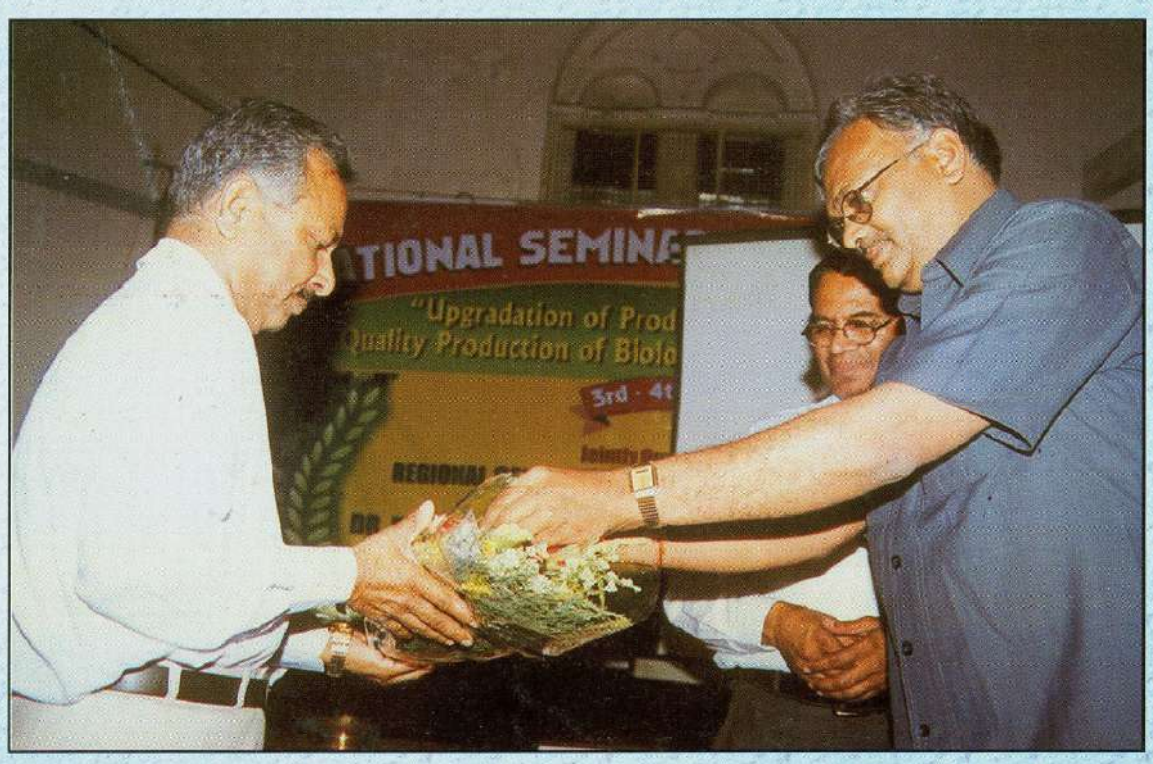
Annual Report

APRIL 2004 - MARCH 2005

Institute of Advanced Study in Science and Technology

VIGYAN PATH, PASCHIM BORAGAON, GARCHUK
GUWAHATI - 781035, ASSAM (INDIA)

Prof. N. N. Dass, Director



Dr. P. Azad, Registrar being felicitated at RCOF, Nagpur.

ANNUAL REPORT

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Institute of Advanced Study in Science and Technology
Vigyan Path, Paschim Boragaon, Garchuk,
Guwahati-781035, Assam (India)
+91-361-2740658/ 659/ 679

Published by

Prof. N. N. Dass
Director, IASST

Printed at :
Abhiruchi Prakash
M. C. Road, Guwahati-781003
Ph. No. 2665348, 2263972

Foreword

Scientists and technicians of the millennium are marching ahead exploring the frontiers of science and technology and spreading the message of science and technology to the masses. Now that the Institute of Advanced Study in Science and Technology (IASST) has its own building and laboratory at Paschim Boragaon, Vigyan Path, Garchuk, Guwahati-781035 it is the honest duty of all the scientists to work hard for raising the standard of scientific out put to the international level. Since it is the only multidisciplinary research institute in the whole of the North East of India, it is the sacred duty of all the employees of the IASST, scientists, technical and non-technical staff to spread the message of science and technology to the nook and corner of North East India. There should be more cohesion and interaction amongst of the faculty members of the Institute. Intra and inter collaboration are essential since working in isolation does not produce expected fruitful result.

There are some important milestones in the annals of development of the IASST. A brief chronology of events may bring to light on the joy and sorrow, exultation and tribulation, success and failure on its onward march. The Assam Science Society, the only organization of the Scientific Community of Assam, realizing the importance of a fundamental research laboratory with facilities for carrying out advanced research in the North Eastern Region adopted a resolution, as early as 1959 (in its subject committee meeting held on 18.12.59) stating a Research Laboratory be established at Guwahati for fundamental research in scientific subjects. However, the resolution was not materialized till 1979. In that year, the Assam Science Society established a research laboratory in the name and style of the Institute of Advanced Study in Science and Technology (IASST) at Khanapara, Guwahati-781022 and it was formally inaugurated by Prof. Dorothy C. Hodgkin, Nobel Laureate on November 3, 1979.

The IASST was registered under the Societies Registration Act XXI of 1860 (No. 4219 of 1990-91) as an independent autonomous organisation in 1991.

In 1989, a task force headed by Sri P.C. Mishra, IAS the then special Commissioner and Secretary to the Govt. of Assam, Department of Science and Technology recommended that the proposed national institute to be set up under the Assam Accord should be nucleated around the existing IASST founded by the Assam Science Society with suitable structural and organizational upgradation.

The Project proposal was examined by the Planning Commission, Govt. of India.

The Task Force constituted by the State Government in the light of L.C. Jain Commission, constituted by the planning commission recommended that proposed Institute, agreed under Clause 7 of ASSAM ACCORD, could nucleate around the existing IASST.

The State Government was supposed to provide the necessary land about 30 acres free of cost and bear a financial burden to a tune of 10% of financial requirement.

The Interministrial meeting held at the Technology Bhavan on 4th Nov, 1991, under the Government of India on Task force report with Central Government agencies like DST, DBT, ICMR, Ministry of Home Affairs, Finance, DAE, Planning Commission, Govt. of Assam took some major decisions for the development of IASST.

The Foundation Stone of the New buildings of The IASST at Paschim Boragaon was laid by Hiteswar Saikia the then Hon'ble Chief Minister of Assam on 8th March 1995 on a plot of land measuring sixty bighas donated kindly by the Govt. of Assam. The new Academic cum Administrative Building has built area of 5220.8 Sq.m. The DST, GoI provided Rs. 10.6257 crores for the Manpower, Consumable, Contingency, Book & Journal, Travel, Overhead, Building and other components, Equipment under the Upgrading Project. We moved to our new campus on the 1st June 2005 from our old campus at Khanapara, Guwahati.

On January 24, 2004 Sri Himanta Biswa Sarma, Hon'ble Minister of State, Planning and Development, Govt. of Assam visited the campus and assured the scientists and the staff about the development of the connecting road from NH37 bye-pass to the new campus. The road was proposed to be named as Vigyan Path. Thanks to the well wishes of the Hon'ble minister, the Govt. of Assam released Rupees two crores to cover the pay and arrear due accumulated from 1996.

On the 2nd April 2004, myself and the Head, Material Sciences Division defended the proposal of taking over the Institute by the Government of India before a High level Committee chaired by Dr. VS Ramamurthy, Secretary, DST, GoI for possible conversion of The IASST from GOA institution to Government of India Institution in Delhi. After thorough discussion and deliberation by the Committee, it was decided that the IASST would be taken over as affiliated institute of national level and the actual take over would be done only after the approval of the Central Cabinet.

On 27th December Governor and Chief Minister visited the IASST on the occasion of the visit of His Excellency, A.P.J. Abdul Kalam, President of India. His Excellency, President of India was to interact with the scientists of the IASST, but he could not attend the meeting due to the Tsunami disaster. However, as advised by the Rastrapati Bhawan, New Delhi-4, the meeting proceeded as scheduled. The meeting was chaired by Prof. K.M. Pathak and hon'ble guests were felicitated by Prof. N.N. Dass. The speech of His Excellency, A.P.J. Abdul Kalam was read in absentia by Dr. B. Hari Gopal. In his address to the scientists, His Excellency, President of India said " Since I am in the midst of researchers, I would like to share my thoughts on the mission of transmitting India into a developed nation". His Excellency Lt. Gen. (Retd) Ajai Singh, PVSM, AVSM the Governor of Assam, Hon'ble Chief Minister of Assam, Sri Tarun Gogoi and Dr. B. Hari Gopal, Scientist G and Adviser, DST, GoI addressed the scientists and well wishers of the IASST on that occasion. His Excellency Lt. Gen(Retd) Ajai Singh, PVSM,AVSM, the Governor of Assam, expressed his good wishes for the IASST. In his speech the Hon'ble Chief Minister of Assam, Sri Tarun Gogoi referred to the proposal of taken over the institute by the Central Government " You will be happy to know that the Department of Science and Technology, Government of India at a high level meeting recently agreed to fund the institute as a centrally funded autonomous institute out of its own plan resources. The matter is awaiting cabinet approval. We are hopeful that when this takes place, it will give a tremendous boost to the development of scientific research thus leading to optimum utilization of the rich flora and ushering in a sea change in economic scenario of the State as well as the entire North East region". Hon'ble Chief Minister showed his keen interest in the research works and visited the laboratories and interacted with the scientists. Dr. B. Hari Gopal, Scientist G and Adviser, DST, GoI promised to help the IASST in its all round development. A host of dignitaries of Assam including Dr. Bhagawan Ch. Lahkar (I & PR) Adviser to CM and top brass of Assam Government visited the Institute on that day.

The 31st December 2004 is a red-letter day for the Institute of Advanced Study in Science and Technology, IASST because on that day His Excellency, President of India, Dr. APJ Abdul Kalam visited

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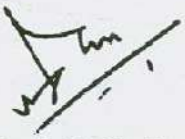
the institute and interacted with the scientists of the IASST. On that day, the President of India accompanied by the Governor and Chief Minister of Assam along with other high-level officials of the Central and State Governments visited the laboratories of the Institute. Prof. K.M. Pathak the Chairman of the Council IASST, some school children and myself, along with the scientists of the Institute, welcomed the President. He expressed happiness after inspecting various projects presently being pursued by the scientists of the Institute. Later he interacted with the scientists of the IASST. He stressed on the development of nano, bio and information Technology. He also predicted that future of the energy problem could be solved by fission and fusion processes and solar sources.

The Govt. of Assam provided an amount of Rupees 5 lakhs to the IASST for the visit of His Excellency President of India to the institute and also developed NH37 bye-pass the Vigyan Path.

The institute now has an asset of Rupees 16.04 crores and a liabilities of Rs. 0.43 crore. The Institute so far produced 34 Ph.D's and published 240 papers in reputed Journals. There are 17 on going projects and it has successfully completed 26 projects.

The IASST is the only multidisciplinary research institute in the whole North Eastern region and has been carrying out commendable research works in Material Sciences (Plasma and Polymer), Mathematical Sciences, Life Sciences, Resource Management and Environmental Sciences and teaching in Computer Sciences so much so that it catches the imagination of many well wishers, planners and visitors.

To raise the standard of the IASST to the international level the institute needs adequate man, material and equipment. Besides the scientists need transport, health care unit and residential accommodation, better service facilities, job security, after retirement benefits so that they can work without hindrance. It is feasible only if the Institute is taken over as envisaged by the Govt. of India.



Date : 31-03-2005

Prof. N. N. Dass
Director, IASST

1. His Excellency The President of India Dr. APJ Abdul Kalam's Address to the Research Scholars and Scientists of the Institute of Advanced Study in Science and Technology, Guwahati.

27 December 2004

Power of Innovation

I am delighted to address and interact with Research Scholars and Scientists of the Institute of Advanced Study in Science and Technology. I greet the organizers, members of the Institute, academia, scientists, technologists and distinguished guests. I thought of sharing with you my experience in Himachal Pradesh where I visited a few days back. From the point of view of bio-diversity these two states have many things in common, excepting that the altitude of Himachal varies from 450 meters to 4500 metres. Like Himachal, Assam is a beautiful land with beautiful people. Beautiful people have creative minds.

I would like to share my thoughts with this distinguished audience on science and society. First I would like to talk about Srinivasa Ramanujan who was one of the greatest geniuses known and acknowledged of his time.

A genius well ahead of time

Srinivasa Ramanujan lived only for 33 years and did not have formal higher education or means of living. Yet, his inexhaustible spirit and love for his subject made him contribute to the treasure houses of mathematical research - some of which are still under serious study and engaging all-available world mathematicians' efforts to establish formal proofs. Ramanujan was a unique Indian genius who could melt the heart of the most hardened and outstanding Cambridge mathematician Prof G H Hardy. In fact, it is not an exaggeration to say that it was Prof. Hardy who discovered Ramanujan for the world. Professor Hardy rated various geniuses on a scale of 100. While most of the mathematicians got a rating of around 30 with rare exceptions reaching to 60, Ramanujan got a rating of 100. There can not be any better tribute to either Ramanujan or to Indian heritage. His works cover vast areas including Prime Numbers, Hyper geometric Series, Modular Functions, Elliptic Functions, Mock Theta Functions, even magic squares, apart from serious side works on geometry of ellipses, squaring the circle etc. One of the tributes to Ramanujan says that, **'every Integer is a personal friend of Ramanujan'.** I would suggest the Institute of Advanced Study in S&T to create many Ramanujans in the field of mathematical sciences. For this, we also need persons with the mind like Prof Hardy to spot geniuses and nurture them in all walks of their lives.

Recent development in biotechnology

I note that one of the key areas in which this institute is working is Life Sciences. India missed the great opportunity in partnering the human genome project and thereby lost the utility of tremendous data. I suggest the Indian biomedical community to take the initiative to become a working partner in the proteomics project of gene characterization. Proteomics is the study of all the proteins expressed by the genome of a cell. It is the logical extension of genomics. Proteomics helps to understand basic biological processes critical to normal cellular functions as well as to the development of diseases. It identifies the essential components of these processes and exploits these components as targets in the development of new methods to prevent or treat diseases. The national programme on proteomics has to be accelerated with partnership from industries and R & D laboratories. I would suggest that this should be pursued as a mission mode project. This will lead to our being invited to participate in the global proteomics programme. Particularly, the proteomics resulting into a gene chip can become the future diagnosis and treatment regime for many diseases.

Bioinformatics

The convergence of bioscience and IT into Bioinformatics has given the thrust to researchers for genomics-based drug discovery and development. Pressure is mounting over the pharmaceutical companies to reduce or at least control costs, and have a growing need for new informatics tools to help manage the influx of data from genomics, and turn that data into tomorrow's drugs.

Bioinformatics data plays a vital role and emerging as a business model for the medical and pharmaceutical sector. Key areas such as gene prediction, data mining, protein structure modeling and prediction, protein folding and stability, macromolecular assembly and modeling of complex biological systems are thriving and IT has major role to play in these areas in bringing the tools to manage the high throughput experiments and the data they generate, and sharing and integrating all the data in a meaningful way which results into the detailed models of complex systems, particularly biological pathways.

Convergence of Technologies

The technologies are converging together to provide a quality of service (QOS) with the reduced infrastructural setup. The information technology and communication technology have already converged leading to Information and Communication Technology (ICT). Now, nano-technology is knocking at our doors. It is the field of the future that will replace micro electronics and many fields with tremendous application potential in the areas of medicine, electronics and material science. When nano technology and ICT meet, an integrated silicon electronics, photonics is born and it can be said that material convergence may happen. With material convergence and biotechnology linked, a new science called Intelligent Bioscience will be born which leads to a disease free, happy and more intelligent human habitat with longevity and enhanced capabilities.
Simulation of mega projects

Another area of national importance where the environmentalists can help is in the Inter-linking of river project. As you are aware, a Task Team has been constituted for evolving the plan of action including the ecological enhancement plan for executing the project. This mission will eliminate the periodical problem of drought and flood experienced in a number of river basins. This is an important mission from both water and power security. The task team is in the process of preparing the total plan for the nation. Environmentalists can provide useful inputs on problems of and solution about ecological aspects of the interlinking of river projects. Also they can validate the ecological enhancement plan through the study of existing terrain through the analysis of satellite pictures. This will be a very useful input for implementing this mega mission. Statistical model for the Interlinking of rivers connecting the rainfall and snow measurements and the ground porosity for the water run off model is a great challenge for the mathematicians and environmentalists.

Nano-bio chip

Recently I met Prof. Vijay K Varadan of Pennsylvania State University, US. He shared his experience on the possible line of treatment for Parkinson's disease and Epilepsy. The primary symptoms in Parkinson's Disease, as you all are aware, are tremor or trembling in hands, arms, legs, jaw and face, rigidity or stiffness of the limbs, slowness of movement and impaired balance. Prof Varadan has devised a wireless system for monitoring and control of Parkinson disease. The system consists of an implantable nano-bio chip in the head region for generating a pulse to the nerve system; controlled either by a modified pacemaker or smart hat. Passive polymer based gyro sensor, is implanted in the tremor location. The sensor gets power from the Pacemaker and the Pacemaker then reads the tremor motion. The Pacemaker then generates pulse in the implanted device in the head to control the tremor. This appears to be a promising line of treatment for such diseases. Prof. Varadan also has reported that a few patients affected by Parkinson diseases had a full recovery. This is the promising area of research in which some of the researchers of this Centre can concentrate.

Molecule to drug

In India many R&D organizations and pharma industries discover the molecules, but most of these newly discovered pharmaceutical molecules are sold to multinationals abroad for further development to drug. Naturally, the benefit of value addition goes to the companies abroad. The research and drug design, development and acceptance for introduction is a big mission. Molecule to drug is indeed the business of strong minds with the capacity to take calculated risks. In this connection, I recall the principle taught by my Guru Prof Satish Dhawan, 'If one takes challenging tasks, problems will always occur. But problems should not become masters of the doers. Instead the problem has to be defeated and we should succeed. I would

suggest the participation of Life Sciences community to work on the conversion of Molecule to Drug on a mission mode in partnership with pharmaceutical industries. I have recently visited a number of world class R&D facilities by Indian pharmaceutical industries. I observed some of them are busy making molecule into a drug. Academics should familiarize with them and work on problems of interest to them.

Evolution of research philosophy

As you all know that Johns Hopkins University in USA is doing a pioneering research work in many fields. I met Dr. Charles Cummings of the Johns Hopkins Board and his team, few days ago. I asked one question that was in my mind, to Dr Charles, What made Johns Hopkins a world class research centre in addition to its cherishing societal missions. His answer was, 'it is a great tradition, it started with a number of visionaries with value system and missions. This tradition continues.'

Since I am in the midst of researchers in many areas, I would like to share my thoughts on the mission of transforming India into a developed nation.

Our National Mission - Challenges

Our nation is going through a major challenge of uplifting of 260 million people who are below the poverty line. They need habitat, they need food, they need health care, and they need education and employment finally resulting in a good life. Our GDP is growing at more than 6% per annum. Whereas, the economists suggest that to uplift the people below poverty line, our economy has to grow at the rate of 10% per annum consistently, for over a decade.

Integrated Action for Development

To meet the needs of one billion people whose number will further increase, we have a mission of transforming India into a developed nation. We have identified five areas where India has core competencies for integrated action: (1) Agriculture and food processing (2) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country. (3) Education and Healthcare (4) Information and Communication Technology (5) Strategic sectors. These five areas are closely inter-related and when effectively addressed, would lead to food, economic, energy and national security.

Engines for Growth

Emphasis should be on full utilization of natural and human resources of the region to meet the demands of the modern society. We should also remember that about 50% of our population is young people, with aspirations for a better life. Value addition to Agriculture, Manufacturing and Service sectors of the economy, building on the regions' core competencies and technologies, will lead to high income growth rate and employment potential. The engines for growth will be launching of the five national missions viz. water, energy, education and skills, infrastructure and employment generation, which will enable achievement of 10% GDP growth rate per annum, sustainable for a minimum period of ten years. Scientists and technologists assembled here should provide the knowledge and value addition to the human resource for maximizing their output for meeting the challenges of societal transformation.

Conclusion: Enlightened Citizenship

When we think of national development, I am clear what is needed is the evolution of enlightened and visionary leaders amongst us in all walks of life whether it be politics, administration, religion, business, education or science which has a bearing on the evolution of our nation and the society. And, enlightened leadership is all about empowerment. When a child is empowered by the parents, he gets transformed into a responsible citizen. When a teacher is empowered with knowledge, a guru emerges. When women are empowered, a stable society gets established. When the political leaders of a nation empower the people through visionary policies, the prosperity of a nation is assured. When religions are empowered to become a spiritual force, peace and happiness blossoms in the society. It is thus, the need of the hour to develop enlightened leadership amongst various sections of our society who will have a vision and a commitment to peace, progress and development. When a leader of any institution empowers the people working with them, such leaders are created who can change the course of their institution, thereby the state and the nation. Empowerment by enlightened leaders will lead to the creation of enlightened citizens who have a strong value system. I believe if the majority of the people become enlightened citizens, they will spread the righteousness in right earnest. If they do, I am very confident that we will have a Developed Nation before 2020.

My best wishes to all the Research Scientists and scholars assembled here.
May God bless you.

2. Research and Development Activities

2.1 Material Sciences Division

A. Plasma Physics Unit:

The Plasma Physics unit of Material Sciences Division has been working on basic and applied field of plasma research. On basic plasma science, the areas covered by this unit are waves and instability, dusty and multicomponent plasma, beam plasma interaction. Research on plasma processing currently includes DC cylindrical magnetron and RF/DC planar magnetron reactors.

Instability characteristics in a DC cylindrical magnetron discharge:

The study of generation and growth of plasma instabilities driven by the influence of crossed electric and magnetic field (EXB flow) has been drawing attention in recent times due to its implications in fusion devices, ionospheric plasmas, cylindrical and planar magnetron devices. A prototype cylindrical magnetron system has been designed and fabricated at the IASST using a stainless steel cylinder of 30 cm in diameter and 100 cm in length. Three magnetic coils with 500 numbers of turns in each are wounded using SWG-8 enamel coated copper wires, which can produce magnetic field of 0.600 kG at 25 Amps. Base pressure of the chamber is brought down to $2x10^{-6}$ mbar and argon working pressure is maintained at $\sim 10^{-3}$ - 10^{-4} mbar. Discharge voltage (~ 1000 V) is applied into the cathode using a DC regulated power supply (1.5 KV, 1 amp) and typical discharge current is 500mA. A photograph of the discharge with argon shows the abnormal glow plasma produced in the device. Measured plasma parameters using a cylindrical Langmuir probe are: density $\sim 10^{10}$ cm^{-3} and electron temperature ~5 eV. Radial density profile measurement shows a sharp density gradient towards the wall. Radial potential profile measurement using a hot emissive probe shows a sharp potential fall near the cathode, which indicates the positive space charge mode.

An electrostatic instability with an intermediate frequency range (50-100 kHz) between electron collision frequency and electron cyclotron frequency has been observed in presence of ExB field in the cylindrical magnetron device. The amplitude of the instability becomes maximum at particular values of magnetic field and discharge voltage. The different modes of the instability are prominent only when the neutral gas pressure is sufficiently low ($\sim 4 \times 10^{-3}$ mbar). The instability is suppressed when the magnetic field is higher. A radial probe assembly has been successfully used to measure the azimuthal mode numbers of the instability. Using this probe assembly, radial perturbations at different azimuthal positions within same radius are picked up on a four channel Lecroy Digital Storage Oscilloscope for simultaneous measurement of phase and frequency using the fast fourier transform of the raw data. A constant amplitude test signal applied to the plasma through the cathode is found to grow when its frequency matches with the frequency of the instability. The electron saturation current of the Langmuir probe versus discharge voltage shows a hysteresis loop in the instability excitation region.

Possible origin of the instability is due to ExB/density gradient and some other nonlinear mechanism. This type of instability is found to enhance the anomalous electron transport across the magnetic field and possibly prevent the transition of positive space charge mode to negative space charge mode at high magnetic field and low pressure. Due to the electron loss, the efficiency of a magnetron sputtering system is decreased and also

e properties of a deposited film is affected significantly due to the substrate bombardment by energetic ectrons.

F planar magnetron sputtering reactor:

The Radio Frequency planar magnetron sputtering reactor consists of a stainless steel chamber of 45 cm diameter and 42 cm in length with water cooled 10 cm diameter planar magnetron assembly. A combination rotary and diffusion pumps bring down the chamber pressure as low as 1 x 10^{-6} mbar in 1 hour. The amber, planar magnetron assembly and the pumping system are fabricated by Hindhivac, Bangalore.

The discharge is produced with argon at partial pressure ~10^{-3} mbar using a RF source 13.56 MHz, 500 atts (Comdel, USA) and a matching network. The plasma density and temperature are ~10^{11} cm^{-3} and eV respectively in the high density region. Pure aluminium metal plate of 10 cm diameter and 3mm thickness used as sputtering target and fitted on the lower end of the magnetron assembly. The magnetron assembly d the metal aluminium plate act as the live RF electrode. The magnetic field of the magnetron traps the asma closer to the target plate which increases the ionization as well as the plasma density. The negative dc lf bias at the target plate, on the other hand, accelerates the ions toward the target plate and Al atoms are uttered out from the metal plate surface. A photograph of topology of a commercial aluminium target plate ter sputtering is shown.

The substrate (glass, bell metal) for film deposition is placed below the magnetron assembly. The substrate older is fitted with a heater and its distance from the target is adjustable. For metal oxide film deposition xygen gas is injected at different flow rates using Mass Flow Controllers (Alborg, USA). Different process arameters such as gas flow rates, substrate temperature and bias, electrode material, deposition time, distance etween the electrodes and RF power applied to the plasma are considered for obtaining good quality sulating metal oxide films. Characterization of the processed films using X-ray diffraction spectroscopy and canning electron microscope has been being undertaken for optimization of process parameters.

on beam-sheath interaction:

Evolution of a potential dip in front of an electron absorbing plate has been experimentally investigated. he experiment is carried out in double plasma device with multidipole magnets for surface plasma confinement. otential drop of the order of Te/2 exists between bulk plasma and the boundary of electron space charge gion where the potential minimum occurs. The dip parameters obey Child's law. The Teflon coated floating ack of the electron absorbing plate provides the ion pumping mechanism for the dip formation. Injection of ı ion beam increases the rate of trapped ion flow into the dip than the ion leak rate due to pumping.

usty plasma:

Dusty plasma has been successfully produced in a double plasma device using a dust reservoir and a trasonic vibrator which operates at 23 KHz. Glass powder of 5~10 micron size are sprayed into the argon asma uniformly. Dust density is estimated from the scattered laser light intensity using a Monochromator. angmuir probe and emissive probe measurements are used to measure the dusty plasma parameters. Excitation f ion-acoustic waves and study of their propagation characteristics have been initiated.

Microwave refletometry technique :

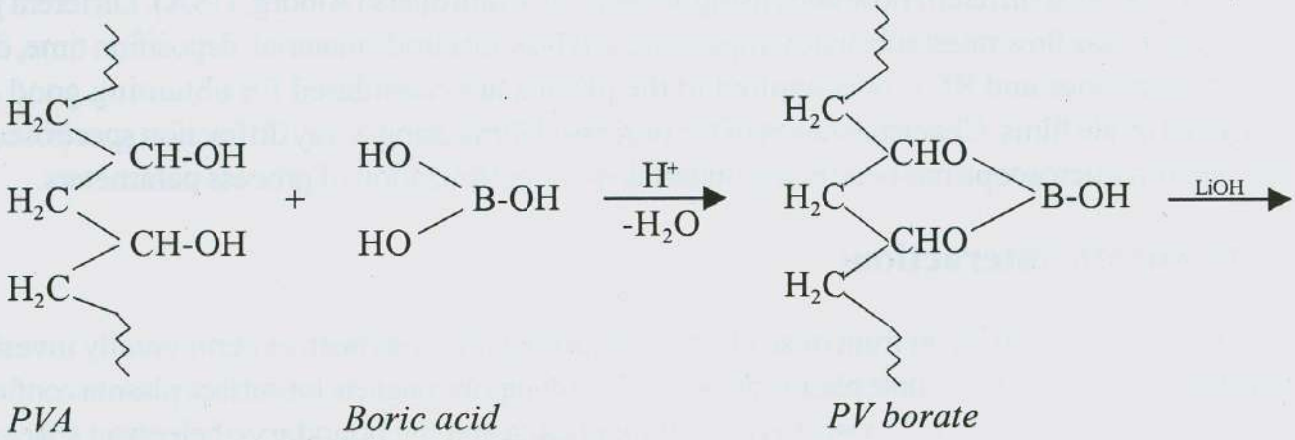
The microwave reflectometry system has been fabricated and test operation has been performed at SINP, Kolkata. The 26-28 GHz microwave generator with a fast sweep is used to transmit through the plasma. The reflected signal (after reflection from the cut off layer) is received by the zero bias detector. The local density and the cut-off layer are deduced from phase shift experienced by the reflected wave from the launching point to the cut-off layer of plasma.

B. Polymer Science unit :

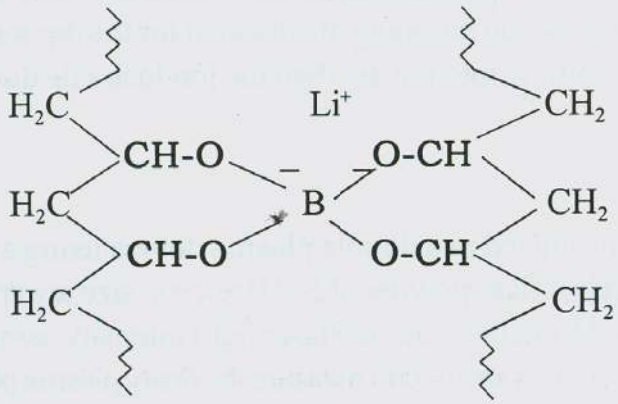
Synthesis, Characterization and Conductivity measurement of Poly vinyl borate and its Lithium derivative:

Poly(vinyl borate), PVBO and Lithium derivative of PVBO can be prepared by homogeneous esterification of PVA with boric acid in non-aqueous medium in the presence of a catalyst $C_2H_5ON0_2$·DMSO. The compounds were characterized by IR and ^1H NMR technique. Conductivies were determined from 30 to 90°C in solid state. The compounds so formed showed ionic conductivity and their conductivities were dependent on frequencies used. The addition of Li^+ ion increases the ionic conductivity of PVBO dramatically. The total ionic transport number and activation energy of the polymers were also determined.

The reactions for the production of PVBO and PVBO-Li may be summed up as;



PVA *Boric acid* *PV borate*

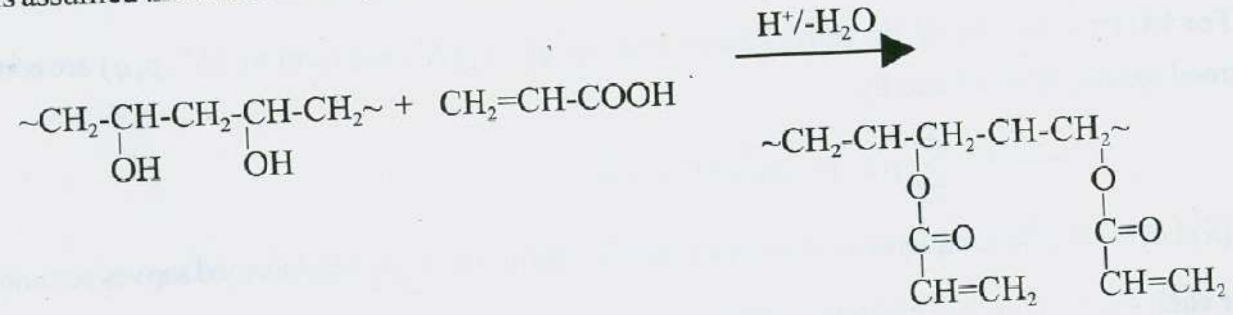


Lithium derivative of PV borate (gel)

Use of the esters of fatty acids and Poly vinyl alcohol as freeze suppressants

Polyvinyl alcohol (PVA) when esterified with different acids like acrylic acid (AA), lauric acid (LA), stearic acid (SA) etc. forming corresponding esters in the presence of a suitable catalyst. It was observed that few of them act as a freeze suppressants for crude oil and also for lubricating oil by around 10°C. The result actually varies from 5°C to 15°C depending upon the type of acid used for esterification. The esters were characterised by IR and NMR techniques.

It is assumed that the reaction proceeds in the following way while using acrylic acid;



Preparation of Poly (vinyl cinamate) PVCT from polyvinyl alcohol

Poly (vinyl alcohol), PVA can be dissolved in a non-aqueous medium in the presence of catalytic concentration of ethyl nitrate dimethyl sulfoxide, C H ONO ·DMSO. From the PVA solution, Poly (vinly cinnamate), PVCT was prepared by homogeneous esterification of PVA with cinnamic acid. The esters thus formed contained some unconverted hydroxyl group. The formation of the esters was cofirmed by IR and ^{1}H-NMR spectra. The molecular weight of PVCT was determined by GPC method. Thermal stabilities of the esters were checked by TGA and DTG analysis. The ester was also examined for flow improver properties.

2.2 Mathematical Sciences Division

Sequence Spaces and Summability Theory

An Orlicz function is a function M: $[0,\infty) \to [0,\infty)$, which is continuous, non-decreasing and convex with $M(0) = 0$, $M(x) > 0$, for $x > 0$ and $M(x) \to \infty$, as $x \to \infty$.

A subset E of N is said to have density $\delta(E)$ if $\delta(E) = \lim_{n\to\infty} \frac{1}{n} \sum_{k=1}^{n} \chi_E(k)$ exists, where χ_E is the characteristic function of E. A X-valued sequence (x_n) is said to be statistically convergent to L if $\delta(\{k \in N: q(x_k - L) \geq \varepsilon\}) = 0$.

(a) Related to Statistical Convergence

(*i*) Let (X,q) be a seminormed space, seminormed by q. For M an Orlicz function, $p=(p_k)$ a sequence of strictly positive real numbers and n a non-negative integer, the sequences spaces $\bar{c}(\Delta^n, M, p, q)$ and

$\bar{c}_0(\Delta^n, M, p, q)$ are defined. It is shown that for $p = (p_k) \in \ell_\infty$, the spaces $m(\Delta^n, M, p, q) = \bar{c}(\Delta^n, M, p, q) \cap \ell_\infty(\Delta^n, M, p, q)$, $m_0(\Delta^n, M, p, q)$ and $\ell_\infty(\Delta^n, M, p, q)$ are complete paranormed space, paranormed by

$$g_\Delta(x) = \sum_{k=1}^{n} q(x_k) + \inf\left\{\rho^{\frac{p_k}{H}} : \sup_k M\left(q\left(\frac{\Delta^n x_k}{\rho}\right)\right) \le 1, \rho > 0\right\},$$

where $M=(1, \sup p_k)$.

For $M(x)=x$, for all $x>0$, the above spaces $m(\Delta^n, p, q)$, $\ell_\infty(\Delta^n, p, q)$ and $m_0(\Delta^n, p, q)$ are complete seminormed spaces, seminormed by

$$g_\Delta(x) = \sum_{k=1}^{n} q(x_k) + \sup_k \left[q\left(\Delta^n x_k\right)\right]^{\frac{p_k}{M}}.$$

(*ii*) Let $\Lambda=(\lambda_k)$ be a sequence of non-zero complex terms. Let X_k be seminormed sapves seminormed by f_k, for each $k \in N$. Then the sequence space $(\bar{c})_0^{(p)}(X_k, \Lambda)$ is the class of all sequences (x_k) such that $\{(f_k(\lambda_k x_k))^{p_k}\} \in \bar{c}_0$. Different algebraic and topological properties of this space is studied. Some inclusion results are proved and necessary and sufficient conditions are obtained for their equality. It is shown that $m_0^{(p)}(X_k, \Lambda)$ is a complete seminormed space, seminormed by

$$g(x) = \sup_k (f_k(\lambda_k x_k))^{\frac{p_k}{M}},$$

whenever each X_k is a complete seminormed space.

(*iii*) The notion of statistically convergent bounded variation sequence is introduced as follows:

$(x_k) \in \bar{bv}$ implies $\sum_{i=1}^{\infty} |\Delta x_{k_i}| < \infty$, where $\delta(K) = 1$ and $K = \{k_1, k_2, \ldots\}$.

The decomposition theorem is proved. The statistical analogue of some results due to G.H. Hardy [*Proc. Camb. Phil. Soc.* 19(1917), 86-95] are obtained.

(b) Related to I-Convergence

A non-void class $I \subseteq 2^N$ is called an *ideal* if I is additive(i.e. $A,B \in I \Rightarrow A \cup B \in I$) and hereditary (i.e. $A \in I \,\&\, B \subseteq A \Rightarrow B \in I$). An ideal I is called non-trivial if $I \neq 2^N$. A non-trivial ideal I is said to be admissible if I contains every finite subset of N. For I an ideal, the filter of I is defined as $\Im(I) = \{K \subseteq N : N-K \in I\}$.

A sequence (x_k) is said to be I-convergent if there exists $L \in C$ such that for all $\varepsilon>0$, $\{k \in N: |x_k - L| \ge \varepsilon\} \in I$. We write $I\text{-}\lim x_k = L$. A sequence (x_k) is said to be I^*-convergent to L if there is a set $\{n_1 < n_2 < \ldots\} \in \Im(I)$ such that $\lim_{i \to \infty} x_{n_i} = L$.

A real valued sequence (x_k) is said to be *I-monotonic increasing* (*I-monotonic decreasing*) if there is a set $\{n_1 < n_2 < \ldots\} \in \Im(I)$, such that $x_{n_i} \le x_{n_{i+1}}$ ($x_{n_i} \ge x_{n_{i+1}}$) for every $i \in N$.

It is shown that if I is not maximal and $I \neq I_f$, then c^I and c_0^I are not symmetric. The decomposition result "A real sequence (x_n) is I-monotonic increasing (I-monotonic decreasing) if and only if x can be written as $x = y+z$, wher y is non-decreasing (non-increasing) real sequence and $z = (z_n)$ is such that $\{n \in N : z_n \neq 0\} \in I$."

It is shown that "an I-monotonic sequence is I-convergent if and only if it is I-bounced." The analogue of Sandwich theorem is proved.

The convergence field of I-convergence is a set $F(I) = \{(x_k) \in \ell_\infty : \text{there exists } I\text{-lim } x \in R\}$.

It is shown that "The function $g: F(I) \to R$ is a Lipschz function and hence uniformly continuous." Also "If $x, y \in F(I)$, then $xy \in F(I)$ and $g(xy) = g(x)\, g(y)$." It is shown that "A sequence (x_n) is I-convergent if and only if it is I-Cauchy."

(c) Work related to the space $m(\phi)$.

Let $\wp_s$ denote the set of all subsets of N, those do not contain more than s elements. Let Φ denote the class of all non-decreasing sequences (ϕ_n) such that $0 < n\phi_n \leq (n+1)\phi_n$ for all $n \in N$. For E_k, seminormed spaces, seminormed by f_k, for each $k \in N$ and $\Lambda = (\lambda_{n,k})$ a multiplier sequence, the sequence space $m(E_k, \phi, \Lambda)$ is defined. Its different algebraic and topological properties this space are studied. Some inclusion relations with different spaces are obtained. The crucial generalized multiplier problem is proved. Its continuous dual is obtained.

(d) On Absolute Summability Factor

Let $\sum_{k=0}^{\infty} a_k$ be an infinite series with the sequence of partial sums (s_k), (p_k) a sequence of positive real numbers and $P_k = \sum_{n=0}^{k} p_k$, for all $k \in N$. The series $\sum_{k=0}^{\infty} a_k$ is said to be summable $(\bar{N}, p_k)$ to L if $t_k = \frac{1}{P_k} \sum_{\upsilon=0}^{k} p_\upsilon s_\upsilon \to L$, as $k \to \infty$, and is said to be absolutely $(\bar{N}, p_k)$ i.e. $|\bar{N}, p_k|$ summable, if $\sum_{k=1}^{\infty} |t_k - t_{k-1}| < \infty$.

Given a sequence $a = (a_n)$, for $k \geq 1$, we write $\phi_k(a) = t_k - t_{k-1}$, where

$$t_k = \frac{1}{P_k} \sum_{\upsilon=0}^{k} p_\upsilon s_\upsilon = \frac{p_k}{P_k P_{k-1}} \sum_{n=1}^{k} P_{n-1} s_n, \text{ for all } k \in N.$$

For M an Orlicz function, $r = (r_k)$ a sequence of strictly positive real numbers, we define the following sequence space :

$$|\bar{N}_p|(M, r, q, s) = \{(a_k) : \sum_{k=1}^{\infty} k^{-s} \left[M\left(q\left(\frac{\phi_k(a)}{\rho} \right) \right) \right]^{r_k} < \infty,\ s \geq 0, \text{ for some } \rho > 0\}.$$

This generalizes and unifies the results due to different workers. It is shown that $|\bar{N}_p|(M,r,q,s)$ is a paranormed space, paranormed by

$$g(a)=\inf\left\{\rho^{\frac{r_n}{H}}:\left(\sum_{k=1}^{\infty}k^{-s}\left[M\left(q\left(\frac{\phi_k(a)}{\rho}\right)\right)\right]^{r_k}\right)^{\frac{1}{H}}\le 1,n\in N\right\},\ \text{where } H=\max(1,\sup r_k).$$

Different inclusion results are proved.

(e) On Lacunary Sequence Spaces.

By a lacunary sequence $\theta=(k_r)$, we mean an increasing sequence of non-negative integers with $h_r=(k_r-k_{r-1})\to\infty$, as $r\to\infty$, where $k_0=0$. We denote $I_r=(k_{r-1},k_r]$ and $\eta_r=\frac{k_r}{k_{r-1}}$, for $r\in N$. For M an Orlicz function and m a non-negative integer, we introduce the classes of sequences $[N_\theta,M,\Delta^m]_0$, $[N_\theta,M,\Delta^m]$ and $[N_\theta,M,\Delta^m]_\infty$. It is shown that these are linear spaces. The space $[N_\theta,M,\Delta^m]_\infty$ is a normed linear space, normed by

$$g_\Delta(x)=\sum_{i=1}^{m}|x_i|+\inf\left\{\rho>0:\sup_r h_r^{-1}\sum_{k\in I_r}M\left(\frac{|\Delta^m x_k|}{\rho}\right)\le 1,r\in N\right\}.$$

Different inclusion results are proved. It is shown that the spaces $[N_\theta,M,\Delta^m]_0$, $[N_\theta,M,\Delta^m]$ and $[N_\theta,M,\Delta^m]_\infty$ are neither solid nor convergence free. The spaces $[N_\theta,M]_0$ and $[N_\theta,M]_\infty$ are solid and hence are monotone.

(f) On Almost Convergence

Let σ be a one to one mapping of the set of positive integers into itself such that $\sigma^m(n)=\sigma(\sigma^{m-1}(n))$, $m\in N$. We define the space

$$c(M,p,\sigma,q,s)=\{x\in\ell_\infty(X):\lim_{k\to\infty}k^{-s}\left[M\left(q\left(\frac{x_{\sigma^k(n)}-L}{\rho}\right)\right)\right]^{p_k}=0,$$

uniformly in n, for some $\rho>0$, $L\in C$ and $s\ge 0\}$.

Similarly the space $c_0(M,p,\sigma,q,s)$ and $\ell_\infty(M,p,\sigma,q,s)$ are defined. Their different algebraic and topological properties are proved. Some existing results are obtained as particular cases.

Numerical Linear Algebra

Numerical works "On Sensitivity of Eigenvalues and Eigendecompositions of Matrices" deriving solutions to two open problems in the area of sensitivity analysis of eigenvalues and eigendecompositions of matrices have been provided. The first problem is due to James Wilkinson and is over 35 years old. It is concerned with finding the distance from a square matrix say, A, of size n with n distinct eigenvalues to the nearest matrix

having less than n distinct eigenvalues. The second problem which was first posed James Demmel is more than 15 years old and is concerned with providing a characterization of the stability of eigendecompositions of matrices. The authors have shown that the solutions for both these problems may be read off from the ε-pseudosputea of the matrices. For the first problem, a procedure for finding a matrix with less than n distinct eigenvalues which is nearest to A with respect to the 2-norm is also provided.

Analysis of the effect of perturbation on the spectra of matrix pencils and polynonmials under the assumption that the perturbations also have the same structure as that of the original matrix pencil or polynomial. Given a matrix polynomial

$$P(\lambda) := \sum_{k=0}^{m} \lambda^k A_k ,$$

where $A_0, A_1, ---, A_m$ are square matrices of size n over the field of real or complex numbers, the problem of finding a scalar λ and a vector $x \in \boldsymbol{C}^n$ (or $\boldsymbol{R}^n$) satisfying $P(\lambda)x=0$ arises in the analysis and numerical solution of higher order systems of ordinary and partial differential equations. Very often the polynomial $P(\lambda)$ has additional structure. For example, if $P(-\lambda) = -P(\lambda)$ or $P(-\lambda) = P(\lambda)$ then $P(\lambda)$ is said to be respectively odd or even. Again if $P(\lambda)^* = \sum_{k=0}^{m} \lambda^k A_k^*$, where * denotes transpose or conjugate transpose and $P^*(-\lambda) = -P(\lambda)$ or $P^*(-\lambda) = P(\lambda)$ then $P(\lambda)$ is said to be *-odd or *-even respectively. Similarly if $revP(\lambda) = \lambda^m P\left(\frac{1}{\lambda}\right)$ be the reversal of $P(\lambda)$ and $revP(\lambda) = P(\lambda)$, $revP(\lambda) = -P(\lambda)$, $revP^*(\lambda) = P(\lambda)$ or $revP^*(\lambda) = -P(\lambda)$ then $P(\lambda)$ is said to palindromic, anti-palindromic, *-palindromic or *-antipalindromic respectively. It has been established that algorithms for solving the associated structured polynomial eigenvalue problem that ignore the structure of the original problem may lead to grossly erroneous results in a finite precision environment. The design of such structure preserving algorithms has been a significant topic of research in the last decade. This immediately gives rise to the need for perturbation analysis of the spectra of $P(\lambda)$ under perturbations $\Delta P(\lambda)$, where $\Delta P(\lambda) = \sum_{k=0}^{m} \lambda^k \Delta A_k$ also has the same structure as that of $P(\lambda)$.

Another collaborative work involve designing a simple algorithm for finding the Wilkinson's distance in $O(n^3)$ steps. It has provided a solution to the problem of finding Wilkinson's distance which is the distance from a matrix A all the eigenvalues of which are distinct, to the nearest matrix having a multiple eigenvalue. As a natural extension of this work, the task of finding a simple and efficient algorithm for finding the Wilkinson's distance and a nearest matrix having at least one multiple eigenvalue is being carried out.

Applied Mathematics (Theoretical Plasma Physics)

Our motivation is to study the various nonlinear plasma acoustic wave equations in different plasma configuration. In order to derive the characteristics behaviors of nonlinear plasma waves we adopted some new methods or approach and consequently, as we found the earlier methods for solving the wave equation, new methods, like sine-Gordon method, tanh-method, have been employed for the success of having the results in relation to exact features observed in laboratory plasmas as well as in space plasmas. The totality of the work could be divided in two ways: One type of nonlinear wave derived by the reductive perturbation technique has been solved by sine-Gordon method. The first observation highlights the soliton in plasmas but as left earlier, later with the modification on plasma configuration as well as the method for solutions, derive the double layers and the soliton radiation in plasmas. These are the new observations bursting as thrust observation in plasma

dynamics. While the other method is the pseudopotential approach which derives generally the Sagdeev potential equation and could find to revisit the soliton dynamics along with other phenomena. But because of an ideal plasma model, the usual pseudopotential method fails to derive the nonlinear wave equation as a Sagdeev potential equation. Thus we adopted a new approach to derive the wave equation from which we studied the formation of sheath in plasmas. Sheath formation is natural phenomena as and when a solid body immersed in it. Based on the idea, we studied the sheath formation in space around a solid such as around the moon. we also derived the characteristics behaviour of dust levitated into the sheath. Further, based on the physical situation, we estimated the size of the dust grains in space along with the calculation force acting on dust grains as a result of all studies we were able to find the formation of dust clouds around the solid body. The work has been done in an inhomogeneous plasma model consisting of additional negative ions along with a continuous ionization effects. Due to such complex plasma, but ideal model in space, the nonlinear wave dynamics derive successively new findings. The results derived here are very much interesting in the light of having a parallel observations on soliton radiation along with the dip and hump solitons as similar to those observed in space by scientific satellite. The different modes of plasma acoustic wave found altogether double layers, spiky solitons, explosive and bursting soliton and soliton radiation etc. The study on the formation of sheath in plasmas has the importance in plasma technology.

Applied Stochastic Process

An $M^x/G/1$ queue have been investigated with a random setup time, where the service of the first unit at the commencement of each busy period is preceded by a random setup time . Our investigations include the study of the system size distribution, busy period distribution and distribution of unfinished work. Basically combination of renewal theory and embedded Markov chain technique have been applied to generalized the results of Levy and Kleinrock [*Operations Research* , 34 , 426-436 (1986)] .

Another scope related to this model is exceptional first vacation model, where length of the first vacation is different from rest of the vacations. Next , we have investigated the queue size distribution at different epochs and busy period distribution of an $M/G/1$ Bernoulli feedback system with first exceptional vacation. Our results generalized the results of Lee [*Computers and Operations Research*, 15, 441-445 (1988)].

Probabilistic service discipline is a simple method to make a service discipline controllable. The main advantage of probabilistic discipline is that the system may be optimized. Because of wide applications , especially in computer networks, several probabilistic discipline have been proposed in the literature : Second optional service by Madan [*QUESTA* , 34 ,37-46 (2000)] , Cyclic polling system with Bernoulli Schedules by Keilson and Servi [*Journal of Applied Probability* , 23 , 790-802 (1986)] , Binomial gated service discipline for Cyclic systems by Levy [*IEEE Transaction and Communication* , 39 , 1341-1350 (1991)] etc.

In this context, a recursive solution of the queue size distribution of an $M/G/1$ queue have been developed with second optional service. Basically, embedded Markov chain technique has been applied to develop this recursive solution. By applying same technique the results have been generalized for an $M^x/G/1$ queue with Bernoulli vacation and two stages service system. The investigation includes study of system size distribution and waiting time distribution. Moreover, a recursive solution to compute state probabilities for such models have been developed.

Control of queues is one of the most significant areas of research. As the number of published papers on this topic is extremely vast. For the sake of convenience we shall often refer to basic classified bibliography by Crabill et-al [*Operations Research*, 25, 219-232 (1977)]. Based on their classification we investigated following two control policies viz.-

(i) ***N*-policy :** where the server is turned on when the number of units in the queue exceeds N. In this context, we have firstly investigated an $M^x/G/1$ queue with an additional service channel under N-policy. Our model generalized the results of Lee and Srinivasan [*Management Sciences*, 35, 708-721 (1989)] and Lee et-al [*QUESTA* , 15 , 387- 399 (1994)] . Secondly, we investigated the queue size distributions of an $M^x/M/1$ queue with multiple vacations under N-policy. Basically, supplimentary variable techniques have been applied in the study of both the models.

(i) **Restricted Admissibility policy :** According to which '*p*' (say) percent of arriving batches are accepted during busy periods and '*p*' (say) percent of arriving batches are accepted during the vacation periods. This control policy has been introduced for an $M^x/G/1$ queue with Bernoulli vacation model, where after completion the server may take a vacation or decided to stay in the system. Further, we generalized these results for a two stages queuing system, where the server provide two successive stages of service, first stage of service followed by a second stage of service to the arriving customers. We have provided extensive analysis for the queue size distributions at version epochs for both the models. Our results generalized the results of Servi [*IEEE Trans. Selected Area of Communication*, 4, 813-820(1986)].

The queueing system in which an arriving customer who finds the server busy leaves the system area and repeats his demand after some time are called retrial queue or queues with repeated attempts. Between trials a customer is said to be "orbit". These models arise frequently in the analysis of local area networks, telephone and other communication systems. In this direction we have investigated some operating characteristic for a two phase queueing system under classical retrial policy. Our investigation also includes orbit size distribution and joint distribution of the server state and number of customers in the retrial group. This model generalized both the classical $M/G/1$ retrial queue and the $M/G/1$ queue with second optional service.

Distribution Theory

We also focus on the development of the discrete analogue of the bivariate Pearsonian system of Curves. The expression for the bivariate distribution and a method to estimate the parameters of the distribution have been developed.

A suitable expression for the mean deviation of the discrete analogue of Pearsonian system of curves has been obtained. As is known the mean deviation is appropriately used when (a) it is desired to weight all deviations from the mean according to their size and (b) extreme deviations would influence standard deviations underlay. An expression for this important measure exists for the continuous Pearsonian system of curves. Also, in this paper a test has been made to check whether the expression for mean deviations follows the property of mean deviation for the discrete distributions as well. A computational technique with some illustrations has been provided too.

Database of R&D Institutions by Broad Research Area in the North East Region.

The main aim of the project is to prepare a directory of all the institutions in the North East region, those are having R&D activities. This includes those are having extramural \ intramural research projects. Further the directory will help in having an idea of the R&D activities of the region, since the details of the individual projects will be there. The lists of most of the institutions, Educational as well as other organizations, NOG's, Industries have been collected from different sources.

2.3 Life Sciences Division

A. Seri Bio-tech Unit :

Muga Silkworm

1) **Rearing performance:** The indoor rearing technique for rearing of muga silkworm has been confirmed for rearing of blue coloured muga worm, which is a variant of prevalent green colour muga worm. The blue colour variety has a better result in producing fecundity. The seeds were collected from Hahim area of Lower Assam area and reared in indoor condition for a total of 5 successive generations. The larval body weight, larval duration, effective rate of rearing, seed cocoon weight, fecundity, hatching% of both blue and prevalent green phenotypes were compared. It is observed that the fecundity and hatching % of blue muga are always higher than the prevalent green type irrespective of seasons and other factors.

2) **Studies on bacterial flacherie diseases:** Attempts were made to control *Pseudomonas aeruginosa* strain AC-3 infection in *Antheraea assama* larvae by some plant extracts under *in vivo* condition. By feeding different doses of bacterial cell suspension to *A. assama* larvae it was found that the dose of 0.05 O.D. (A_{600}) bacterial cell suspension was suitable for inducing bacterial infection for *in vivo* control experiment. Extracts of fruit of *Terminalia chebula*, clove of *Allium sativum* and leaf of *Ferula foetida* were used for control of the bacteria. Larvae were fed with either bacteria, or with plant extract, or with bacteria-plant extract sprayed leaves. It was found that the larvae that were fed with bacteria-*A. sativum* extract were better adapted to resist bacterial infection as compared to the other two plant extracts.

   Nine plant extracts and two essential oils were tested for their effectiveness in inhibiting the growth of *P. aeruginosa* strain AC-3 under *in vitro* condition. The plants were extracted by two different methods and screening of their antibacterial activity was conducted by agar cup assay method and disc diffusion test. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of plant extracts that inhibit the test strain were determined. *Ocimum basilicum* had the lowest MIC of 8 mg/ml and MBC of 12 mg/ml. Lemon grass oil had a MIC and MBC of 100 µl.

   Haemolymph of *A. assama* larvae and pupae were analyzed by SDS-PAGE for change in protein profile under the influence of *P. aeruginosa* strain AC-3 infection. A total of 8 proteins in the larvae and 9 proteins in the pupa were found to be constitutively synthesized in both the control and bacteria-challenged sets. Molecular weight of proteins within the range 17 - 66 kd were determined. The change in protein profile was similar in both the larva and pupa when they were treated with live *P. aeruginosa* cells. However, in the bacteria-challenged pupae additional two proteins (mw<17 kd) were detected which was absent in their larval counterparts.

3) **Studies on muga fibres:** Peculiar golden colour is the unique characteristic of muga silk, which brings tremendous market value in national and International level. Due to high demand for muga silk, a large-scale adulteration has been practiced by unscrupulous traders, which is highly detrimental to the servival of this industry. Experiment has been started to study the physico-chemical properties of this fibre in a systematic manner and to produce a database for quality control, blending, dyeing and detection of adulteration.

Eri Silkworm:

The germ plasm stock of eri silkworm has been maintained. It is tried to understand the genetic variabilities of colour morphs of eri silk worm population and also tried to separate the pure line of the same.

Food plant garden:

A garden of food plants of silkworm has been maintained at campus of IASST. The som plant (*Machilus bombycina*, King) for muga silkworm and castor (*Ricinus communis*) for eri silkworm has been planted.

B. Biochemistry and Medicinal Plants

The demand for medicinal plant is increasing day by day in both developing and developed countries due to the growling recognition of natural products being non narcotic, available at affordable prices and sometimes the only source of health care available to the poor.

Plants are known to play a vital role in the management of various diseases. Many ethnic people of the North Eastern region living in the rural as well as in the hilly areas solely depend upon the remedies prepared from plant sources. Many such remedies practiced by these people in the remote places have miraculous effect in curing some diseases, where modern system of treatment is helpless in such cases.

With the revival of interest in traditional system of medicine, it becomes imperative to investigate and study in depth the folklore remedies still in practice in the remote corners of our country. Over one and half million practitioners of the Indian system of medicine, use plant base remedies for preventive and curative applications. However, effective standardization of these herbal drugs is yet to be developed in order to meet the ever-increasing stringent International regulations, which are now being implemented in India and abroad. Therefore, we have undertaken to study some selected medicinal plants used by the traditional practitioners/ herbalists etc their efficacies and efforts have been made to standardize these herbal remedies.

Investigation, evaluation, standerdisation of herbal remedies

We have concentrated on the investigation, Evaluation, standardization and development of herbal medicine, which are most effectively used by the people in the villages / hilly areas in some parts of Assam. On the basis of the interactions with the local herbal/traditional practitioners in the form of a survey in some areas of Kamrup district, we have undertaken for scientific evaluation of the plant-base remedies used for liver ailments practiced/used by these people.

In this connection, we have collected three plants, used by the local people against liver ailments since a long time and have been processed for evaluation of the efficacy against liver ailments. The LD-50/ED-50 of two plants of the plants (SN-1 and UP-1) has been determined. The methanol extract of the plant has been undertaken for efficacy evaluation using various models in the laboratory. The extracts show quite positive results as expected and the work for further confirmation is in progress.

Artificial colours in food stuffs

Food is one of the primary needs of human being. Food gets its attraction by its taste, colour, texture and smell. Generally, people get attracted first for its beautiful colours and then the smell of the foodstuffs. For this reasons, the manufacturers have used various colours since the ancient time while preparing the foodstuffs.

But, in many cases artificial colours are used in the foodstuffs, which are harmful to health due to the quality and the quantity of the colour used.

The manufacturers of this region also use various artificial colours in the foodstuffs. No work to access these artificial colours used in the foodstuff have been done by any group. We have undertaken this work of qualitative and quantitative evaluation of permitted and non- permitted colours in the foodstuffs used by the people of the Kamrup district.

We have collected more than five hundred various food samples.It has been found after analysis that in 52% of the collected samples used above the permitted limit of colours as per the Prevention of Food Adulteration act 1954. The analysis show that the artificial colours used by the manufacturer/vendors are permitted colours.

The following colours are invariably used in the foodstuffs:-

Tartrazine, Sunset yellow, Ponceau 4R, Cazmoisine, Brilliant Blue FCF

It is found in our study that Tartrazine and Sunset yellow are the most common colours used invariably in many foodstuffs. It has been observed that the samples collected from rural areas contain higher colour concentrations than that of urban samples.

In rural area 71.66 % and in case of Urban samples 33.34% of the collected samples contain higher concentration of colours than prescribed one.

Nutritional value of food plants

Many diseases can be arrested, prevented and even cured by manipulating diet properly. The vegetables included in the daily menu of food in fact act as remedy in many diseases.

During this period we had undertaken the work of nutritional evaluation of eleven commonly used leafy vegetables of the N.E. Region. The vegetables have been evaluated for Moisture, protein, fibre, total soluble carbohydrate, ash and metallic contents present in the plants (Table-1).

Sl. No.	Name of plants	Moisture (g)	Protein (g)	Fibre (g)	Total soluble carbohydrate (g)	Ash (%)
1.	Drymaria cordata	91.5	4.3	24	0.04	11
2.	Paderrqu foetida	81.5	3.4	38	0.003	17
3.	Adhatoda vesica	75.2	2.5	18	0.04	10
4.	Phlaganthus thyrriflura	74.5	2.4	22	0.07	12
5.	Hydrocotyl jovonica	68.4	2.3	30	0.055	20
6.	Hydrocotyl asiatica	68.5	205	26	0.055	19
7.	Oxalis corniculata	71.3	1.1	30	0.058	14
8.	Alternanthera sessiles	87.6	2.2	16	0.053	8
9.	Leucas lavendulaefolia	92.2	1.7	12	0.023	16
10.	Conandrum sativum L	90.4	0.8	28	0.072	15
11.	Rumex vesicarius	9.4	1.6	24	0.0345	12

Work is in progress for estimation of Vitamins and correlating the nutritional value, metallic contents etc. with the curing of certain diseases.

Anti-inflammatory & analgesic activities evaluation

A potent Medicinal plant *Clerodendron Colebrookianum* Walp was undertaken for analysis for its anti-inflammatory and analgesic activities. The results obtained from proximate analysis and inorganic metal ion content determination along with the extractive values *of the plant Clerodendron Colebrookianum* provide certain parameters. These can serve as markers in finger print analysis in identification of the drugs in whole or when incorporated in poly-herbal formulations. It has also been observed that the plant samples collected in two different seasons vary in their phytocontents, which is evident from the results. The methanol extract of the plant collected in the month of January and in June was studied separately for preliminary evaluation of pharmacological properties. The plant extract of January collection shows more significant results than that of the extract of the plant collected in the June month of the year.

Most of the metal ions in the January collection of the plant samples are found to be higher in comparison to that of the plants collected in the June month of the year. The presence of higher concentration of Magnesium and Iron is significant and requires further work on this aspect of the plant to explore the correlation with the use of this plant in various diseases related to blood pressure and heart by the ethnic people of this region. The work in this aspect is in progress.

This study establishes the anti-inflammatory, analgesic effects of the extract of *C. colebrookianum* & its ability to prolong Phenobarbitone induced sleeping time. The methanol extract of the plant *C. colebrookianum* showed significant anti-inflammatory activities against Carrageenin induced rat paw odema. The carrageenin induced inflammatory process is believed to be biphasic. The initial phase seen at the first hr is attributed to the release of histamine and serotonin. The second accelerating phase of swelling is due to the release of prostaglandin, bradykinin and lysozyme. It has been reported that second phase of oedema is sensitive to both clinically useful steroidal and non-steroidal anti-inflammatory agent. The anti-inflammatory activity exerted by the methanol extract (MLE) of C. *colebrookianum* suggests that they could have acted by affecting kinnin, prostaglandin, bradykinin and lysozyme synthesis.

Other important results obtained in the present work were the central & peripheral analgesic activities demonstrated by the inhibitory action on the acetic acid induced writhing, hot & cold water test. The experiment confirms the analgesic activity of the methanol extract of the leaves of this plant. The strong anti-inflammatory and analgesic activity of the methanol extract of the plant prove that the presence of terpenes, sterols, glycosides and other polar bioactive components may be responsible for these activities. Further investigations on this are in progress.

Role of natural antioxidants in cardiovascular diseases

Antioxidants are the defense mechanism of the body. Healthy cells can scavenge free radicals effectively by means of the antioxidants. In general, there is a dynamic relationship between reactive oxygen species (ROS) and antioxidants in the human body. Deficiency of antioxidants might promote coronary heart disease through accumulation of oxidized low density lipoprotein-cholesterol (LDL-C) in macrophages, promotion of endothelial dysfunctions, smooth muscle cell proliferation, thrombosis and plaque rupture. Consumption of natural products is inversely correlated with heart disease rate. A sufficient supply with antioxidants from diet might help to prevent or delay the occurrence of pathological changes associated with heart diseases.

We conducted one laboratory experiment to observe the antioxidant activity of a natural cardioprotective agent and found that oral administration of crude extract of *Clerodendron colebrookianum*

Walp (CC), a perennial shrub of N E region of India, enhances the antioxidant activity in experimental rat plasma as evidenced by lowering of thiobarbituric acid reactive substances (TBARS). Moreover the plasma lipid profile like total cholesterol (TC), triglycerides (TG), phospholipid (PL), low-density lipoprotein-cholesterol (LDL-C), very low-density lipoprotein-cholesterol (VLDL-C), lowered significantly after oral administration of crude extract of CC. Significant increase in cardioprotective lipid i.e. HDL-C after administration of CC extract was another interesting findings of this experiments. Regarding the hypolipidemic mechanism of action it can be concluded that the cholesterol lowering effect resulted not from the cholesterol synthesis but from increased excretion of cholesterol from the gut. Lowering of TBARS level indicated that CC could prevent hypercholesterolemic disease through reducing lipid peroxidation. The results were compared with a standard drug lovastatin. The results of this study indicate that CC may be a useful therapy for hypercholesterolemia through reducing oxidative stress and cholesterol level.

C. Biofertilizer unit

Biofertilizer unit of life Sciences Division has, specially, been working with biodiversity of prospecting PGPRs of NE Region, particularly of Assam for quality production of bioinoculants of N_2 fixers, P-solubilizers and disease and pest reducers to cope up with the recent trends of sustainable agriculture with biofertilizer, biopepticides and organic farming, which are both ecofriendly and cost effective.

Six strains of Rhizobia from 6 common pulses (Blackgram, Greengram, Arhar, Pea, Lathyrus and Groundnut) of 7 districts(Kamrup, Nalbari, Nagaon, Marigaon, Sonitpur, Lakhimpur, Darrang) of Assam have already been evaluated in farmers field with two test crops viz. Blackgram and Greengram under a DBT, GOI sponsored project and screened and found effective for their broad host infectivity, acid tolerance,nitrogenase activity and antibiotic resistance. These strains have been preserved for production of Biofertilizer to cater the need of the farmers particularly of pulse growers of the region.

Further *AM* fungi of the NE Region have been studied for phosphate solubilization and mobilization under a 2nd DBT, GOI., sponsored project to isolate, identify and evaluate their symbiotic properties in dual inoculation with the above native Rhizobial strain and to estimate reduction of chemical fertilizer in fertilizer schedule for pulse production due to dual inoculation.

Studies on effective biocontrol measures of disease like Red-rot of sugarcane has already been achieved with *Trichoderma harzianum, Trichoderma viride* and *Bacillus subtilis* under a project sponsored by ASTEC, Govt. of Assam while *Pseudomonas* mediated induced resistance and biocontrol of blast of rice caused by *Pyricularia oryzae* is continuing.

Microbial diversity of biosphere Reserves of Dibru-Saikhowa and Manas have been initiated under a project, sponsored by the Ministry of Environment and Forest, Govt. of India, New Delhi. Besides, rehabilitation of degraded soil of upper Assam due to excessive mining of coal is also initiated with the financial assistance from Ministry of Environment and Forest, Govt. of India, New Delhi.

2.4 Resource Management and Environment Division

Exploration of biodiversity

Exploration of fish, amphibia and snake in three states (Assam, Arunachal Pradesh and Nagaland) of NE region is in progress. Important contributions have been made towards exploration and eco-biological study of various faunastic compositions.

During the year findings on Snake fauna of Nagaland has been published. The report includes 21 (Twenty one) new records for the state of Nagaland (Ao etal 2004). Six species of frogs that are new record for India have been included in the global database. (www.Globalamphibians.com) published by Conservation International, Washington DC, USA. These are:

Megophrys glandulosa (Boulenger,1850)	Nagaland
Megophrys wuliangshanensis (Ye & Fei, 1995)	Nagaland
Amolops viridimaculatus (Jiang,1983)	Nagaland
Rana humeralis (Boulenger,1887)	Nagaland and Assam
Rhacophorus gongshanensis (Yang&Su, 1984)	Nagaland
Rhacophorus translineatus (Wu,1977)	Arunachal Pradesh

Habitat ecology and developmental biology

Study of Wetland Biota

Wetland fauna constitute a major percentage of Indian fauna. Conservation of wetland and systematic study of wetland biota has been started in our laboratory. Wetlands comprise 1.12 hectares of the total land area of Assam. Beel fisheries contribute 12.5% of the total fishery resources of Assam. The present study has been taken up in 33 component beels of Hajo area of Kamrup district of Assam. The beel area encompasses a total area of about 545 hectares. The beels are connected to the river Brahmaputra with two tributaries namely Lakhaitara and Boilla. Ichthyofaunal diversity, Annual fish catch data, ecobiological study and conservation status of the indigenous fish species collected so far has been completed.

A total of 50 species has been identified and their conservation status ascertained. Fishes belonging to 20 different families inhabit these water bodies. Annual fish catch varies from 31 ton to 108 ton in five major landing sites.

All the gears used for catching fishes in these wetlands have been recorded. Different gears are used for catching fishes of various size groups. 13(thirteen different types of gears have been recorded from these wetlands. Fish captured by these gears have been grouped under three size groups. (Above 20 cm., below 20 cm., and below 12 cm.) .

A total of 500 fishermen families have been interviewed for assessing socio-economic status of the fisherman community. Depending on season monthly income per family varies from Rs.400.00 Rs.3000.00. Alternative mode of income generation is from Poultry farming, daily wage labourer, selling of gears and agriculture. Eighty percent children of these families are literate and about 20 percent are illiterate.

Thorough monitoring of habitat ecology of these beel have been done. Detailed study on developmental biology of selected species is in progress. (Both Amphibia and Fish)

Environmental Chemistry

A. Biodegradation and Waste Management

Research related to industrial pollution and their abatement is being conducted. Lime sludge waste and their possible utilisation in fisheries have been investigated.

Physico-chemical characterization of water and soil samples of Govt., Public and Private fish pond

along with beels of Kamrup, Nalbari, Barpeta, Darrang, Sonitpur, Lakshimpur, Goalpara, Morigaon, Nagaon, Jorhat and Sibsagar districts of Assam has been analyzed.

Physico-chemical parameters viz. pH, Conductivity, Water holding capacity, Organic carbon content, Available Phosphorus, Chloride, Calcium carbonate and heavy metals - Pb, Zn, Mn, Cu etc. of lime sludge samples collected from Hindustan Paper Mill located at Jagiroad have been analyzed.

Experimental findings have revealed that Lime sludge increases the pH, alkalinity and hardness of water thereby increasing the population of plankton. Increase in total alkalinity and total hardness influence the growth of phytoplanktonic groups thereby increasing the zooplankton population. These are important food items of planktonivorous fishes.

The beneficial effect of application of lime sludge waste on the physico - chemical parameters of water is evident from the results obtained in the study. Lime sludge waste may be used as a suitable substitute for liming material in fish farming, which is being produced in large quantity by the paper mill and can be obtained at low cost.

B. Hydrocarbons and Heavy Metals

Hydrocarbons:

Production, collection and transport of crude oil in the oil field areas, results in contamination of soil with petroleum hydrocarbons during spillage due to accidental release or poor housekeeping. Effluents from oil fields and emissions from gas flaring practices in these fields are likely to introduce a large number of hydrocarbons into soil.. There are several toxic components in petroleum waste including alkyl compounds, olefin hydrocarbons and aromatic hydrocarbons. Among the major pollutants are the polycyclic aromatic hydrocarbons (PAHs). Polycyclic aromatic hydrocarbons (PAHs) are resistant to degradation in the natural environment due to the conjugated system of multiple benzene rings. It is important to know the type of PAHs in such contaminated soil and their degradation history, in particular their entry into the food chain.

In our study, we are investigating the concentration levels, the distribution and the possible origin of PAHs found in recent soil surrounding the group gathering stations (GGS) of the oil fields in the Sibsagar District of Assam, documenting various environmental factors such as soil texture, pH, presence of heavy metals in the soil on their degradation and therefore, the possibility of reclaiming the soil for safe agriculture, determining whether the PAHs in the soil have been entering into fruits, vegetables and other agriculture crops such as paddy rice growing in the oil fields, and evaluating the role of various agricultural crops on accelerating the degradation of the PAHs in soil and thus aiding the reclamation process.

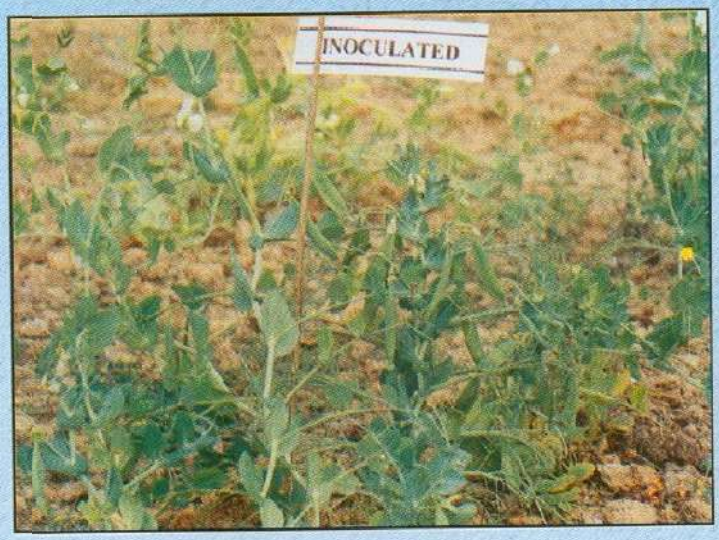
Heavy metals:

Heavy metals today have a great ecological significance due to their toxicity and accumulative behaviors. The determination of the concentration levels of heavy metals in the soil samples as well as the elucidation of the chemical forms in which they appear in the soil is a prime target in current environmental research, due to the close relationship between the toxicity and the various chemical forms. The environmental behaviour and toxicity of an element can only be understood in terms of its actual molecular form, which has led to the introduction of the term "speciation" used to describe the distribution of the metals in various chemical forms.

Heavy metals like Zn, Pb and Cd occur in the environment simultaneously and there are several diseases associated with contamination from trace metals like Cd, Pb, Ni, Cu, Mn, and Fe, out of which Pb,

Rana humeralis, a new record for India - Collected from Hajo, Kamrup

Soil microflora isolated from Dibru-Saikhowa RF



Experimental production of pulses at IASST

Large scale fish catching from 'Beels' of Assam

Workshop on Computational Information Processing, Mathematical Sciences Division, IASST

Prof. Gautam Barua, Director, IIT Guwahati delivering the Inaugural speech

Prof. K.M. Pathak, Chairman, Council of IASST delivering the Presidential address. On the dias (from left): Dr. D.P. Mukherjee, Prof. J. Medhi, Shri D.N. Saikia, Dr. A.K. Dey and Prof. N.N. Dass

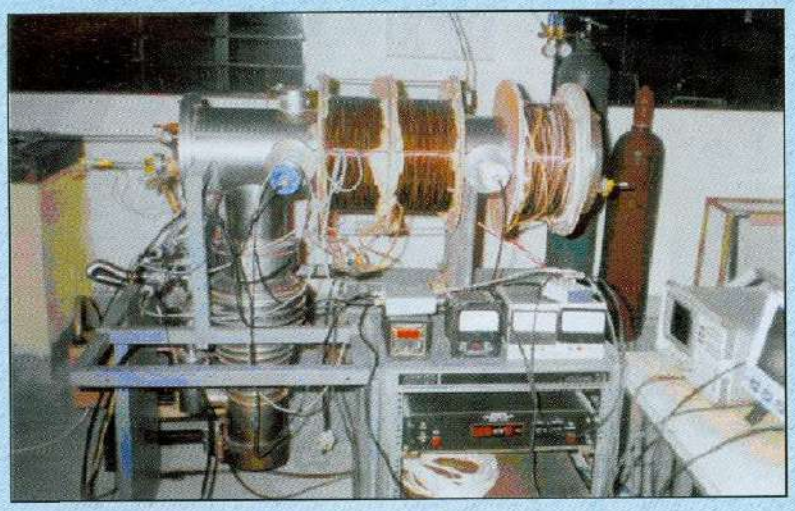
Dr. D.P. Mukherjee, ISI, Kolkata delivering his lecture

Dr. A.K. Dey, ISI, Kolkata interacting with the participants

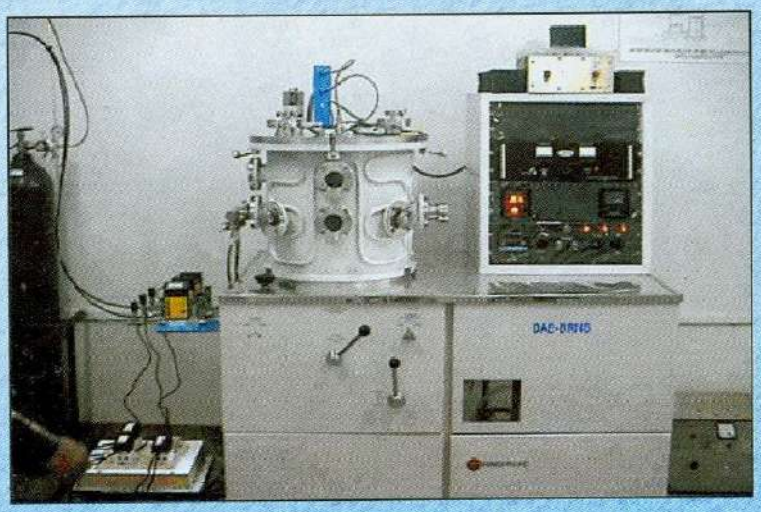
Research setup & results of the Plasma Physics Group, Material Sciences Division

View of dc discharge in cylindrical magnetron device

Sputtered commercial aluminium target in Planar RF Magnetron discharge



Experimental setup of dc cylindrical magnetron device



Radio frequency planar magnetron sputtering unit

Prof. K. M. Pathak welcoming Lt. Col. (Retd.) Ajai Singh, His Excellency, the Governor of Assam to IASST

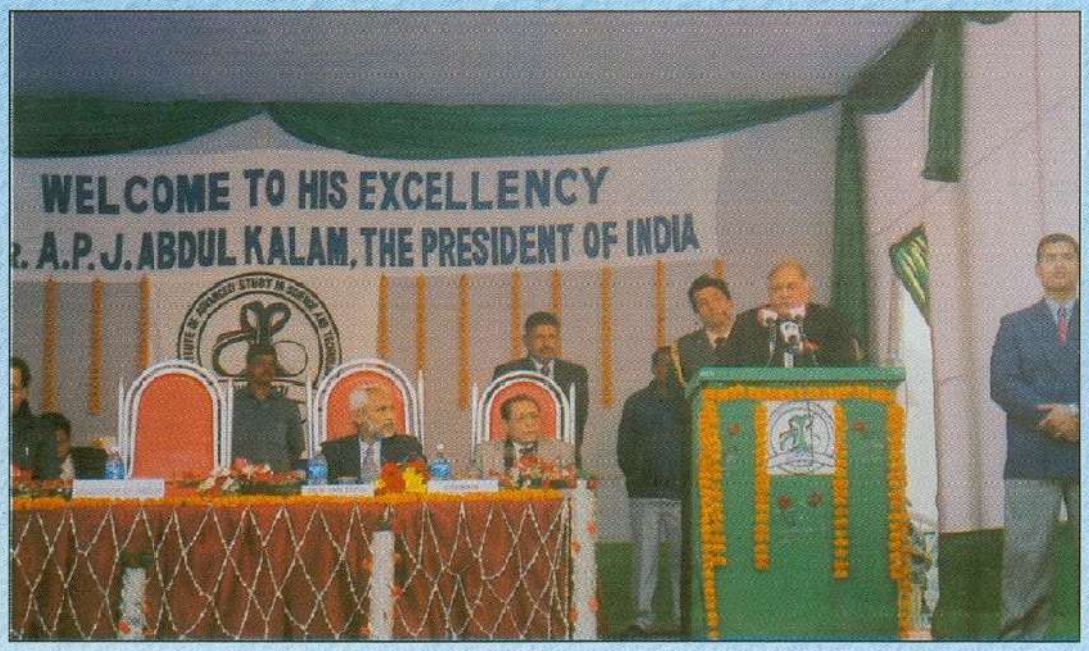
Prof. Joyanti Chutia showing the plasma laboratory to Shri Tarun Gogoi, Chief Minister, Assam

Shri Tarun Gogoi, Chief Minister, Assam interacting with scientists and distinguished guests at IASST

Views of the Audience

A view of Academic building of IASST

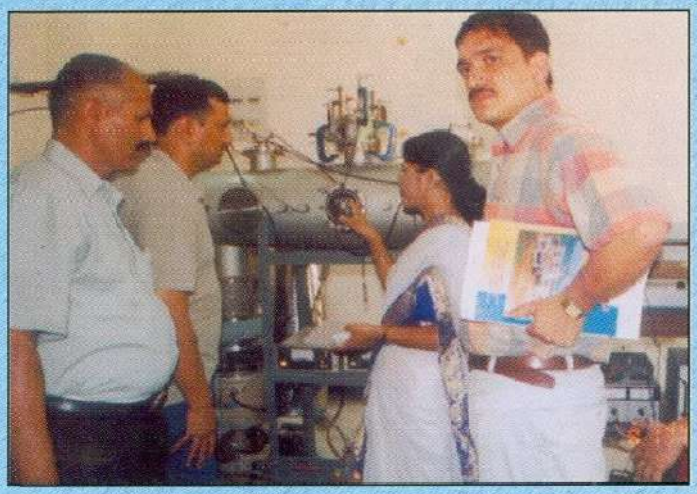
Prof N.N. Dass felicitating Shri Tarun Gogoi, Chief Minister, Assam



Lt Col. (Retd.) Ajai Singh, Governor, Assam delivering his speech

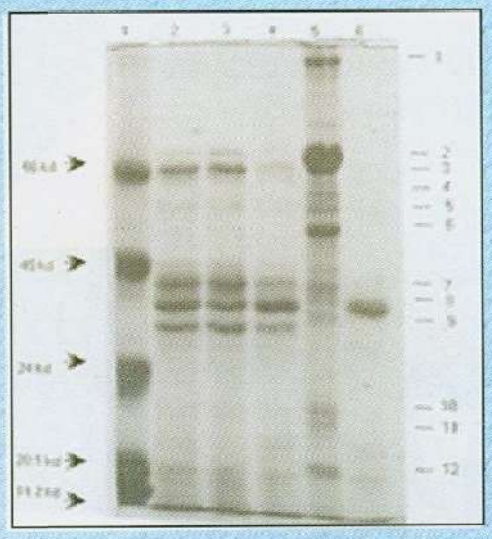
Scientists of IASST interacting with the Chief Minister

Some moments from the DST Expert Committee's visit to IASST



Oil Flaring in Rudrasagar Oil field

Contamination due to leakage and seepage of crude oil at Rudrasagar



Partially purified bacterial protein of muga silkworm

5th instar blue muga larva

Flacheri infected muga silkworm

Cd and Ni were found to be the most dangerous from epidemiological point of view. In general, most of the toxic manifestations of metals depend on their synergistic and antagonistic properties. Depending on the degree of contamination of the site and the heavy metals investigated, high metal concentration is normally associated to iron, manganese, organic carbon, calcium, sulphide and small particles.

The bio-availability of heavy metals in sediments is governed by numerous factors like precipitation, adsorption onto the organic and inorganic sediment fractions, etc. Therefore, it is necessary to study the mechanism of heavy metal adsorption and adsorption capacity of the soil. In the polluted areas, concentrations of the trace metals in the surface layer are usually higher than in the deeper layers of sediment. Several factors are responsible for the accumulation of a particular metal in the soil samples, viz., valency of the metal, chemical forms of the metal in the pore water, association characteristics, anions, pH, time of exposure, rate of sedimentation, temperature, site of sampling, etc. Again the accumulation of heavy metals on the soil samples could be due to precipitation of heavy metals as carbonates, oxides and hydroxide, which occurs at high pH. The precipitates settle down on to the soils. Sources of contamination may be through polluted tributaries, wastewater inflows, airborne inputs, rainfall, dust precipitation, industrial sludge, and transport activities. Trace metals present in the soil system are among the several possible causes of biological stress, but the effects of metals in the environmental levels are difficult to demonstrate.

In the study conducted at the IASST, soil samples were collected near the two GGSs of Lakowa oil field and two GGSs of Rudrasagar oil field at three different depths (0-15,15-30 and 30-45 cms.) during June 2004 and January 2005 and were analysed for physico-chemical parameters, viz., pH, Electrical conductivity, water holding capacity, soil texture, organic matter, phosphate, sulphate, chloride, sodium and potassium. The major metals detected were Zn, Ni, Cd, Cu, Cr. Pb, Mn, Hg, Fe, Co, Al, As and Se.The preliminary study reveals that the soil is polluted to various degrees by oil field activities. The results will help in undertaking further investigations for remediation of the contaminated soil.

Environmental Biotechnology Unit

Crude oil seepage in and around oil field is a source of pollution to land and water. Due to oil seepage, heavy metals are accumulated in the land causing degradation of the soil and water in its vicinity. The most promising remedial measure to protect the environment from hydrocarbon and heavy metal pollution is bio-remediation. Phyto-remediation and microbial degradation of petroleum polluted soil are potential tools for heavy metal remediation and hydrocarbon degradation. Study is being carried out in the polluted oil fields of upper Assam by employing these methods.

For collection of potential herbs for phyto-remediation, different localities of Digboi and Guwahati were surveyed. Potential herbs were collected and identified. The identified herbs are then introduced to different concentration of Crude Oil to see their resistance and degradation potential. The root zone activity of the potential herbs was studied and oil-degrading microbes were isolated. Herbs that are showing good results are Soyabean, Sunflower, Mustard, Citronella, Lemongrass, Mimosa and certain species of Poaceae family. Three species belonging to the genus and one species of the genus Auxonopous has been introduced in the experimental field provided by the OIL authorities. Two microbes have been isolated which can survive in synthetic media supplemented with liquid chloroform as the sole carbon source. Identification of the microbes is being confirmed.

Environmental Information System Node on ENVIRONMENT and TEA GARDEN

Database construction on the website: An extensive database has been generated in the website www.nei-envis.org covering all the aspects of 'The Tea industry' for retrieval and dissemination of information.

The website has links to:

- General articles on tea
- All the Tea Boards in the world
- All the Tea Associations in the world
- Al the Tea Institutes
- All about tea production and area under cultivation
- Detailed information regarding pesticides used in the tea gardens
- Permitted and banned tea pesticides
- Status of organic tea, methods, procedures etc.
- News clippings
- Links to various online news, articles, published papers etc

Besides maintaining the web site quarterly news letters are being published. The first issue was published in October, 2002. Since then 7 (seven) news letters have appeared.

The newsletter is circulated to all the ENVIS Centres and Nodes in addition to all the concerned Govt. Departments and agencies. The newsletter is also circulated free of cost to all the related institutes, libraries in North East India as well as in the mainland India; and also to the interested individuals on request.

Various organizations related to tea industry in other states have made available to us their findings and these will be published in the news letter in the forthcoming issues

An online tea dictionary is under preparation with the help of experts in the field. The dictionary will be available in the website very shortly with search facility. The dictionary is also being published in parts in the ENVIS Newsletter.

2.5 Library and Information Centre

The IASST Library and Information Centre collection comprises of documents in the field of basic sciences especially Plasma Physics, Polymer Science, Computer Science and Technology, Mathematics and Statistics, Medicinal Plants, Biotechnology, Sericulture, Bioprospecting, Biofertilizers, Virology, Immunology, Agriculture, Microbiology, Pathology, Genetics, Physiology, and Environmental Sciences.

The Library added 69 books into its stock during the year April 2004- March 2005. It subscribed for 59 scientific journals (Indian & Foreign), 7 newspapers. Out of the 59 journals some are online accessibility. Besides this, Annual Report, News letter, Bulletin, Progress Report, etc. are received from different institutions. Present collection of the Library is Books-7125, Current Journals (Both Indian & Foreign)-59, Bound Periodicals-115, Thesis & Dissertation-235, Research Papers-45, Bulletin, Newsletters, and Annual Report-1200.

Library extends services like Current Awareness Service (CAS), Selective Dissemination of Information Service (SDI), Indexing, Reference & Information Service, Referral Service, Circulation Service, Inter Library Lean (ILL), and Internet Service to the users. The Library also provides reading and photocopy facilities to the outside readers.

The computerization of the Library is going on through SOUL Library Management Software.

3. Research Publications (2004-05)

1. *Sheath characteristics in multicomponent plasma with negative ions*
   H. Bailung, D. Boruah, A. R. Pal and Joyanti Chutia
   PRAMANA- journal of physics 62(5), 1091-1098 (2004)

2. *Effect of a slow ion beam on ion-acoustic wave*
   Y. Nakamura, H. Bailung and R. Ichiki
   Physics of plasmas 11(8), 3795 - 3800 (2004)

3. *Observation of ion-acoustic shock wave undergoing Landau damping*
   Y. Nakamura, H. Bailung and R. Ichiki
   Physics of plasmas 11(8), 3925 - 3931 (2004)

4. *Observation of instability in presence of ExB flow in a direct current cylindrical magnetron discharge plasma*
   A. R. Pal, Joyanti Chutia and H. Bailung
   Physics of plasmas 11(10), 4917-4924 (2004)

5. *Characteristics of presheath in multicomponent plasma with negative ions*
   H. Bailung, A. R Pal, D. Boruah and Joyanti Chutia
   Physics Letts. A 333, 102 - 109 (2004)

6. *Plasma density enhancement by thermionic emission in a dc post magnetron Plasma system*
   N. C. Adhikay, A. R. Pal, H. Bailung and Joyanti Chutia
   Plasma Surface Engineering (BARC, 2004) edited A. K. Das

7. *Sheath phenomena in RF plasma*
   B. K. Sarma, D. Boruah, Joyanti Chutia and H. Bailung
   Plasma Surface Engineering (BARC, 2004) edited A. K. Das .

8. *On sensitivity of eigenvalues and eigendecompositions of matrices*
   R. Alam and S. Bora
   Linear Algebra and its Applications 396, 273-301(2005).

9. *On some properties of I-convergence*
   T. Salat, B.C.Tripathy and M.Ziman
   Tatra Mountain Mathematics Publication 28, 2789-286(2004).

10. *Generalized difference paranormed statistically convergent sequences defined by Orlicz functions in a locally convex space*
    B.C.Tripathy
    Soochow Journal of Mathematics 30(4), 431-446 (2004).

11. *On generalized difference paranormed statistically convergent sequences*
    B.C.Tripathy
    Indian Journal of Pure & Applied Mathematics 35(5), 655-663 (2004).

12. *On a new class of sequences*
B.C.Tripathy
Demonstratio Mathematica 37(3), 377-381(2004)

13. *The sequence space on seminormed spaces*
B.C.Tripathy , Y. Altin and Mikail Et
Applied Mathematics and Computations 154, 423-430(2004).

14. *On a class of generalized Lacunary difference sequences defined by Orlicz functions*
B.C.Tripathy and Sabita Mahanta
Acta Mathematica Applicatae Sinica 20(2), 231-238(2004).

15. *On a class of vector valued sequence spaces associated with multiplier sequences*
B.C. Tripathy and S. Mahanta
Acta Mathematica Applicatae Sinica 20(3), 487-494 (2004).

16. *On some new seminormed sequence spaces defined by Orlicz functions*
M. Isiki, Mikail Et and B.C.Tripathy
Thai Journal of Mathematics 2(1), 141-149(2004)

17. *Statistically null vector valued paranormed sequence spaces associated with multiplier sequences*
B.C.Tripathy and B. Sarma
International Journal of Mathematical Science 3(2) (2004) 497-506.

18. *On some new difference sequence spaces*
A. Esi and B. C. Tripathy
Commun. Fac. Sci. Univ. Ank. Series A1, 53 (2), 57-66 (2004)

19. *Dynamics and the characteristics behaviour of soliton propagation in dusty plasmas*
G.C. Das, K. Devi, J. Sarma and N. Devi
Indian Journal of Pure & Applied Physics, 42, 265-274 (2004).

20. *Nonlinear waves to study the evolution of collapsed soliton and its radiation*
G. C. Das, S. Sen, K. Devi and N. Devi
Planetary & Space Science, 52, 581-586(2004).

21. *Characteristics behaviour of dust grains in a magnetized plasmas sheath*
P. Kalita and G.C. Das
Journal of Physics-D, 37, 702-70 (2004)

22. *Analysis of the M^x/G/1 queue with a random setup time*
G. Choudhury and A. Krishnamoorthy,
Stochastic Analysis and Applications, 22, 739-753, (2004).

23. *On the M/G/1 queue with Bernoulli feedback and exceptional first vacation*
G. Choudhury
International Journal of Mathematical Sciences, 3, 417-429, (2004)

24. *An M^x/G/1 queue with Bernoulli vacation schedule under Restricted Admissibility policy*
K.C. Madan and G. Choudhury
Sankhyâ, 66, 175-193, (2004)

25. *Analysis of the M/G/1 queue with an additional service channel A simple alternative approach*
G. Choudhury and M.Paul
Journal of Indian Statistical Association, 42, 63-74, (2004).

26. *Steady state analysis of an M/G/1 queue with repeated attempts and two phase service*
J.R. Artelejo and G. Choudhury
Quality Technology and Quantitative Management,1,189-199, (2004).

27. *A batch arrival queueing system with second optional service and vacation time*
G. Choudhury and M. Paul
Statistical Thinking: Method and Applications (Ed. D.C. Nath and K.K. Das,G.U.), 239-244, (2004).

28. *Steady state analysis of an M^x/(G1,G2)/1 queue with restricted admissibility of arriving batches and modified Bernoulli schedule vacation based on a single vacation policy*
K. C. Madan and G. Choudhury
Journal of Probability and Statistical Sciences, 2, 167-185, (2004).

29. *A batch arrival queue with an additional service channel under N-policy*
G. Choudhury and M. Paul
Applied Mathematics and Computation, 156, 115-130, (2004).

30. *On a batch arrival Poisson queue under threshold policy with a grand vacation*
G. Choudhury, A Borthakur and S. Kalita
International Journal of Information and Management Sciences, 15(3), 13-27, (2004).

31. *A two phase batch arrival queueing model with Bernoulli schedule*
G. Choudhury and M. Paul
Revista de Investigacion Operacional , 25, 217-228, (2004).

32. *Bivariate (Discrete) Pearsonian Systems of curves*
Lipi B. Mahanta & D.C.Nath
Contributions to Applied and Mathematical Statistics. *vol.* 2; 22-31(2004).

33. *Mean Deviation for Discrete Pearsonian System of Curves and its computational techniques*
Lipi B. Mahanta & D.C.Nath
Statistical thinking: Methods and Applications, Gauhati University, 80-87(2004).

34. *A comparative study of Length-weight relationship of Indian minor carp*
R.N. Bhuyan, Sabitry Bordoloi and A. Dutta
Labeo gonius (Hamilton Buchanan) at low and mid altitude region, *Aquacult*, Vol 5(1)(2004) 29-35

35. *Notes on a Collection of Snakes from Nagaland, Northeast India, with 19 New Records for this state*
J.M.Ao,Patrick David, Sabitry Bordoloi and Annemarie Ohler
Russian Journal of Herpetology, 11(2) (2004) 155-162.

36. *Amphibian fauna of Nagaland, India: Species and habitat*
M. Ao and Sabitry Bordoloi
Froglog. No.62. DAPTF . U.K,2004

37. *Altitudinal distribution pattern of amphibian fauna of Arunachal Pradesh with special reference to Dehang Debang Biosphere Reserve, Arunachal pradesh*
M.M. Borah and Sabitry Bordoloi,
India Himalayan biosphere reserves.Vol.5.No.1&2.pp.2003 published in 2004 , 51-55.

38. *Impact of oil exploration on physico-chemical properties of rice field soil at Moran oil field of upper Assam(India)*
S. Deka, A. Devi, H.P. Barthakur and L.C. Kagti
Indian J. of environmental protection (IJEP)24(4):273-276. 2004

39. *Physico-chemical characteristics of lime sludge waste of paper mill and its impact on growth and production of rice*
U.J. Medhi, A.K.Talukdar and S.Deka
Industrial Pollution Control 21(1) 51-58. 2005

40. *Toxin Produced by Collectotrichum falcatum Causing Red Rot of Sugarcane*
R. Saikia, P. Azad and D. K. Arora
Mycobiology, 32(4), 149-154 2004

41. *Dual Inoculation of Native Rhizobium spp. And Arbuscular Mycorrhizal Fungi: An Impact Study for Enhancement of Pulse Production*
Bula Choudhury and Padum Azad
Mycobiology, 32(4), 173-178. 2004

42. *Purification and partial characterization of toxin produced by Colletotrichum capsici that cause Ripe Rot in Chili*
R. Saikia, P. Azad and D. K. Arora
Mycol. Pl. Pathol. 34(2), 421-424 (2004).

43. *Screening of native Rhizobium strains for sustainable crop production in pulse-rice cropping system.*
P. Azad
Biotechnology in sustainable and organic farming
Shree Publishers and distributors, 2004.

44. *Thermal Behavior of Some Homogeneously Polymethyl Methacrylate Grafted High α-Cellulose Products*
Pradeep Das, C.N. Saikia and N.N. Dass,
Journal of Applied Polymer Science, 93(6), 3471-3478 (2004).

4. Research Papers Presented in Conferences/Seminars

1. *Observation of instability in a cylindrical post magnetron discharge plasma*
   Joyanti Chutia, A. R. Pal and H. Bailung
   "European Physical Society Conference" held at Imperial College, London during 28 June - 2nd July, 2004

2. *Evaluation of certain lemongrass [Cymbopogon flexuous (Steudi) Watsi] accessions for their higher yield of oil and citral with seasonal variation under North East India agroclimatic conditions*
   A. Sarma, T.C. Sarma and A.K. Handique.
   National seminar on "Medicinal plant in North Eastern Region" organised by Govt Ayurvedic College, Guwahati-14, Assam during 7th -10th Oct, 2004.

3. *Effect of pulpand paper mill effluent on Seed Germination and Seeding growth of pea (Pisum Sativum), mustard (Brassica migra) and rice (Oryza sativa)*
   U.J. Medhi, A.K. Talukdar and S. Deka,
   National seminar on "New Horizons in Environmental Sciences and Engineering in India" at Bangalore University during 17th - 19th Nov. 2004

4. *Lime Sludge Waste of paper mill as an alternative source of liming material for fish culture*
   Shabeena Yasmin and S. Deka
   "National seminar on New Horizons in Environmental Sciences and Engineering in India" at Bangalore University during 17th - 19th Nov 2004

5. *Herbital Characterizatics and distribution of amphibi on fauna in North East India*
   S.C. Bordoloi
   UGC-CSIR sponsored "National Conference on Biodiversity-its environmental impact and associated diseases in India" held at P.D. Womens College, Jalpaiguri, W.B.

6. *Haemolymph Protein Pattern in Larval Development stages of Antheraea assama ww. in relation to primary Host plants*
   D. Devi and D.K. Sharma
   First National Seminar on "Muga silkworm Biochemistry, Molecular Biology and Biotechnology to improve silk production" organized by Regional Research Laboratory, Jorhat on November 18th -19th, 2004.

7. *Ionic Conductivities of the acid salts of Poly(2-vinyl pyridin) in Solid State*
   N. Sen Sarma, P. Chetri and N.N. Dass
   50th Annual Technical Session of Assam Science Society and National Conference on "Current Trends of Research and Technology" organized by Gauhati University in January 2005.

8. *Screening of Hyper-Accumulator Plants for Crude Oil contaminated Soil*
   A. Sarma, A Das, B. Deuri and S.C. Bordoloi
   National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005

9. *Lemongrass Inflorescence Oil: A source of potential insect feeding deterrent compound*
A.Sarma, K.Kakati, P.R. Bhattacharyya, T.C. Sarma and A.K. Handique
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005

10. *Contamination of soil by oil drilling activities in upper Assam. A case study*
Arundhuti Devi & KG Bhattacharyya
National Seminar on "Pollution in Urban Industrial Environment"(nspuie-2004) RRL, Bhubaneswar, December 2-3, 2004.

11. *Contamination of water bodies by acid mine drainage in the makum coalfield of assam, india: arsenic, lead, mercury, and tin and selenium infiltration*
Kabita Patowary, Hitesh Das, Arundhuti Devi and Krishna G Bhattacharyya
National Seminar on "Pollution in Urban Industrial Environment" (nspuie-2004) RRL, Bhubaneswar, December 2-3, 2004.

12. *Amphibian fauna of Loktak lake, Manipur - A Ramsar site of India*
Banita Ningombam and Sabitry Bordoloi
National conference on "Current trends of Research in Science and Technology" held at Gauhati University on January 28-29,2005

13. *Probability of Use of Lime Sludge Waste of Paper Mill in Fisheries in Assam*
Shabeena Yasmin, Jagannath Bhuyan and S. Deka
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005.

14. *Inoculated Bacterial Degradation Study of Guwahati Refinery sludge*
P.K. Sarma, S. Deka and K.G. Bhattacharyya
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005 .

15. *Physico-chemical Characteristics of Water and Soil Samples of Some Selected Fisheries of Lakhimpur District of Assam*
Jagannath Bhuyan and S. Deka
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005.

16. *Physico-chemical Characteristics of Paper Mill Effluent and Its Impact on Growth and Production of Rice, Mustered and Pea*
U.J. Medhi, A.K. Talukder and S. Deka
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005.

17. *Response of Pea (Pisum Sativum Var. Hortense) to duel Incoculation with Arbuscular Mycorrhiza and Rhizobium*
Bula Choudhury and Padum Azad
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005

18. *Microbial Degumming of Decorticated Ramie (Boehmeria Nivea (L) Gaud) and its fibre characteristics*
Rubul Saikia, S. Bordoloi, P. Boruah and R. Samanta,
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005

19. *Contribution of Earthworm in Soil Nutrient enrichment under Different residue treatment*
Kumud Das, S. Deb and A. Arunachalam
National conference on "Current Trends of Research in Science and Technology" held at Gauhati University on January 28-29, 2005

20. *Impact of arbuscular mycorrhizal fungi on production blackgram and green gram in assam*
Bula Choudhury and Padum azad
National Seminar on "Upgradation of production technology for quality production of biological inputs in agriculture" organised by Regional Centre of organic farming held at Nagpur and College of Agricultre on March 3-4, 2005.

21. *Observation of Instabilities in a cylindrical Post Magnetron Plasma Discharge*
Joyanti Chutia, A.R. Pal and H. Bailung
31st European Physical Society Conference, London 2004.

22. *Anti-inflammatory Potential of the leaves of Aegle marmeloes (Linn) Correa ex Roxb*
Ms. Bedabati Dasgupta
National seminar on "Medicinal Plants in N.E. Region", Dept. of ISM & Health Govt. of India, held at Ayurvedic College, Guwahati from 7- 10 October 2004.

23. *Use of the Esters of Fatty Acids and Polyvinyl Alcohol as Freeze Suppressant*
Neelotpal Sen Sarma and N. N. Dass
National Seminar on "Polymer Research in India: Opportunity & Challenges", 2004.

24. *Assessment of heavy metals and their speciation in a freshly deposited bed sediments of the Brahmaputra River, Assam (India)*
Hitesh Das and Krishna G Bhattacharyya
Abstracts-"National Seminar on pollution in urban industrial environment (NSPUIE-2004)". December 2-3; 2004. pp.25

25. *Anti*-inflammatory Potential of the leaves of *Aegle marmeloes* (Linn) Correa ex Roxb.
J. Kotoky and B. Dasgupta
National seminar on- Medicinal Plants in N.E. Region, held at Ayurvedic College, Guwahati during 7- 10 October 2004.

26. *Contamination of soil by oil field operations in Sibsagar district, Assam. a case study in Rudrasagar oil field of ONGCL*
Mukut Kalita, Hitesh Das, K.G.Bhattacharya and Arundhuti Devi
National conference on "Current trends of research in science and technology" held at Gauhati University on January 28-29,2005

27. *Assessment of pollution risks generated by group gathering stations in Sibsagar district, Assam: A case study in Lakowa oil field of ONGCL*
Mukut Kalita, Hitesh Das, K.G.Bhattacharya and Arundhuti Devi
National conference on "Current trends of research in science and technology" held at Gauhati University on January 28-29, 2005

28. *Habitat Characteristics and distribution of Amphibian species in North East India*
Sabitry Choudhury Bordoloi
National Seminar an Biodiversity and its associated diseases organized by P. D. Women's college, Jalpaiguri, West Bengal held in Nov. 28-29, 2004.

5. Workshop Attended

1. Dr. P. Azad attended national seminar-cum-workshop on 'Upgradation of production technology for quality production of biological inputs in agriculture' organised by Regional Centre of organic farming, Nagpur and College of Agricultre, Nagpur March 3-4, 2005.

2. Mr. T. D. Goswami attended the seminar on 'Social role of media and building up of a national information resource centre-cum-archive for North East' organized by Media Trust, Assam and Raja Rammohan Roy Library Foundation, Kolkata held at Institution of Engineers, Panbazar, Guwahati during September 21 to 22, 2004.

3. Dr.(Mrs) Rajlaskhmi Devi attended the " National Seminar on Medicinal Plant in North Eastern Region of India" during October 07-10, 2004 organized by Govt. Ayurvedic College, Guwahati-781014.

4. Dr (Mrs.) Dipali Devi attended the first national seminar on 'Muga silkworm Biochemistry, Molecular Biology and Biotechnology to improve silk production' organized by RRL Jorhat during Nov.18-19, 2004.

5. Mr. B.K. Sarma attended workshop on 'International host lab experiment on synthesis of nanomaterials by thermal plasma' held at Pune University during Nov. 17- Dec. 2, 2004.

6. Dr. (Mrs) Rajlakshmi Devi attended the 50th Annual Technical Session of Assam Science Society and National Conference on Current Trends of Research in Science and Technology. January,28-29, 2005. Organized by Gauhati University.

7. Mr. N.C. Adhikary attended DAE-BRNS workshop on Plasma Surface Engineering held at Bhaba Atomic Research Center, Mumbai during September 23 - 25, 2004.

8. Mr. B.K. Sarma attended DAE-BRNS workshop on 'Plasma Surface Engineering' held at Bhaba Atomic Research Center, Mumbai during September 23-25, 2004.

6. Awards/Honours/Recognition/Nomination

1. Prof. Joyanti Chutia has been awarded Membership of the National Academy of Science, Allahabad, India.

2. Prof. Joyanti Chutia has been nominated as a member of Subject Expert Committee (SEC) on Physical and Mathematical Science of Women Scientist Scheme (WSS) of Department of Science and Technology, Govt. of India, New Delhi.

3. Prof. Joyanti Chutia has been awarded 'Sadhani Sourya' in February, 2005.

4. Prof. Joyanti Chutia was appointed as examiner to evaluate Ph. D. thesis and to take Viva voce examination in the Department of Physics and Astrophysics, Delhi University, New Delhi.

5. Prof. Joyanti Chutia was appointed as examiner to evaluate Ph. D. thesis in the Department of Physics, Devi Ahilya Vishwavidyalya, Indore.

6. Dr. B.C. Tripathy is an Editorial Board member of the periodical " Far East Journal of Mathematical Sciences ", Allahabad.

7. Dr. B.C. Tripathy is an Editorial Board member of the periodical "Journal of Indian Academy of Mathematics", Indore.

8. Dr. B.C. Tripathy is an Editorial Board member of the periodical "Global Journal Applied Mathematics and Mathematical Sciences", New Delhi.

9. Dr. G. Choudhury is an Editorial Board member of the periodical "Far East Journal of Theoretical Statistics", Allahabad.

10. Dr. G. Choudhury is a reviewer of the Mathematical Reviews of American Mathematical Society, USA.

11. Dr. B.C. Tripathy was appointed as examiner to evaluate Ph. D. thesis of the Jai Prakash University, Chapra, Bihar.

7. Ph.D Awarded

1. Sri Pranab Sarma was awarded Ph.D degree for his work, by the Gauhati University under the guidance of Prof. K.G. Bhattacharyya, Department of Chemistry,G.U. and Dr. Suresh Deka, Associate. Professor, RMED, IASST.

2. Mrs. Mausumi Sen was awarded the Ph.D degree by the Gauhati University under the joint supervision of Dr. B.C. Tripathy, Mathematical Sciences Division of IASST and Prof. B.C. Kalita of Gauhati University.

3. Ms. Barnali Sinha was awarded Ph.D. degree by Gauhati University, under the guidance of Prof. Joyanti Chutia, Material Sciences Division, IASST and Prof. G.C. Das, Mathematical Sciences Division of IASST.

4. Shri R.N.Bhuyan was awarded Ph.D for his thesis entitled "Ecobiology of *Labeo gonius* (Hamilton-Buchanan) and effect of low temperature on breeding behavour at mid altitude region, Shillong, Meghalaya,

India." under the guidance of Dr. Sabitri Bordoloi, Associate Professor, RM&ED, IASST and Prof. Amalesh Dutta of Zoology Deptt., G.U.

5. Meren Ao was awarded Ph.D degree for his thesis entitled "Ecobiology of Hyla annectans(Jerdon), 1870 and distribution of amphibian fauna in relation to water quality of Nagaland, India" under the guidance of Dr. Sabitri Bordoloi, Associate Professor, RM&ED, IASST and Prof. A. Dutta of Zoology Deptt., G.U.

6. Sri Arup Kr. Deka was awarded Ph.D degree for his thesis entitled "Studies on effectiveness of native Rhizobial strains and their impact on pulse production in Assam" under the guidance of Dr. P. Azad, Life Science Division, IASST.

7. Mrs. Lipi B. Mahanta was awarded Ph.D degree by the Gauhati University on her thesis "On the study of Peersonian System of Curves and Development of Computer Algorithms" under the supervision of Prof. Dilip C. Nath, Department of Statistics, Gauhati University.

8. Ongoing Projects

Project Title	Funding Agency	Total Fund & Period	Research Group
Microwave reflectometry for plasma density measurement in Tokamak	Department of Science and Technology, Govt. of India	13.65 lakhs 2002-05	Dr. H Bailung -PI Prof. J Chutia -Co-PI Prof. RN Pal(SINP) -PC H K Gogoi -JRF
Metal oxide deposition process by RF magnetron sputtering	Department of Atomic Energy, Govt. of India	16.88 lakhs 2003-05	Prof. J Chutia -PI Dr. H Bailung -Co-PI Prof. R N Pal(SINP) PC B K Sarma -JRF
Study of post magnetron discharge plasma	Department of Science and Technology, Govt. of India	30.02 lakhs 2004-07	Prof. J Chutia -PI Dr. H Bailung -Co-PI A R Pal -SRF
Studies on some batch arrival queueing models with vacations	National Board of Mathematics, DAE, Govt. of India	3.34 lakhs 2002-05	Dr. G Choudhury -PI M Paul -SRF
Nonlinear waves studying the coherent structures of soliton radiation, spikes and shock phenomena in plasmas	University Grants Commission, New Delhi	3.77 lakhs 2002-05	Prof. G C Das -PI Dr. N Devi -Co-PI S Sarma, Project Fellow.

MT3	Database of R&D Institutions by Broad Research Area in N.E. Region and Research Activities in S&T in Assam	Department of Science and Technology, Govt. of India	9.07 lakhs 2004-06	Prof. D N Das -PI Dr. B C Tripathy -Co-PI K Deka, Research Investigator J K Bora Research Investigator
MT4	Status of Science Teaching in Secondary Schools of Assam	Department of Science and Technology, Govt. of India	14.4 lakhs 2005-08	Prof. B K Bhattacharyya -PI K J Barkataki -RI S K Sinha -RI
MT5	Fuzzy Real Valued convergent and Statistically Convergent Sequences Defined by Orlicz Functions	University Grants Commission, New Delhi	4.21 lakhs 2005-07	Dr. B C Tripathy -PI Dr. P Rajkhowa -Co-PI (Cotton College) H Dutta -Project Fellow
LS1	A systematic study of physico chemical properties of Muga silk (*Antheraea assama* Ww) fibre produced in the North Eastern region of India	Department of Science and Technology, Govt. of India	20.85 Lakhs 2005-08	Dr (Mrs.) D Devi -PI Dr. K C Baruah -Co-PI Prof. N N Dass -Co-I
RMED1	Ichthyo faunal diversity and fishery potential in the wetlands of Hajo, Kamrup District, Assam and study of socioeconomic status of fisherman community	GB Pant Institute of Himalayan Environment and Development, Kosi-Katarmal, Almora, Uttaranchal.	5.43 lakhs 2004-07	Dr.S C Bordoloi -PI A Baishya -RA
RMED2	Utilization of lime sludge waste of Jagiroad paper mill for fish culture	ICAR, New Delhi	11.34 lakhs 2001-05	Dr. S Deka -PI Dr. A Devi -Co-PI S Yasmin Ankur Bordoloi Jagannath Bhuyan
RMED3	Assessment of Oil field soil (with special reference to polyaromatic hydrocarbons) for their eventual remediation and reclamation	Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi	18.48 lakhs	Dr A Devi -PI Dr. K G Bhattacharyya -Co-PI (Gauhati University) Dr. A Kumar -Co-PI (ITRC, Lucknow) H Das, JRF M Kalita, JRF

Phytoremediation of oil and heavy metal in polluted soil and water in and around oil fields of Upper Assam	Oil India Ltd Duliajan, Assam	11.82 lakhs	Dr. S C Bordoloi -PI A Sharma B Deuri A Das B Ningambam
Environmental Information System Node on tea garden environment	Ministry of Environment & Forests, Govt. of India	7.95 lakhs 2002-07	Dr S C Bordoloi -Co-Ordinator U Kalita -IT Assistant
Studies on native *VAM* fungi and their combined application with selected strains of *Rhizobia* for improvement of pulse production in NE Region	DBT, Govt.of India, New Delhi	6.70 lakhs 2003-06	Dr. P. Azad-PI Dr. S. Deka-Co-PI B. Choudhuri- JRF
Microbial Diversity of Dibru-Saikhowa and Manas Biosphere Reserves of Assam	Ministry of Environment and Forest, GOI, New Delhi	24.13 lakhs 2004-07	Dr. P. Azad-PI Dr. G. Sarma, GU - Co-Invs Dr. S. Deka-Joint-Invs R. Saikia-JRF K. Das-Tech. Asst.
Rehabilitation of Degraded Soils of Upper Assam Due To Excessive Mining of Coal	Ministry of Environment and Forest, GOI, New Delhi	12.21 lakhs 2005-08	Dr. P. Azad-PI A.K. Barma, JNU-Co-PI N. Nesha-JRF
Conductivities of polymeric materials in solid state	DST, Govt. of India, New Delhi	13.46 lakhs 2004-07	Dr. N Sen Sarma -PI Prof. N N Dass -Co-PI Dr. P Chetri -RA
Study of Polymeric Foam and their uses in Laser-Plasma Experiments	DAE, Govt. of India, BARC, Mumbai	28.90 lakhs 2004-2007	Prof. Narendra Nath Dass-PI Dr. Joyanti Chutia -Co-PI Dr. N. Sen Sarma - Co-PI
Development of Herbal remedies for Liver Ailments	DRDO, Ministry of Defence, Govt. of India	5.00 lakhs 2004-2006	Dr. J. Kotoky-PI B. Dasgupta - Project Asst.
Assesment of risk due to intake of artficial colours available in Kamrup district, Assam.	ASTEC, Assam	0.71 Lakh 2003-04	Dr. J. Kotoky - PI J. Saikia- Project Asst.

9. Project "Upgradation of IASST"

IASST has developed its own campus at Paschim Boragaon, Guwahati -35 under the project "Upgrading of IASST" funded by Department of Science and Technology, Govt. of India. Total sanctioned amount of Rupees 10.6257 Crores has been utilized in the construction of Academic cum Administrative Building, Research Scholars Hostel, Boundary wall, Approach road, Electrical substation, procurement of laboratory equipment and books and journals, internal decoration etc. during 1999-2005. The shifting works from the rented premises at Khanapara to the permanent campus was initiated in February 2003 and completed in May 2004. IASST has started functioning at its permanent campus from June 1, 2004.

10. Other Scientific Activities

1. Prof. Joyanti Chutia attended the 3rd meeting on project evaluation of Women Scientist Scheme held at Bangalore as a member of Subject Expert Committee (SEC) on Physical and Mathematical Science of DST, Govt. of India, New Delhi.

2. Dr. A.K. Buragohain has been entrusted with the responsibility of Principal Co-ordinator by Assam Science Society for a project entitled "Environment orientation in the Schools of North-East India" funded by the Ministry of Human Resource, Govt. of India. The first two day Organizatinal Workshop under the project was organized at Guwahati on May 21-22, 2004 where Dr. Buragohain participated as the Principal Co-ordinator.

3. Dr.(Mrs.) Sabitry Choudhury Bordoloi, delivered an invited lecture in the National Seminar on Biodiversity and its associated diseases organized by Women's College,Jalpaiguri,West Bengal held in 28-29 November, 2004. *Topic "Habitat Characteristics and distribution of Amphibian species in North East India".*

4. Dr.(Mrs) Sabitry Choudhury Bordoloi presented the achievements of ENVIS Node on Environment and Tea garden in the National workshop of Envis centers and Nodes held at Dehradun from 25th to 27th june,2004.

5. Prof. N.N. Dass, Director, IASST along with the Registrar, IASST attended the Parliamentary House Committee meeting on education (2003-2004) held at Dispur on 23rd July, 2004 and presented the Progress Report of IASST.

6. Dr. B.C. Tripathy delivered an invited lecture on the topic entitled " Why Mathematics is a Difficult Subject ?" at Arya Vidyapeeth College on August 27, 2004.

7. Dr. S.C. Bordoloi of RM&ED held the position of Chairperson in Technical Session III of UGC-CSIR sponsored National Conference on Biodiversity- its environmental impact and associated diseases in India held at P.D. Womens College, Jalpaiguri, W.B. during November 28-29, 2004.

8. Prof. N.N. Dass, Director of IASST chaired one of the sessions of National Symposium on chemistry at the Inorganic and Organic Interphase on the 7th December 2004 held at I.I.T., Guwahati.

9. Prof. N.N. Dass, Director of IASST chaired one of the Technical Sessions on 29th January in the 50th Annual Technical Session and National Conference on Current Trends of Research in Science and Technology under Assam Science Society Gauhati University, Guwahati on 28th and 29th January 2005.

10. Prof. N.N. Dass, Director of IASST inaugurated the Workshop on Restoration Ecological 2005 on the 1st February 2005 organized by 'AARANYAK' at the IIBM, Khanapara, Guwahati-22.

11. Research Collaboration

Prof. Narendra Nath Dass, Materials Sciences Division	Prof. Aradhana Dutta, Deptt. of Chemistry, Dibrugarh University, **India**	Polymer Science
	Prof. Ravi K. Khardeker, Centre for Advanced Technology, Indore, **India**	Laser Polymer
	Prof. K. G. Bhattacharyya Gauhati University, **India**	Physical Chemistry
	Dr. C. N. Saikia, RRL, Jorhat, **India**	Polymer Science
	Dr. S. D. Boorah, Dr. N. N. Dutta RRL, Jorhat, **India**	Membrene Science
Prof. Joyanti Chutia, Materials Sciences Division	Prof. Robindranath Pal Saha Institute of Nuclear Physics, Kolkata, **India**	Plasma Processing Microwave Technique for plasma diagnostics
	Prof. H. C. Pant Centre for Advanced Technology, Indore, **India**	Laser Plasma Interaction
Dr. Heremba Bailung, Materials Sciences Division	Prof. Y Nakamura Institute of Space and Astronautical Science, **Japan**	Dusty Plasma, Plasma Diagnostics

Dr. Binod Chandra Tripathy, Mathematical Sciences Division	Prof. Mikail Et, Prof. Rifat Colak, Dr. Yavuz Altin, Dr. M. Isiki Firat University, **Turkey**	Orlicz sequence spaces,Difference sequence spaces, Fuzzy sequence spaces.
	Prof. Ayhan Esi Inonu University, **Turkey**	Orlicz sequence spaces, Difference sequence Spaces
	Prof. Tibor Salat, Prof. Milos Ziman Commenius Univ, **Slovakia**	I-convergent sequences
	Prof. P. Y. Lee Nanyang Technological University, **Singapore**	Orlicz sequence spaces
	Prof. B. Choudhary University of Botswana, **Botswana**	Orlicz sequence spaces, Difference sequence Spaces, Fuzzy Sequence spaces
	Prof. Prabhat Chandra Patna University, **India**	Duals of sequence spaces
	Prof. Pawan K. Jain University of Delhi, **India**	Orlicz sequence spaces.
	Prof. B. K. Tripathy Berahampur University, **India**	I-convergent sequences, Difference sequence spaces.
Dr. Gautam Choudhury, Mathematical Sciences Division	Prof. J.R. Artalejo Complutence University of Madrid, **Spain**	Retrial models
	Prof. K.C. Madan Ahila University Monama Kingdom of Bahrian , **Bahrian**	Brenauli vacation models
	Prof. L. Tadj King Saud University of Riyadh, **Saudi Arabia**	Control of queues
	Prof. C. Tadj Ecole de Tecnologie Superiure, **Canada**	Control of queues
	Prof. A. Krishnamoorthy	Setup time models

	Cochin University of Science and Technology, **India**	
Dr. Shreemayee Bora, Mathematical Sciences Division	Prof. Volker Mehrmann Institute fur Mathematik Technische Universitat Berlin, **Germany**	Perturbation Theory for matrices, Matrix Pencils Matrix polynomials Matrix polynomials and operators
	Prof. Ralph Byers University of Kansas, **U.S.A.**	Perturbation Theory for matrices, Matrix Pencils Matrix polynomials Matrix polynomials and operators
	Prof. Michael Overton Courant Institute of Mathematical Sciences, New York, **U.S.A.**	Perturbation Theory for matrices, Matrix Pencils Matrix polynomials Matrix polynomials and operators
	Prof. Rafikul Alam IIT Guwahati, **India**	Perturbation Theory for matrices, Matrix Pencils Matrix polynomials Matrix polynomials and operators
Dr. Padum Azad, Life Sciences Division	Prof. A. K. Verma J N U New Delhi, **India**	Microbial Biotechnology
	Prof. A. K. Yadav Regional Biofertiliser Development Centre, Nagpur, **India**	
	Prof. K. B. V. R. Tilak Hyderabad, **India**	
	Prof. D. K. Arora N B A I M, **India**	
Dr. (Mrs) Sabitry Choudhury Bordoloi, Resource management and Environment Division	Dr. Annemarie Ohler, Dr. Patrick David Department of systematique UMS 0602, 25 rue Cuvier 75005 Paris, **France**	Amphibian Taxonomy Ophibian Taxonomy
Dr. Arundhati Devi,	Dr. Ashwani Kumar	Environmental

Resource management and Environment Division	Industrial Toxicology Research Center, Lucknow, **India**	Biotechnology
	Prof. K. G. Bhattacharyya Deptt. of Chemistry Gauhati University, **India**	Environmental Chemistry
Dr. Jibon Kotoky, Life Sciences Division	Dr. V. Jagdeesan Fodd and Drug Toxicology Research Center, National Institute of Nutrition, Hyderabad, **India**	Development of drug and Toxicology study
	Dr. Mukul Das Rastogi Industrial Toxicological Research center, Lucknow, **India**	Toxicological assement of artificial colours in foodstuffs
Dr. Dipali Devi, Life Sciences Division	Prof. K.P. Gopinathan Department of Cell Biology and microbiology, IISc, Bangalore, **India**	Silkworm Molecular Biology
	Dr. J. Nagarju Scientist S DNA fingerprinting and Diagnostic Centre, Hyderabad, **India**	Silkworm Molecular Biology
	Prof. S. C. Kundu Department of Biotechnology, IIT, Kharagpur, **India**	Silkworm Genetics, Molecular Biology
	Prof. Shimada Toru Head, Department Entomological Sciences, Tokyo University, Tokyo **Japan**	Protein Analysis
	Prof. D. K. Sharma Department of Zoology, Gauhati University, **India**	Enzyme separation Eri Silkworm
Dr. Suresh Deka, Resource management and Environment Division	Dr. H. J. Purohit Scientist, National Environmental Engineering Research Institute, Nagpur, **India**	Microbiology, Molecular biotechnology

Dr. T Chakraborty Scientist, Institute of Microbial Technology, Chandigarh, **India**	Molecular biology
Prof. K. G. Bhattacharyya Dept. of Chemistry,	Environmental Chemistry Physical Chemistry
Dr. A. Talukdar Dept. of Chemistry, Gauhati University, **India**	Environmental Chemistry
Dr. H. P. Sarma Department of Environmental Science, Gauhati University, **India**	Environmental Chemistry
Prof. A. Dutta Dept. of Zoology, Gauhati University, **India**	Ecology, Fishery etc.
Prof. H. P. Barthakur Rtd. Prof Assam Agricultural University, Jorhat **India**	Agricultural Microbiology and soil chemistry

12. Colloquium Organised

Speakers	Title	Date
Dr. Ashok Das Dept. of High Energy Physics, University of Rochester, USA	Integrable Models	May 25, 2004
Dr Ashwani Kumar, Head, Environmental Biotechnology, ITRC, Lucknow	Microbial Degradation of Chlorinated Pesticides	December 21-22, 2004
Dr.B. Hari Gopal, Scientist G, DST ,	The speech of His Excellency, A.P.J. Abdul Kalam was read in absentia.	December 27, 2004
Prof. Dulal Borthakur, University of Hawaii, USA	Development of recombinant vaccines against Mycobacterium tuberculosis	January 10, 2005
Prof. D. Dutta Majumder FNI, Emeritus Professor, Secretary and Director, Institute of ICSIT	Immuno-Cybernetics and Bio- informatics related approaches to cancer research for drug discovery	January 12, 2005

Dr. Andre F. Clewell, A F Clewell Inc., Holmes Beach, Florida, USA	Ecological Restoration giving stress on Deforestation and its restoration without further damaging the eco-system.	February 4, 2005
Dr. Narayan R. Desai, Society for Ecological Restoration - India	Necessity of having the regional indigenous plant varieties along with the hybrid varieties for natural harmonious growth	February 4, 2005
Prof. H. C. Pant, Prof. of BARC, High pressure Physics Division, Mumbai	Delivered a lecture concerning great future and remarkable ideas for the growth and support of Science and Technology in N. E. region of India	February 5 , 2005

13. Distinguished Visitors

Dr. A.P.J. Abdul Kalam,
His Excellency The President of India

Mr. Tarun Gogoi,
Chief Minister of Assam

Dr Ashwani Kumar,
Head, Environmental Biotechnology,
ITRC, Lucknow

Mr. Baneswar Khaund,
S.E., A.S.E.B.

Prof. D. Dutta Majumder
FNI, Emeritus Professor
Secretary and Director,
Institute of Cybernatics Systems and
Information Technology (ICSIT)

Dr. Narayan R. Desai,
Society for Ecological Restoration
India

T.Y. Dass, IAS,
Commissioner and secretary to the Govt.
of Assam
Department of Science and Technology.

Prof. H. C. Pant
Laser Plasma Division
Center for Advanced Technology
Indore- 452013

Lt. Gen. (Retd) Ajai Singh,
His Excellency The Governor of Assam

Prof. N.N. Sidhanta
Retd. Prof. Deptt. of Chemistry, GU

Prof. Dulal Borthakur,
University of Hawaii,
USA

Mr. Narayan Chandra Das,
Executive Engineer, A.S.E.B.

Dr. Andre F. Clewell,
A. F. Clewell Inc.,
Holmes Beach, Florida,
USA

Dr. B. Hari Gopal,
Scientist G,
Department of Science and Technology,
Technology Bhavan., New Delhi

D. N. Saikia, IAS
Commissioner and secretary to the
Govt. of Assam
Department of Science and Technology

D.S.T. team lead by Dr. C.K. Nayar

14. Symposium / Seminars Organised

The Mathematical Sciences Division conducted the workshop on Computational Information Processing, organised by the Electronics and Communication Sciences Unit (ECSU) of Indian Statistical Institute (ISI), Kolkata, during March 8-11, 2005. This is the 4th workshop organized by ECSU, of ISI Kolkata in the North East region. A total of 47 participants were selected from different parts of the North East region. The workshop was attended by 40 participants. The lectures were delivered by the scientists of ECSU, ISI, Kolkata, which includes Prof. Arun K. De; Prof. Dipti P. Mukherjee; Prof. B. Chanda of international repute. The workshop was inaugurated by Prof. Gautam Barua, Director, IIT Guwahati and Sri D. N. Saikia, Commissionor, S&T; Assam was the chief guest of the occasion. The inaugural meeting was presided over by Prof. K.M. Pathak, Chairman, IASST Council and Prof. J.P. Medhi, Emeritus Professor Gauhati University was the Guest of Honor of the occasion.

The workshop lectures were on the areas of pattern recognition and image analysis emphasizing applications involving document image processing, content-based image retrieval, image database, video image processing, visual cryptography, neural networks, fuzzy logic and related areas. There were some presentations by the participants, which showed that this type workshop has succeed in attracting the workers in the field as well as the younger generation of this part of the country for carrying out research in information processing.

15. Council of the IASST (2004-2005)

Prof. K.M. Pathak,
Chairman, Council of IASST,
Guwahati-781 035

Prof. Asis Datta,
Director,
National Center for
Plant Genome Research,
J. N.U. Campus,
New Delhi - 110067

Mrs. T. Y. Das, IAS
Commissioner and Secretary,
Govt. of Assam,
Deptt. of Science & Technology,
Dispur, Guwahati-781006

Prof. H. C. Pant,
Emeritus Visiting Scientist,
Ex- Head of Laser Plasma Division,
CAT, Indore-452013.

Dr. P. C. Deka,
Vice Chancellor.,
Tezpur University,
Napaam, Tezpur-784028.

Prof. J.K. Datta Gupta,
Head of Biophysical Science Group,
SINP, 1/AF, Bidhan Nagar,
Kolkata-700064

Sri. J.K. Borooah,
Barunagar Tea Estates Pvt. Ltd.,
Maniram Dewan Road,
Chandmari, Guwahati- 781003

Prof. N.N. Dass,
Director, IASST,
Guwahati-781 035

Dr. V. Rao Aiyagari,
Head , SERC Division,
Department of Science. & Technology,
Govt. of India,
Technology Bhavan,
New Mehrauli Road,
New Delhi -110016

Prof S. K. Sarma,
President, Assam Science Society,
Latasil,
Guwahati -781001

Dr. G. Barua,
Director, IIT Guwahati,
North Guwahati, Guwahati -781 039

Prof. B.C. Kalita,
Deptt. of Mathematics,
Guwahati University,
Guwahati-781 014

Prof. (Ms.) Joyanti Chutia,
Professor and Head,
Material Sciences Division,
IASST, Khanapara, Guwahati-781022

16. Visit of His Excellency, Dr. APJ Abdul Kalam, the President of India

Visit of His Excellency, Dr. APJ Abdul Kalam, the President of India to IASST was initially scheduled on Dec 27, 2004. However, due to tsunami disaster on Dec 26, '04 (which hit eastern coast and Andaman Nicobar islands) his visit was postponed to Dec 31, 2004. On Dec 27, '04, however, the Governor of Assam, Lt. Gen. (Retd.) Ajoy Singh, PVSM, AVSM, Chief Minister of Assam Sri Tarun Gogoi and Dr. B. Hari Gopal, Scientist G, Adviser of DST, Govt. of India attended the meeting and the addressed the scientific community. The speech of His Excellency was read in absentia by Dr. B. Hari Gopal. Prof KM Pathak , Chairman, Council of IASST presided over the meeting and Prof. NN Dass Director, IASST the hon'ble guests.

On Dec 31, 2004 His Excellency, the President of India paid his maiden visit to IASST. His Excellency was accompanied by the Hon'ble Governor of Assam and the Chief Minister of Assam along with other official dignitaries. The President of India visited the research laboratories of different divisions and interacted with scientists of IASST. He inspired the scientists for dedicated research in bio-sciences, renewable energy sources and nano-sciences. He also urged the scientists to produce more Ramanujan, the great Indian Mathematician.

IASST thanks all the personalities who contributed to make the visit of His Excellency, the President of India to IASST successful and memorable.

17. Conversion of the IASST to Govt. of India Institution

Dr. N. N. Dass, Director IASST accompanied by Prof. Joyanti Chutia, Registrar i/c IASST, attended the meeting of possible conversion of the IASST, Guwahati to Govt. of India institution, convened by the Secretary, Ministry of Science and Technology at New Delhi on 2nd April 2004. A power-point presentation was made on behalf of the IASST and the Director, Dr. N.N. Dass also clarified the various queries of the expert members.

After thorough discussion and deliberation by the committee, it was decided that the IASST would be taken over as affiliated institute of national level. The actual take over would be done only after approval of the Central Cabinet, which would be available within about three months' time (vide letter U.O.No.CS.5/ 2003 dated April 5, 2004 from the Chief Secretary, Assam to the Hon'ble Chief Minister)

18. Research Staff

Director

Narendra Nath Dass, M. Sc., Ph. D., DIC (London)

Scientists & Staff

A. Material Sciences Division

Joyanti Chutia, M. Sc., Ph. D.	Professor & Head
Heremba Bailung, M. Sc., Ph. D.	Associate Professor
Neelotpal Sen Sarma, M. Sc., M. Tech.,Ph. D.	Assistant Professor
Anupam Barman, B.E, M.S	Assistant Professor
Nirab Ch. Adhikary, M. Sc.	Sr. Research Asstt.
Prafulla Chetri, M.Sc., Ph. D.	Research Associate
Arup Ratan Pal, M. Sc.	SRF
Putul Kalita, M. Sc.	SRF
Hemendra Kr. Gogoi, M. Sc	JRF
Bimal Kr. Sarma, M. Sc.	JRF
Sankar Moni Borah, M. Sc.	JRF
Niren Sarma, B.Sc.	Lab Asstt.
Krishna Kanta Swargiari	Mechanic

B. Mathematical Sciences Division

Jyoti Prasad Medhi, M. Sc. D. Sc.	Honorary Professor
Dhirendra Nath Das	Honorary Professor
Ganesh Ch. Das, M. Sc., Ph. D.	Honorary Professor
Basanta Kumar Bhattacharyya, M. Sc., Ph.D	Honorary Professor
Binod Ch. Tripathy, M. Sc., Ph. D.	Associate Prof. and Head In-Charge
Gautam Choudhury. M. Sc., Ph. D.	Assistant Professor
Lipi B. Mahanta, M. Sc, DCA, Ph. D	Assistant Professor
Sreemioyee Bora	Assistant Professor
Paritosh Ch. Das, M.Sc	Teacher Fellow(UGC)
Madhuchanda Paul, M. Sc.	SRF
Karabi Devi, M.Sc	JRF
Smriti Sarmah, M.Sc.	Project Fellow
Hemen Dutta, M.Sc	Project Fellow
Kandarpa Deka, M.Sc	Project Investigator
Jayanta Kumar Bora, M.Sc	Project Investigator
Sanjib Kumar Sinha, M.Sc.	Project Investigator
Kanchan Jyoti Barkotoki, M.Sc.	Project Investigator

C. Resource Management & Environment Division

Sabitri C. Bordoloi, M. Sc., Ph. D.	Associate Prof. & Head In-charge
Suresh Deka, M. Sc., Ph. D.	Associate Professor
Arundhati Devi, M. Sc., Ph. D.	Assistant Professor
Aparna Dutta, MCA	Assistant Professor
Sabina Yasmin, M. Sc	JRF
Barsha Deuri, M. Sc.	JRF
Ankur Bordoloi, M. Sc.	JRF
Banita Ningombam, M. Sc	JRF
Hitesh Das, Ph. D.	JRF
Mukut Kalita, M. Sc	JRF
Anirudha Sharma, M. Sc	JRF
Anjali Baishya , M. Sc	JRF
Tutul Bartamulee, M. Sc	Teacher Fellow
Utpal Kalita, B.Tech	IT Assistant
Manmohan Huzuri, B. Sc.	Lab Attendant

D. Life Sciences Division

Narendra Nath Dass, M. Sc., Ph. D., DIC	Director, Head
Padum Azad, M. Sc., Ph. D.	Associate Professor
Alok Buragohain, M.Sc., Ph. D., DIC	Associate Professor
Jibon Kotoky, M. Sc., Ph. D.	Assistant Professor
Dipali Devi, M. Sc., Ph. D.	Assistant Professor
Rajlakhmi Devi, M. Sc., Ph. D.	Senior Research Assistant
Arundhati Chaudhury. M.Sc. Ph.D.	Research Associate
Bula Choudhury, M.Sc.	JRF
Mahendra Kalita, M.Sc	Teacher Fellow
Jitu Saikia, M. Sc	Project Assistant
Bedabati Dasgupta, M.Sc	Project Assistant
Kumud Das, M.Sc	Technical Assistant
Julee Bordoloi, B. Sc.	Lab. Assistant
Subrata Goswami, B.Sc.	Lab. Assistant

Administrative Staff

Padum Azad, M.Sc., Ph.D.	Registrar
Rajesh Sharma, B. A.	PRO
Juri Pathak, M.C.A.	Instructor
Prabodh Kr. Deka, B. A.	UDA
Rabin Kalita, B. Sc.	LDA
Dwijen Deka, B. A.	LDA
Prabhat Barma	LDA
Saraswati Bora	LDA
Diganta Das	Stenographer
Binoy Choudhury	Messenger
Madhu Kalita	Electrical Helper

Engineerign Cell

H K Saikia, B.E.	Civil Consultant
A K Das	Assistant Engineer
Montu Deka, B.E.	Junior Engineer
Munindra Singh	Typist

Accounts Section

Ganesh Ch. Bhuyan, M Com.	Finance & Accounts Officer
Suresh Sarma, B Com	Accountant
Ramen Mahanta, B. Com.	Jr. Accountant
Bijuphukan Bhagabati, B.Sc. A-Level, MCA	Instructor

Library & Information Centre

Tarini Dev Goswami, B Sc, M. Lib.	Asstt. Librarian
Niranjan Bhagobaty, B.Sc, PGDCA	Sr. Instructor
Kumud Baishya	Library Asstt.

Laboratory Helper

Tarun Talukdar	Lab. Attendant
Madan Kalita	Lab. Attendant
Gora Gupta	Lab. Attendant
Balin Das	Lab. Attendant
Ratul Baishya	Lab. Attendant
Srikanta Baishya	Field Attendant
Kabindra Deka	Lab. Attendant
Nripen Ch. Goswami	Messenger
Sabin Kalita	Animal Keeper

Supporting Staff

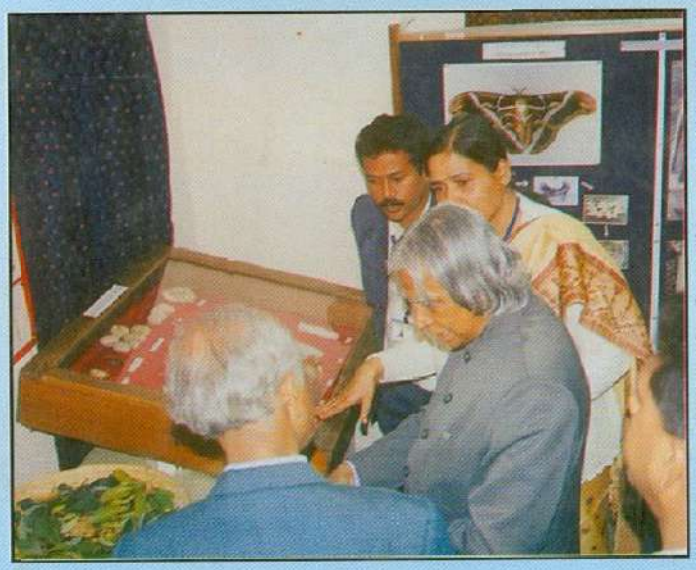
Nimai Hazam	Driver
Phatik Baishya	Driver
Babul Deka	Messenger
Bipul Kumar Das	Messenger
Madhabi Das	Cleaner
Haren Medhi	Night Chowkidar
Lakhi Kanta Saud	Night Chowkidar
Balabhadra Pathak	Day Chowkidar

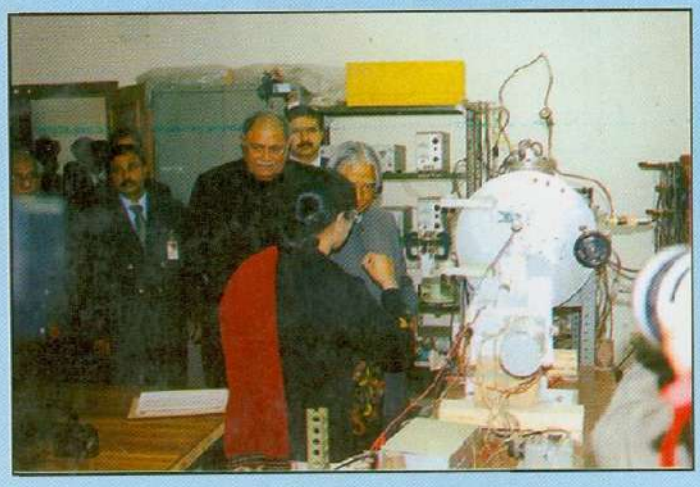
19. Annual Accounts 2004-2005

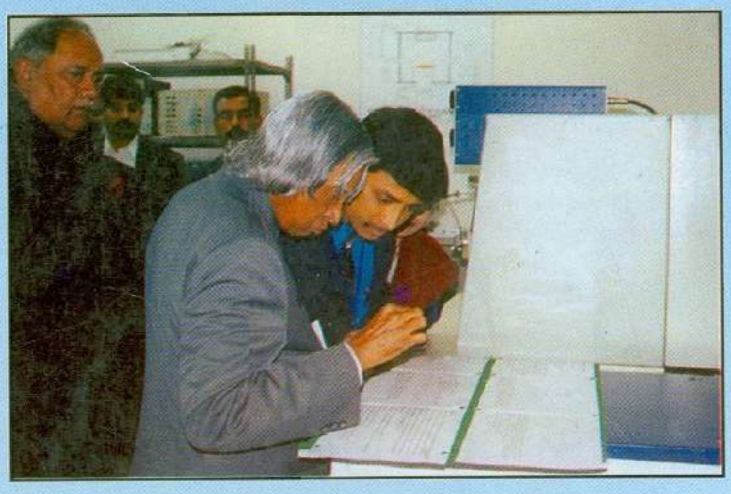
Annual Accounts for the year 2004-05
Institute of Advanced Study in Science and Technology

Sl No	Head of Account	Opening Balance as on 1st April 04	Receipt During the year 2004-05	Total Amount Received	Payment During the year 2004-05	Closing Balance as on 31st March 05
1	Microwave reflectometry for plasma density measurement in Tokamak Plasma	(-) 85,921	-	(-) 85,921	298,580	(-) 3,84,501
2	Study of metal deposition processes by RF magnetron sputering (BRNS)	7,10,897	200,120	9,11,017	910,949	68
3	Study on some batch arrival queing models with vacations	32,651	-	32,651	186,502	(-) 1,53,851
4	Nonlinear Waves- in Plasma.	1,66,583	-	1,66,583	112,000	54,583
5	Database of R&D Instituion.. Assam		500,000	5,00,000	132,930	3,67,070
6	Studies on Native VAM Fungi	24,506	214,000	2,38,506	194,479	44,027
7	Development of Herbal Remedies for liver ailments	1,12,821		1,12,821	72,000	40,821
8	Utilisation of lime sludge wasts of Jagiroad Paper Mill for Fish culture	28,841	181,792	2,10,632	274,137	(-) 63,504
9	Study of Silk industry in Sualkuchi Cluster	30,914	-	30,914	30,914	-
10	Development of Plasma physics Div.	(-) 69715	-	(-) 69,715	-	(-) 69,715
11	Phytoremdiation of Oil and Heavy metal polluted soil and water	(-) 14,043	461,988	4,47,945	280,000	1,67,945
12	ENVIS problems in Tea Gardens	(-) 4,06,100	578,200	1,72,100	230,000	(-) 57,900
13	Ichthyofaunal diversity and fishery potntial in the wetlands of Hajo	-	183,000	1,83,000	158,376	24,624
14	Assessment of oil field soil for their eventual remediation and reclaimation	-	622,000	6,22,000	364,345	2,57,655
15	Conductivites of polymeric materials in solid state	-	750,000	7,50,000	571,777	1,78,223
16	Status of Science teaching in secondary school of Assam	-	500,000	5,00,000	35,000	4,65,000
17	Rehabilation of Degraded soils of Upper Assam due to excessive mining of coal	-	228,000	2,28,000	-	2,28,000
18	Fuzzy real valued convergent and statistically convergent sequences defined by orlicz function	-	288,100	2,88,100	50,000	2,38,100
19	Study of Post Magnetron Discharge Plasma	-	2,000,000	2,000,000	1,111,000	8,89,000
20	Microbial Diversity of Dibru-Saikhowa biosphere	-	442,865	4,42,865	446,000	(-) 3,135

Sl No	Head of Account	Opening Balance as on 1st April 04	Receipt During the year 2004-05	Total Amount Received	Payment During the year 2004-05	Closing Balance as on 31st March 05
21	Study of polymeric foam and their use in laser plasma experiments	-	2,242,400	22,42,400		22,42,400
22	Food Colour	18,188	-	18.188	22,000	(-) 3,812
23	Upgrading IASST	(-) 1,96,559	10,000,000	98,03,441	9,652,239	1,51,202
24	Entry of polyclic...Soil from Oil...degradation	(-) 17,091		(-) 17,091		(-) 17,091
25	General Management	(-) 1,25,42,875	20,000,000	74,57,125	17,309,496	(-) 98,52,371
26	IASST General Fund	1,19,65,437	715,029	1,26,80,466	1,144,269	1,15,36,197
27	Land and Building	1,36,010		1,36,010		1,36,010
28	O' Level (EGTS) to North East	(-) 59,160	-	(-) 59,160		(-) 59,160
29	Workshop Govt of Assam	1,00,000	-	1,00,000	100,000	-
30	Meeting for the project 'Development of Plasma Physics Division'	(-) 5,132	-	(-) 5,132		(-) 5,132
31	CSIR (Math) (Karabi Devi)	(-) 65,260	130,520	1,30,520	130,520	-
32	CSIR (A. Choudhury)	0	169,400	1,69,400	169,400	-
33	CSIR (Plasma)	0	143,960	1,43,960	143,960	-
34	Education	0	400,000	4,00,000	400,000	-
35	National and International Workshop	1,85,600		1,85,600		1,85,600
	Total	**1,15,852**	**40,951,374**	**4,10,67,226**	**34,530,873**	**65,36,353**
36	Reserve Fund (Fixed Deposit)	11,84,800	-	11,84,800		11,84,800
37	Corpus Fund for leave salary encashment	2,00,000	-	2,00,000		2,00,000
	Grand Total	**15,00,652**	**40,951,374**	**4,24,52,026**	**34,530,873**	**79,21,153**







Dr. APJ Abdul Kalam, President of India at the IASST

Dr. APJ Abdul Kalam, President of India addressing the scientists at IASST

Preparing for the Presidents Visit