Computer Science Division has been conducting the following courses in Computer Science and Application.

a. Certificate course of one-month duration.
b. Certificate course of three-month duration
c. Certificate course of six-month duration
d. Post Graduate Diploma in Computer Application of one-year duration.

During the year 1992-93, the number of students trained up through different courses are given below :

Name of courses	No. of student admitted	No. of student passed out
1. Post Graduate Diplma in Computer Application.	30	14
2. Certificate course of six - month duration	29	29
3. Certificate course of three-month duration	21	17
4. Certificate course of one-month duration	43	43

Projects :

The Division helps in the research programme of the Institute of Advanced Study in Science & Technology by providing computer time and consultancy services wherever required. Moreover, specific jobs are also done for projects and doctorial thesis works from different Institutions like the Gauhati University, Assam Agricultural University, Cotton College etc. The Statistical data analysis for the project on "Socio-economic impact of Manas Wild Life Sanctuary on the People Residing on the Buffer Zone" on behalf of the world wide fund for Nature, India has been completed. The Statistical data analysis as well as graph preparation was done for four research scholars - two from the IASST and the rest from the College of Veterinary Science, A.A.U.

ON GOING PROJECTS

Projects	Sponsoring agency/organisation
1. A Study on the impact of oil exploration on microflora in the rice field soil of upper Assam.	Ministry of Environment and Forest, Govt. of India.
2. Study of Chaotic Phenomena in Plasmas.	Ministry of Science and Technology, Govt of India.
3. Study of Availability and Requirements of S&T Manpower in the State of Assam in the next 20 years.	Ministry of Science and Technology , Govt. of India.
4. Studies on some aspects of Muga Silk worm, Antheraea Assamensis.	Assam Science Technology and Environment Council, Govt. of Assam.
5. The phytochemical basis of the biological effects of the medicinal plants.	Deptt. of STE, Govt. of Assam.
6. Correlation of Alkaline posphatase trigey cerides and other lipids in the atherosclerosis.	Deptt. of STE, Govt. of Assam.
7. Hepatoprotective actions of the medicinial plants.	Deptt. of STE, Govt. of Assam.
8. Effects of carcinogen on retinol binding protien.	Deptt. of STE, Govt. of Assam.

RESEARCH PUBLICATION

Plasma Physics

1. Buragohain, A. et. al.; Identification chaos on the sheath formation in Plasmas Phys. Dev. lett. (Submitted)
2. Buragohain, A. et.al.; Strange attractors for deterministic chaos in double Plasma device, 8th National symposium on Plasma '93 (Accepted).
3. Chutia, J. et.al.; Influence of negative ions of periodic bifurcation in ion-beam Plasma System, Proc. of ICPIG Conference, Ruhr Universitat, 1993 (Accepted)
4. Das, G.C. and Sen, K.M.; Propogation of multi-dimensional ion-acountic waves in multi component plasmas with negative ions, centrib. Plasma Phys. 33 p. 15, 1993.
5. Das, G.C. and Singh, Kh. Ibobanbi; Nonlinear Propagation of ion-acoustic solitary waves in relativistic ion-beam Plasma with negative ions, Indi. J. Pure and Appl. Phys. 1993 (accepted)
6. Das G.C.; and Sen, K.M.; Transient behaviours of cylindrical solitons in multi-Component Plasma; Chaos, Solitons and Fractals Vol 3 No. 4, 1993.
7. Das, G.C.; Propagation and stability of Kadomtsev-Petriashvili Solitary waves in Plasmas (communicated)
8. Das, G.C.; Turbulence in Solitary waves in Plasma; 8th National Symposium on Plasma '93 (Accepted)
9. Das, G.C. and Sen, K.M.; Double layers and collapsible waves in Plasma expected in Interplanetary space; 8th National symposium on Plasma '93 (accepted)
10. Das, G.; and Singh, S.S.; On the solitary wave propagation in an inhomogeneous Plasma; 8th National Symposium on Plasma' 93 (accepted)
11. Das, G.C. and Gogoi, M.; Propagation and Stability of Kadomtsev-petviashvili solitary waves in Plasmas; 8th National Symposium on Plasma'93 (Accepted)
12. Dwivedi, C.B.; Kinetic Properties of an acoustic like mode in a two-ion quasi-neutral Plasma, Pramana, Jnl. of Physics, 1993 (Accepted)
13. Dwivedi, C.B. et. al.; Plasma instability at the inner edge of the accretion disk-I, J.Astrophysics & Astronomy, 1993 (Accepted)
14. Dwivedi, C.B. et. al.; Plasma instability at the inner edge of the Accretion disk-II, J. Astrophysics & Astronomy, 1993 (Accepted)
15. Deivedi, C.B. Kalita, M.K.; Existence of an acoustic-like double layer in a two-ion quasi-neutral Plasma; 8th National Symposium on Plasma'93 (Accepted).
16. Dwivedi, C.B. et. al.; Buoyant instability in Accretion disk; 8th National Symposium of Plasma '93 (Accepted)
17. Dwivedi, C.B. et. al.; Dynamics of a Self gravitating dusty Plasma; 8th National Symposium of Plasma '93 (Accepted)
18. Sarma, B.K. et. al.; Effects of negative ions on the sheath formation in a Plasma; 8th National Symposium on Plasma '93 (Accepted)

Life Science

1. Azad, P.; Pollen viability and yield of cirtrus infected with citrus yellow corky vein virvses in Assam (Abstract), XII Int. Conf. on Citrus Virology, New Delhi Nov. 1992.
2. Devi, Rajlakhmi and Goswami, P.; Hypolipidaemic action of clerodendrum

colebrookianum (Abstract) Ann. Tech. Sec. A. Sc. Society, 1992.

3. Goswami, P. and Choudhury, A.K.; Effect of Antituber cular therapy on free Amino acids of Serum, Antiseptic, 89/7, 1992.
4. Goswami, P. and Sarma, T.C.; Effects of Boerhaavia Diffusa Linn. Extract on the Activities of Enzyme System (1) in vitro Study on Amylase and choliresterase Activities; J. Research in Ayurvedic and Siddha, XIII/1. 2/48, 1992.
5. Goswami, P. and Deka, B.K.; Long pholoperiod exposure effect on dehydrogenases of reprodutive organs, (communicated)
6. Goswami, P. and Khurana, I.; Carbohydrate components in Sanile cataract (communicated)
7. Goswami, P. and Sarma, T.C.; Effect of Boerhaavia Duffusa Linn. Extract on Activities of enzyme system (ii) in vivo Study on catalase and adenosine triphosphatas (AT phase), J. Research in Ayurvedic and Siddha, 1993.
8. Kotoky, J. and Goswami, P.; Studies on the Indian medicinal Plants: Chemical investigation of Clerodendron colebrookianum walp (Communicated)
9. Raja, P. Sarkar and Goswami, P.; Teratogenic effects of Single dose administration of 4-DAB. J.A. Sc. Society, 35(II), 1993.
10. Sharma, R.K. and Goswami, P.; Liver functions Stimulating effects of terminaeia chabuea, Ann. Tech. Sec. A. Sc. Society, 1992.

Mathematics

1. Bhattacharjee, Meenaxi; The Probability of generating Certain profinite groups by two elements, Isreal Journal of Mathematics (accepted)
2. Bhattacharjee, Meenaxi; Free subgroups of inverse limits of wreath products of groups; Proceedings of the International Conference on ordered groups and infinite permutation, groups held at Marseille, France, 26-30 July '93.
3. Bhattacharjee, Meenaxi; A family of infinitely presented infinite nearly simple groups; Proceedings of the International Conference on Groups, 1993 Galway St. Andrew' held at Galway, 1-14, August'93.
4. Bhattacharjee, Meenaxi; Constructing finitely presented infinite nearly simple groups, communicated to Journal of Algebra.
5. Bhattacharjee, Meenaxi; The ubiquity of free subgroups in certain inverse limits of groups, Journal of Algebra (Accepted)
6. Bhattacharjee, Meenaxi; Free subgroups in certain profinite groups, communicated to journalof Algebra.
7. Bhattacharjee, Meenaxi; A finitely presented infinite simple group, Journal of Gauhati University Maths Association (accepted)

Resource Management and Environment :

1. Deka, S.; Devi, A., Kagti, L.C. and Barthakur, H. P.; Studies on the impact of oil pollution on the microflora of rice field soil of Moran (Assam), Environment and Ecology (Accepted)
2. Deka, S. and Devi, A.; Impact of flaring of the group gathering station on physico chemical properties of rice field soil at Lakow oil field of Assam, Communicated to Pollution Research.
3. Deka, S. and Baruah, C.K.; Studies on the storage efficiency of different carrier materials for Rhizobia Culture, Environment and Ecology 10 (4), 857-860 (1992)

Chemical analysis of the plant extract being carried out in the Life Science Division

SEMINARS/SYMPOSIA/MEETINGS ATTENDED

Dr. P. Goswami delivered a talk on "Gene therapy" in the technical session of the A.Sc. S. held on Dec. 5, 1992.

Dr. P. Goswami presided over the Technical Session of the Technical Session (Biological) of the A.Sc. S. held on Dec. 5, 1992.

Dr. P. Azad participated at the national seminar on "Sophisticated Instruments Technique for Life Science" organised by the DST, Govt. of India at NEHU, Shillong.

Dr. P. Azad participated at the XII International Conference on "Citrusvirology' organisal by the Advanced Centre for plant virology, India and Indian phyto-pathological Society at IARI, New Delhi held in Dec. 1992.

Dr. J. Kotoky particiapted at the Instrumentation Training Programme held at Meghalaya Science Laboratory, Shillong.

Dr. J. Kotoky participated at Annual Technical Session of the A.Sc. S. held on Dec. 5, 1992.

Dr R. K. Sharma particiated at the Annual Technical Session of the A.Sc.S. held on Dec. 5, 1992.

Dr. R. K. Sharma particiated at the Bharat Gyan Vigyan Jatha and delivered talks on herbal medicine at Goalpara, Sibsagar, Tezpur and Palasbari.

Mrs Rajlakhmi Devi participated at the Annual Technical Session of the A.Sc.S. held on Dec. 5, 1992.

Dr. S. Deka delivered the talk on "The possible health hazarts due to Antomobile Pollution " in the all India winter schoool held during 12-24 Oct' 92 at the Prince of Wales Institute, Jorhat, Assam.

Dr. S. Deka participated at the Annual Review and Monitoring meeting of on-going projects of the Ministry of Environment and Forest, Govt. of Inida, held 27-28 Sept' 92 at BHU.

Dr. S. Deka particiated at the Annual Technical session of the A.Sc.S. held on Dec. 5, 1992.

Dr S. Deka particiapted at the seminars organised by the Assam Science Society held on July 25, 1992 at the Cotton College.

Miss A. Devi participated at the National Seminar on "Modern Trends in Analytical Technique Application in Chemistry" organised by the Chemistry Deptt. Gauhati University during 4-6 May, 1992.

Miss A. Devi participated at the seminar on "Chemical Industries Potentialities for Development in Assam" organised by the Society for Chemical Education, Gauhati University, 1993.

Miss A. Devi participated at the training workshop on AAS/ICP held at the RSIC, NEHU, Shillong during 22-28 Feb'93.

Dr. Meenaxi Bhattacharjee presented a Seminar titled' Constructing bigger groups from Smaller ones, at the Mathematics Deptt. Gauhati University on March 15, 93.

Dr Meenaxi Bhattacharjee participated at the international Mathematical Conference titled "Ordered Groups and Infinite Permutation Groups" held at Marseille, France, in July'93.

Dr. Meenaxi Bhattacharjee participated at the international Mathematical conference titled" Groups'93 Galway/St. Andrews" in August'93.

SEMINAR/CONFERENCE ORGANISED

1. Prof. Y Nakamura, Institute of Space and Astronautical Science, Tokyo, Japan, delivered talk on "Chaotic phenomena in plasmas" on 20th November, 1992.
2. Dr. P. K. Goswami, M. Tech. Ph.D. Imperial College, London U.K. delivered talk on "Robust Controller design" on 9th December, 1992.
3. Prof. A.W. Wolfendale, FRS, Astronomer Royal, Durham University London delivered talk on "Energy Crisis and its Probale Solution." on 3rd Feb.'93.

INTERNATIONAL COLLABORATION

The Institute has been working on a joint research Programme on "Nonlinear Phenomena in Plasmas" with the Institute of Space and Astronautical Science, Tokyo, Japan through the International Collaboration of Prof. Y. Nakamura of the said Institute of Japan. He has donated a good number of sophisticated equipments to the IASST for the successful execution of the joint research Programme. He visited the Institute for a period of three weeks from 1st November to 21st November, 1992. A research scholar of the IASST had been trained in his Institute for a period of Six months from May to October, '92.

FACILITIES :

Library :

The library of the Institute has played a very important role in retrieval and dissemination of information. It has catered the need of information for the staff members of the Institute. The reference and reading room services of the library were extended to the academic staff members of different Universities/ organisations in and around Guwahati.

The library of the Institute is having 1000 books on different subjects mainly on Plasma Physics, Environmental Science, Life Science, Computer Science and Mathematical & Statistical Science. It has subscribed 25 titles of Journal for the current year.

Computer Section:

Computer facility has been used extensively by the staff members of the Institute. The computer Section at present has one UNIPOWER 30 (ECIL), mini Computer system with 6 terminals and two printers, one PC/AT 386 (WIPRO) with 5 (five) terminals and one Dot matrix printer running on UNIX opereating system, one PC/XT with printer and two off-line Data Entry Machines and one PC/AT 286 (WIPRO) with Printer.

Analysis of water quality and estimation of Soil Nitrogen in the Resource Management and Environment Division

Students of the Computer Science Centre attending the class.

ACADEMIC STAFF OF THE INSTITUTE

Hony. Professor

1. Dr.J.Medhi,
   Emeritus Professor, G.U., Mathematical and Statistical Science Division.
2. Dr. B. K. Tamuli,
   Emeritus Fellow UGC,
   Mathematical and Statistical Science Division.
3. Dr. K.D. Krori,
   Mathematical and Statistical Science Division.
4. Dr. J. N Talukdar,
   Life Science Division.
5. Dr. L. C. Kagti,
   Resource Management and Environment Division.

Visiting Faculty Members:

1. Dr. Y. Nakamura,
   Institute of Space and Astronautical Science Tokyo, Japan.
2. Dr. J. Roy,
   Indian Statistical Institute, Calcutta.
3. Dr G. P. Bhatttacharjee,
   I.I.T., Kharagpur.
4. Dr. G. Baruah,
   I.I.T., Kanpur.
5. Dr. P. Gupta,
   I.I.T., Kanpur.
6. Dr. M. Duttta,
   Gauhati University.
7. Dr. H. K. Baruah,
   Gauhati University.

Plasma Physics Division:

1. Dr. Jayanti Chutia,
   Associate Professor.
2. Dr. G. C. Das,
   Associate Professor.
3. Dr. M.K. Kalita,
   Secretary(i/c)
4. Dr. C. B. Dwivedi,
   Assistant Professor.

Life Science Division:

1. Dr. P. Goswami,
   Director.
2. Dr. P. Azad,
   Assistant Professor.
3. Dr J. Kotaki,
   Assistant Professor.

Resource Management & Environment Division :

1. Dr. L. C. Kagti,
   Professor (Hony.)
2. Dr. S. Deka,
   Assistant Professor.

Mathematical and Statistical Science Division:

1. Dr. J. Medhi,
   Professor (Hony.)
2. Dr. B. K. Tamuli,
   Professor (Hony.)
3. Dr K. D. Krori,
   Professor (Hony.)

4. Dr. Meenaxi Bhattacharjee,
   Assistant Professor.
5. Sri D. Das,
   Chief Statistician.

Computer Science Division:

1. Sri A. Barman,
   Assistant Professor.
2. Sri B. Bora,
   Jr. Programmer
3. Ms L. B. Mahanta,
   Jr. Programmer
4. Sri N. Bhagawati.
   Senior Instructor.
5. Ms. Madhuri Talukdar
   Instructor.
6. Ms. Pragoti Choudhury
   Instructor.

Research Fellow/Scholar:

1. Sri B. K. Sharma
2. Ms. A. Devi
3. Ms R. Devi
4. Ms D. Devi
5. Ms. J. Goswami
6. Ms N. Barua
7. Sri H. Bailung
8. Sri A. Buragohain
9. Sri R. Sarma
10. Sri S. Dey
11. Sri R. P. Bhatta
12. Sri Prasanna Deka
13. Mrs. Mousumi Gogoi
14. Sri Deepak Sarma
15. Sri Kaushik Saha

Supporting Staff:

1. Sri M. Singh
2. Sri J. Das
3. Ms. J. Bordoloi
4. Md. S. Talukdar
5. Sri S. Goswami.

Administration:

1. Dr. P. Goswami, Director
2. Dr. M.K. Kalita,
   Secretary (i/c) & Administrative Offficer.
3. Sri M. C. Baruah, F.A.O.
4. Sri R. Sarma, P.R.O.
5. Sri P. K. Deka, U.D.A.
6. Sri S. Sarma, Accountant
7. Ms. S. Bora, L.D.A.
8. Sri R. Kalita, L.D.A.
9. Sri R. Mahanta, Jr. Acctt.
10. Sri D. Deka, L.D.A.
11. Sri K. Baishya, Library Asstt.
12. Sri Nimai Hazam, Driver
13. Sri B. Deka, Messenger
14. Sri U. Deka, Messenger
15. Sri S. Das, Messenger

Laboratory Helper/Watcher:

1. Sri T. Talukdar
2. Sri Madan Kalita
3. Sri Gora Gupta
4. Sri N. Goswami
5. Ms. Madhabi Das
6. Sri K. Deka
7. Sri H. Medhi
8. Sri L. Soud
9. Sri A. Pathak.

Council of the Institute of Advance Study in Science and Technology (1991-94).

1. Dr. S. D. Gogoi Ex - V. C. Dibrugarh University	Chairman
2. Dr. P. Goswami Director, IASST.	Director
3. Dr. Bikash Sinha Director, Variable Energy Cyclotron Centre, Sector 1/ AF Calcutta - 700 004. (Representative of the Deptt. of the Atomic Energy, govt. of India.	Member
4. Dr. A. C. Ghosh Director, Regional Research Laboratory, Jorhat	Member
5. Dr.A. K. Goswami Director, ASTEC, Silpukhuri, Guwahati.	Member
6. Dr. D. N. Barthakur Ex - V.C., AAU (Representative of the Assam Science Society)	Member
7. Sri U. Miri Director, Technical Education, Kahilipara, Guwahati.	Member
8. Dr. K. M. Pathak Prof. of Physics, Gauhati University (Co-opted)	Member
9. Dr. K. C. Baruah Rector, DibrugarhUniversity, Dibrugarh. (Nominee of the V.C. Dibrugarh University)	Member
10. Secretary, Department of Science, Technology & Environment, Govt. of Assam, Dispur	Member
11. Secretary, Education Department Govt of Assam, Dispur.	Member
12. Dr. B.D. Barua President, Assam Science Society, Guwahati.	Member
13. Dr. P. K. Deka General Secretary, Assam Science Society, Guwahati.	Member
14. Dr. P.C. Deka Prof. of Biotechnology, AAU, Jorhat. (Nominee of the V.C. Assam Agricultural University)	Member
15. Dr. R. K. Gartia Deptt. of Physics, Manipur University, Imphal. (Nominee of the V.C. Manipur University)	Member
16. Prof. D.T. Khathing Head, RSIC, NEHU, Shillong	Member
17. Dr. (Mrs) Lily Mazinder Baruah, Deptt. of Botany, B. Barooah College, Guwahati. (Co-opted)	Member
18. Dr. N. K. Baishya Deptt. of Chemistry, Gauhati Unversity. Guwahati. (Nominee of the V.C. Gauhati University)	Member
19. Dr. G.K.D. Mazumdar Reader, Deptt. of USIC, Gauhati University. (Representative of the Assam Science Society)	Member
20. Dr. J. Chutia Associate Professor, IASST. (Representative of Academic Staff, IASST).	Member
21. Dr. M.K. Kalita Secretary (i/c) IASST.	Member
22. Reprasentative from C.S.I.R.	Vacant
23. Representative U.G.C.	Vacant
24. Representative D.S.T.	Vacant

RECEIPT & PAYMENT A/C FOR 1992-93.

Head	Sub-Head	Receipt Amount	Payment Amount
1. Computer	Fees & Other Recepits	1,59,741.00	5,90,562.65
2. General	Other receipt and Grant-in-aid from the Central government through the Deptt. of Science, Technology & Environment, Government of Assam.	30,62,141.75	26,23,806.03
3. Env./R.	Grant from the Brahmaputra Board.	1,04,800.00	
4. Muga Silk	Grant from the Assam Science Technology and Environment Council.	50,000.00	2,04,281.25
5. Env./Oil	Grant from the Ministry of Environment & Forests, Government, of India.	1,13,981.00	1,14,636.84
6. Manpower S&T	Grant from the Deptt. of Science & Technology, Government of India.	2,00,000.00	1,[illegible],475.25
7. Chaotic Plasma	Grant from the Deptt of Science & Technology, Government of India.	2,00,000.00	81,508.[illegible]5
8. Education	Grant-in-aid from the Director of Higher Education, Assam.	1,00,000.00	1,01,271.00
		Cash & Bank balance during 1992-1993	3,626.12.

Dr. M. K. Kalita
Secretary (i/c), IASST

Dr P. Goswami
Director, IASST.