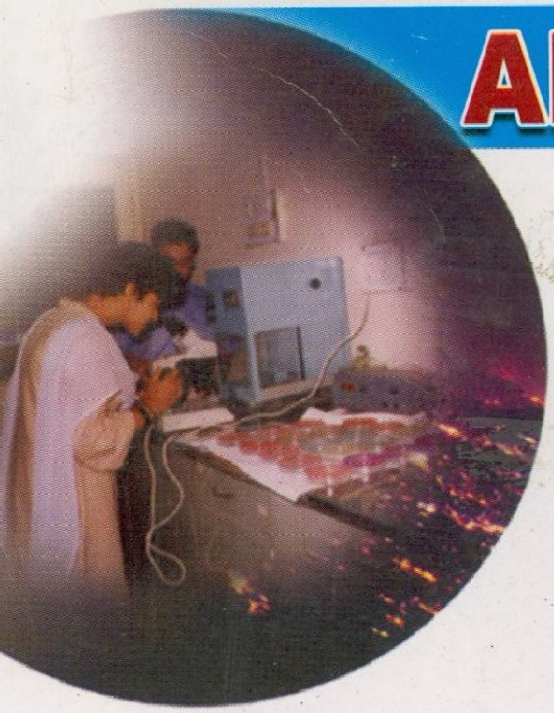
ANNUAL REPORT

April 2002 - March 2003



INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

JAWAHARNAGAR , KHANAPARA, GUWAHATI-22. ASSAM (INDIA)

ANNUAL REPORT

April 2002 - March 2003

28 FEB 2005

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Foreword

It is a great pleasure for me to note that the Institute of Advanced Study in Science and Technology, (IASST), Guwahati-781022 is making a steady progress towards achieving its cherished goal though it is yet to achieve a quantum jump. To demonstrate a spectacular achievement, quantum of assistances and blessings are absolutely necessary though pouring of wealth is not a guarantee to achievement.

The industrial concerns should also come in a big way to encourage the scientists for their own good. Instead of looking for ready made imported ideas and materials, there should be more emphasis for the *interaction* between the resource persons of industries and research . There should be an honest effort to build up mutual trust between industries and research organisations.

Last year we stressed on *discipline* and *hard-work* for success in scientific pursuit. Nobody can attain his/her zenith unless there is hard work backed by lofty ambition. To drink ambrosia, the nectar, collective churning is necessary . We hope that the scientists of the IASST will put their heads and minds together for collective achievement. This of course demands interaction between the scientists as nobody can work in isolation in the modern scientific works. A healthy competition, collective spirit to work may bring about unimaginable glory to the scientists of the IASST also.

I am very glad to observe that almost all the scientists are getting sponsored projects now to carry out their research works. A few projects are also in the pipeline to get research assistance. Such self help gives the scientists sufficient freedom to convert their own idea into reality to attain their definite goal . Tied to the ground even a balloon cannot fly. I hope that all the scientists of the IASST will get research grants to carry out their mission without strings.

For a well recognized institute generation of fund is not difficult. But a nascent institute like the IASST needs the constant blessings from the Government so that its growth becomes spontaneous. We hope that liberal aids will come from the Government so that the IASST can become a National Institute of repute. The Annual Government grant is of about Rupees Forty lakh only. The Government of Assam gave twenty acres of land at Paschim Boragaon, Guwahati- 781 033, where the Academic Building of the IASST is coming up. The DST, GoI sanctioned an one time grant of Rs. 9.55 crore for the Academic Building and Laboratories of the IASST. Various orginazations like the DST, DBT, MIT, OIL, MOEF, ICAR and DAE are supporting various projects. We are really grateful to them for the financial support.

The administrative staff, financial staff, the library staff and the engineering staff of the IASST are working with zeal. I hope that they will work harder for their own institute.

I am really grateful to the Chairman and the council members for their timely advice. We hope under their leadership the IASST will become a National Institute soon.

Prof. N.N. Dass
Director, IASST.

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2. DIVISIONS OF IASST

2.1 MATERIAL SCIENCES DIVISION

Faculty

Name:	Field of interest
Dr. J. Chutia, Professor & Head	Plasma Physics
Dr. H. Bailung, Associate Professor	Plasma Physics (Experimental)
Dr. N. S. Sarma Assistant Professor	Polymer Science
Dr. N. N. Dass, Director	Polymer Science

Material Sciences Division :

Presently it has two units;

i. Plasma Physics
ii. Polymer Science.

i. Plasma physics unit

The Plasma unit is carrying out research works both in theoretical and experimental fields. In the theoretical field, they are exploring the effect of trapped charges in sheath formation in isothermal plasma and levitation of dust grains into sheath formed in magnetic plasma. In the experimental section, the following works are being carried out :

1) *Effect of multi-dipole cusp magnetic confinement on plasma characteristics in a cylindrical RF discharge system.*
2) *Plasma density enhancement by thermo-ionic emission in a dc post magnetron-sputtering system.*
3) *Influence of low energy ion beam on sheath characteristics in plasma.*
4) *Investigation of sheath properties in Ar/SF_6 dc discharge plasma.*

ii. Polymer Science unit

In the polymer division, research works on development of *ionics*, *polymer foams* and *flow improver* are going on.

Ionic properties of poly 2-vinyl pyridine (P-2VP) and its halides are investigated. The effect of additives like KBr on P-2 VP, polyvinyl alcohol (PVA) is also investigated.

Efforts are on to prepare polyacrylates from polyvinyl alcohol. The crux of the problem is to synthesise

the acrylates, which are soluble in petroleum crude .

Work is going on to develop new materials to be used as polymer foam. Polymeric foams are increasingly incorporated as components in laser targets for investigation in various experiments. Low-density foams around 30 mg cm^{-3} are the most convenient polymers to investigate the behaviour of different materials in plasma state. Instead of *in-situ* polymerisation we are trying to develop polymer dust.

The topics of the division are :

- Waves and Instabilities in Plasmas
- Sheath Phenomena in Plasmas
- Basic Plasma Processing
- Conductivity of Polymeric materials in solid state
- Development of Flow improvers to replace the imported one.
- Development of Polymeric foams.

Effect of trapped charges in sheath formation in isothermal plasma:

The motivation of the work is to study the salient features of sheath formation in plasma with the effect of trapped electrons. The trapping process of electrons causes the generation of multi-temperature electrons in plasma medium, which modifies the plasma sheath formation. The study has been augmented through the derivation of a nonlinear wave equation known as Sagdeev Potential equation with the consideration of multi-temperature electrons. The numerical observations show that the presence of high temperature electrons enhances the plasma sheath. Further the levitation of dust dynamics along with its characteristic behaviours within the sheath have been studied, which in turn finds the formation of dust cloud atmosphere in plasma sheath. The observations might have interest in laboratory and space plasmas.

Levitation of dust grains into sheath formed in magnetized plasma :

The nonlinear plasma-acoustic wave, based on the quasipotential analysis to the basic governing equations, has been augmented through the Sagdeev potential equation for finding the sheath formation in magnetized plasma. Afterwards, the interaction as well as the characteristic features of a levitated dust grain into sheath has been studied. Investigations have been furthered to calculate the sizes of different dust grains along with their potential variation which enables further to conclude, from the estimation of net force about the formation of dust atmosphere in space. Again, the different features on dust dynamics that too in relation to the similar observations in laboratory plasmas have been estimated as well.

Effect of multi-dipole cusp magnetic confinement on plasma characteristics in a cylindrical RF discharge system :

An experimental study on the plasma behaviours is carried out to see the effect of multi-dipole cusp magnetic field for surface confinement of plasma in a capacitively coupled cylindrical RF discharge plasma device. All the observations are done in Argon plasma produced at a fixed partial pressure 6.5×10^{-4} mb. The plasma density measured by an RF compensating Langmuir probe increases about 2.5 times with the cusp magnetic

confinement than without it, at the same power. The plasma electron temperature and plasma potential are found to decrease when the cusp magnetic confinement is present. The radial profiles of the plasma parameters are also investigated. The discharge voltage-current characteristics are measured with and without the cusp magnetic confinement. The schematic diagram of the experimental setup is shown in Fig.1.

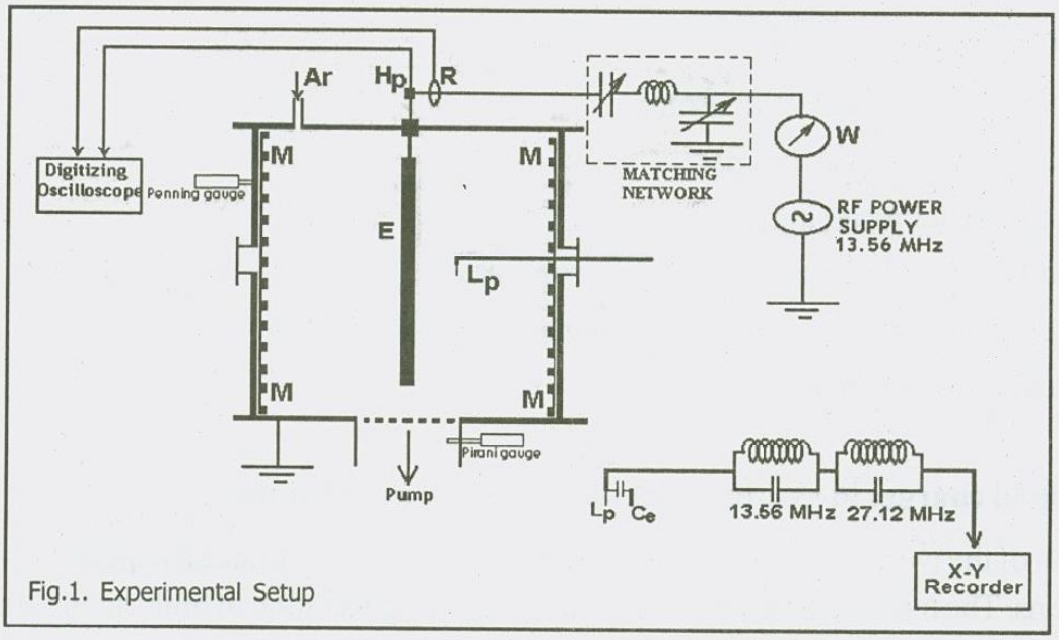


Fig.1. Experimental Setup

Fgl

Schematic diagram of the experimental setup with the RF compensating Langmuir Probe (shown in the rectangular box): E-powered electrode, MM- cusp magnetic cage, L_p-RF compensated Langmuir probe, W- power meter, H_p- 100X probe, R- Rogowski coil, Ce- compensating electrode.

Plasma density enhancement by thermoionic emission in a dc post magnetron sputtering system :

An extra arrangement of filaments is being made [Fig.2(b)] in a conventional dc post magnetron sputtering system[Fig.2(a)] so that thermo-ionically emitted electrons from the tungsten filaments can actively participate in the ionization process. Filaments are placed well inside the cathode sheath so that after being emitted from the filaments, the thermo-ionic electrons get accelerated in the cathode sheath electric field and hence can increase the ionization rate. The present experiment is performed in argon plasma keeping the applied voltage, applied magnetic field and gas pressure fixed. It is found that with the increase of filament heating power the plasma density and discharge current increases significantly when the filament is kept at more negative potential than the floating potential. The increment of density and discharge current becomes more effective when the filament is biased at higher negative potentials.

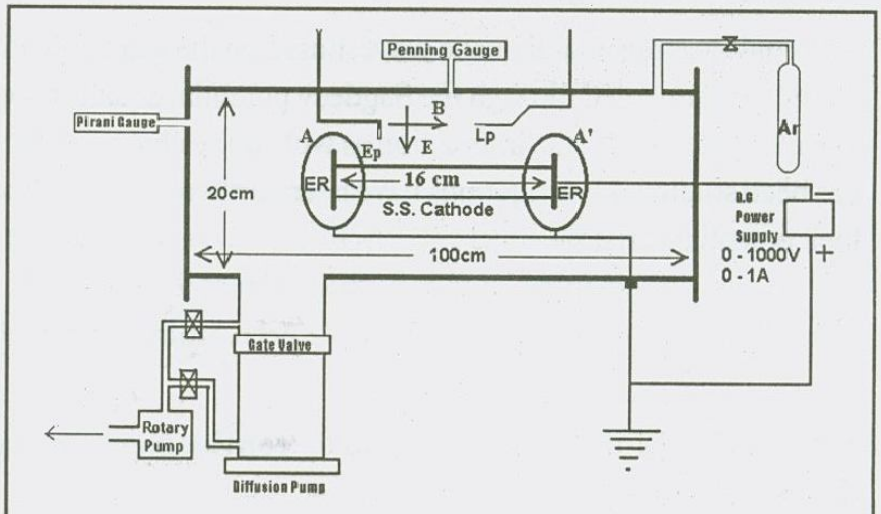


Fig.2(a). Schematic diagram of the experimental set up: B - Magnetic field, E - Electric field, S.S. Cathode - Stainless steel target cathode, AA' - Ring anodes, ER - End reflectors, V1,V2 & V3 - Vacuum valve, Lp - Langmuir

Influence of low energy ion beam on sheath characteristics in Plasma

Characteristics of steady state ion sheath formed in front of a negatively biased metal plate under the influence of an ion beam have been investigated in collisionless Argon plasma. The plasma is produced by hot-cathode discharge in a double plasma device. An emissive probe is used for continuous measurement of the axial plasma potential profile in front of the plate. A usual ion sheath is compressed up to certain limit by an ion beam directed toward the plate with certain energy. The numerical solution of the Poisson's equation, which includes the contribution of energetic ion beam, is compared with the experimental findings.

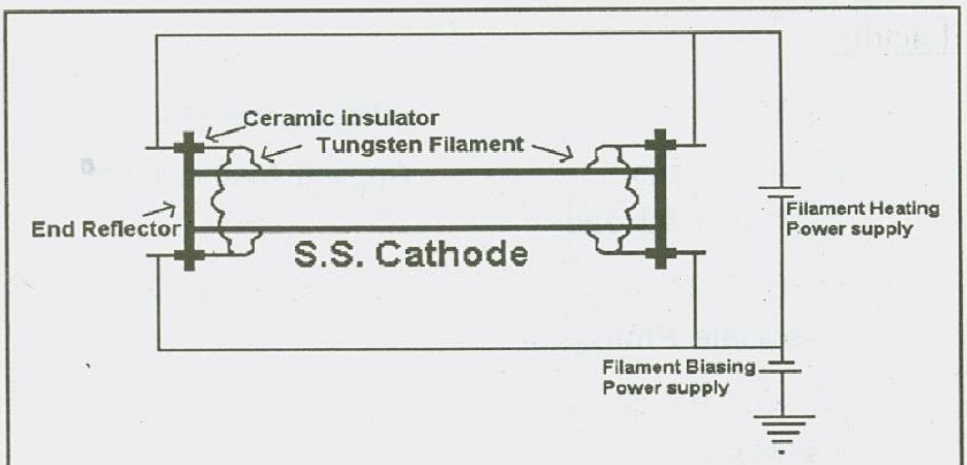


Fig.2 (b). Schematic diagram of the filament arrangement surrounding the cathode.

Investigation of sheath properties in Ar/SF_6 dc discharge Plasma

Properties of plasma sheath boundary in multi-component plasma with negative ions have been investigated experimentally. The modified Bohm sheath criterion derived for thermal electron-thermal negative ion-cold positive ion model predicts the decrease of positive ion drift speed toward the sheath when the negative ion concentration is gradually increased. This modified Bohm criterion has been discussed in this experimental investigation. The experimental parameters (e.g. discharge voltage, discharge current) set for argon plasma production are kept floating during the addition of SF_6 gas. Two important effects caused by the presence of negative ions e.g. decrease in Bohm speed of positive ions toward the sheath and reduction in plasma density have been observed. The reduction in the ion flux toward the sheath therefore causes the expansion of the sheath. The numerical solution of the Poisson's equation, which includes the contribution of negative ions, is compared with the experimental findings.

Installation of RF Plasma for Deposition on Bell metal :

An experimental study on the plasma behaviours is carried out to see the effect of multidipole cusp magnetic field for surface confinement of plasma in a capacitively coupled cylindrical RF discharge plasma device. All observations are done in Argon plasma produced at a fixed partial pressure 6.5×10^{4} mb. The plasma density measured by an RF compensating Langmuir probe increases about 2.5 times with the cusp magnetic confinement than without it, at the same power. The plasma electron temperature and plasma potential are found to decrease when the cusp magnetic confinement is present. The radial profiles of the plasma parameters are also investigated. The discharge voltage-current characteristics are measured with and without and without the cusp magnetic confinement. The deposition rate is increased in RF device with the help of additional cusp magnetic field. These conditions will be utilised in deposition of metal oxide film on bell metal.

2.2 MATHEMATICAL SCIENCES DIVISION:

Faculty

Name	Field of interest
Dr. G. C. Das Professor & Head	Applied Mathematics
Dr. B. C. Tripathy Associate Professor	Pure Mathematics
Dr. G. Choudhury Assistant Professor	Statistics

Mathematical Sciences Division was started in 1993 under a major project from the DST, GoI.

Presently the Division has, however, been maintained by the Institute itself since April, 2001.

The Division has been pursuing research works on the areas of soliton dynamics, sheath formation in plasma consisting of negative ions, levitation of dust grains into the sheath formation in the sheath, queueing network and communication system, distribution theory and application of functional analysis techniques, harmonic analysis and function theory and sequence space.

Applied Mathematics :

The research group led by Prof. G.C. Das has been working on soliton dynamics based on the nonlinear wave equation

$$\frac{\partial \phi}{\partial t} + A\phi\frac{\partial \phi}{\partial x} + \beta\frac{\partial^3 \phi}{\partial x^3} = 0;$$

They have developed a new technique, known as Sine-Gordon method and successfully derived equations satisfying experimental observation. The formation of the sheath in plasma, consisting of negative ions is established .The studies have been augmented through the derivation of Sagdeev potential equation

$$\frac{1}{2}\left(\frac{d\phi}{dx}\right)^2 + V(\phi, x) = 0;$$

The levitation of dust grains into the sheath has also been successfully investigated.

Generalised Kothe-Toeplitz duals of some sequence spaces:

Throughout $w, c, c_0, \ell_\infty, \ell_p, \varphi$ denote the classes of *all*, *convergent*, *null*, *bounded*, *p-absolutely summable* and *finite* sequences respectively.

Let E be a non-empty subset of w and $r \geq 1$, then the η-dual of E is introduced as follows :

$E^{\eta} = \{ (y_k) \in w : (x_k y_k) \in \ell_r$, for all $(x_k) \in E \}$.

A sequence space E is said to be η-*reflexive* or η-*perfect* if $E^{\eta\eta} = E$. For r=1, $E^{\eta} = E^{\alpha}$, the α-*dual* (*Kothe-Toeplitz dual*) of E.

The following aspects are established :

$\ell_r^{\eta} = \ell_{\infty}$ and $\ell_{\infty}^{\eta} = \ell_r$ and the spaces ℓ_r and ℓ_{∞} are η-perfect.

Let $p > r \geq 1$, then $\ell_p^{\eta} = \ell_q$, where $\frac{1}{p} + \frac{1}{q} = \frac{1}{r}$. The spaces ℓ_p and ℓ_q are η-perfect.

$\sigma^{\eta} = c_0^{\eta} = c^{\eta} = (bv)^{\eta} = (bv_0)^{\eta} = \ell_r$, where $bv_0 = bv \cap c_0$ and

$\sigma = \{ (x_k)$: there exists $k_0 \in N$ such that $x_k = - x_{k+1}$ for all $k > k_0 \}$,
known as the class of all *eventually alternating* sequences.

The spaces σ, c, c_0, bv and bv_0 are not η-perfect.

$\varphi^{\eta} = w$ and $w^{\eta} = \varphi$, hence the spaces w and φ are η-perfect.

On some class of difference paranormed sequence spaces associated with multiplier sequences :

Let $\Lambda = (\lambda_k)$ be a given multiplier sequence and $p = (p_k)$ be a sequence of positive real numbers, then we define the following classes of sequences :

$$c_0\{\Delta, \Lambda, p\} = \{(x_k) \in w : (r\lambda_k \Delta x_k)^{p_k} t_k \to 0, as \quad k \to \infty, for \quad some \quad r > 0\}$$

$$c\{\Delta, \Lambda, p\} = \{(x_k) \in w : (r\lambda_k (\Delta x_k - L))^{p_k} t_k \to 0, as \quad k \to \infty, for \quad some \quad L \in C \quad \& r > 0\}$$

$$\ell_{\infty}\{\Delta, \Lambda, p\} = \{(x_k) \in w : \sup_k | r\lambda_k \Delta x_k |^{p_k} t_k < \infty, for \quad some \quad r > 0\},$$

where $\Delta x_k = x_k - x_{k+1}$, for all $k \in N$, and $t_k = (p_k)^{-1}$ for all $k \in N$.

On taking $t_k = 1$, for all $k \in N$ in the above definitions, we have the sequence spaces $c_0(\Delta, \Lambda, p)$, $c(\Delta, \Lambda, p)$ and $\ell_{\infty}(\Delta, \Lambda, p)$ respectively.

It is shown that the spaces $c_0\{\Delta, \Lambda, p\}$, $c\{\Delta, \Lambda, p\}$ and $\ell_{\infty}\{\Delta, \Lambda, p\}$ (with $\inf p_k > 0$) are complete paranormed spaces, paranormed by

$$g_{\Delta}(x) = | x_1 | + \sup_k \left| \lambda_k \Delta x_k p_k^{-t_k} \right|^{\frac{p_k}{J}}, \text{ where } J = \max (1 , \sup_k p_k).$$

It is shown that the spaces are K-spaces (i.e. the co-ordinate maps are continuous). Since the inclusions

$c_0\{\Delta,\Lambda,p\} \subset \ell_\infty\{\Delta,\Lambda,p\}$ and $c\{\Delta,\Lambda,p\} \subset \ell_\infty\{\Delta,\Lambda,p\}$ are proper , so we have the spaces $c\{\Delta,\Lambda,p\}$ and $c_0\{\Delta,\Lambda,p\}$ are nowhere dense subsets of $\ell_\infty\{\Delta,\Lambda,p\}$. It is proved that the spaces $c_0\{\Delta,\Lambda,p\}$, $c\{\Delta,\Lambda,p\}$ and $\ell_\infty\{\Delta,\Lambda,p\}$ are neithers solid nor symmetric . Some inclusion results are proved .

Necessary and sufficient conditions are obtained for the equalities $c_0(\Delta,\Lambda,p)=c_0\{\Delta,\Lambda,p\}$ and $\ell_\infty(\Delta,\Lambda,p)=\ell_\infty\{\Delta,\Lambda,p\}$.

Applied stochastic processes and applied statistics.

Queueing system (a branch of Applied Stochastic Processes) with vacations is an important area of queueing theory . This has received considerable attention from researchers and practioners interested in its applicatons in digital communication , data transmission , local area networks and daily life situations . For example in manufacturing system of job-shop type , each job requires to manufacture more than one unit , in digital communication systems, messages which are transmitted could consist of a random number of packets . For a systematic account of the fundamental methods and main results on this topic , we refer the reader to see *Doshi (1986) , QUESTA ,1 , 29-66* and *Teghem (1986) , Euro.J.Ops.Res., 23, 141-158* . Based on their investigations we have further investigated some important models this year Following is the brief description of the works done with research scholars Ms.M. Paul and Ms.S. Kalita.

(I) First of all we have studied an $M^x/G/1$ queue with a vacation time under single vacation policy, where the server takes exactly one vacation between two successive busy periods. We derive the steady state queue size distribution at different epochs , as well as the steady state distributions of busy period and unfinished work for this model . Our model generalized the model studied by *Levy and Yechiali (1975) , Management Sciences , 22 , 202-211 , Doshi (1986) , QUESTA , 1 ,29-66* , and *Takagi (1992) , Journal of Applied Probability , 29 , 418-429* .

(II) Secondly we investigate the additional queue distribution, distribution of additional delay and waiting time distribution of an *M/G/1* queue with two different vacation times under multiple vacation policy, where length of the first vacation period is different from second and subsequent vacations. The model was first studied by *Lee (1988) , Comp. Oprs. Res. , 15 , 441-445* , by applying *supplementary variable technique* . However, we utilize *length biasing technique of renewal theory*, which is of course a powerful tool to generalize the results of *Lee (1988)* and *Leung (1992) Ops. Res. 40 , S272 - S283* .

(III) In the process of generalization we next study the steady state behaviour of an $M^x/G/1$ queue with vacation time, where the batches of customers are assumed to arrive the system according to a compound Poisson process and there are two types of possibilities of taking vacations viz. (i) the server keeps on taking vacations till he finds at least one unit in the queue (*multiple vacations*) or (ii) he may take only one vacation between two successive busy periods (*single vacation*) .

For this model we investigate the queue size distributions at different points of time. Further, we have studied more generalized model to cover both the cases single as well as multiple vacations. The *supplementary variable technique* has been applied to study such models.

(IV) Further we study the steady state behaviour of an $M^x/M/1$ queue with N-policy , where the server is turned off the system each time when the system becomes empty and turned on again as soon as the server finds a batch of N (≥ 1) customers in the system . By applying *standard birth and death equations* we obtain the queue size distribution at a stationary point of time as well as a departure point of time. For this simple model we demonstrated that the queue size distribution at a departure epoch can be decomposed into distributions of three independent random variables viz.

1. *The queue size of the standard $M^x/M/1$ queue*
2. *The queue size due to N-policy and*
3. *The queue size caused by the arrival size random variable .*

(V) Finally, we develop a *simple transformation free method based on renewal theory* to obtain the moments of an *M/G/1* queue with a random setup time. In this model the service of the first unit in each busy period need an extra amount of time called setup time of random duration before the service is started.

Some on going research problems have been carried out as an inter institutional collaborative research works with *Prof. A. Krishnamoorthy , Department of Mathematics, Cochin University of Science and Technology*, a part of which has been accepted for publication in a journal of international repute. Again, another collaborative research work has been done with *Professor A. Borthakur, Retired Professor of Department of Statistics, Gauhati University, Guwahati*, which has been accepted for publication in another International Journal. Presently some other collaborative research works have been done with *Professor K.C..Madan, Department of Statistics, Yormouk University, Jordan*, as inter institutional collaborative research works. The outcome of these investigations has been communicated to some journals in the form of papers for publications.

Recently , we have started investigation of the queueing system with repeated attempts with distinguished *Professor J.R.Artalejo , Department of Statistics and Operations Research , Complutense University of Madrid , Madrid , Spain* . Many queueing situations have the features that customers finding the service area busy upon arrival must leave it temporarily and join a group of unsatisfied customers , but they repeat their request after some time . Between trials a customer is said to be in 'orbit' . These queueing models arise in the stochastic modeling of many communication protocols, local area networks. The most simple and obvious example is provided by a person making phone calls. If the line is engaged then he is not able to queue but tries his luck again after some time. The operating characteristics of such a model is studied. The findings are communicated for publication in the form of a paper.

2.3 LIFE SCIENCES DIVISION:

Faculty :

Name:	Field of interest
Dr. N. Deka, Professor	Biochemistry and virology
Dr. P. Azad, Associate Professor	Bio-fertilizer and Bio-control
Dr. J. Kotoky, Assistant Professor	Herbal Medicine
Ms. D. Devi, Assistant Professor	Sericulture.

Life Sciences Division:

This division has four units:

i. Biochemistry and Medicinal plants
ii. Sericulture
iii. Bio-fertilizer
iv. Molecular biology

i. Biochemistry and Medicinal plants unit :

a. Investigation, evaluation, standardization and development of herbal medicines

In continuation or earlier work, we had started working on the investigation, evaluation, standardization and development of herbal medicine, which are most effectively used by the people in the village. We had surveyed some areas of Kamrup district and interacted with the local herbal / traditional practitioners in the last year and the information gathered from them about the use of such remedies, we had concentrated on the following broad fields-

b. Study on Sida cordifolia - a potent hepatoprotective agent :

The plant *Sida Cordifolia* had already been studied last year for evaluating its efficacy against liver ailment using a liver toxicant, carbon tetrachloride. In the year of reporting, we have studied the hepatoprotective efficacy of the root extract of this plant against another proven experimental model using D-Galactosamine. It was studied against rats intoxicated with D-Galactosamine which have been subsequently fed the root extract of the plant. The methanol extract of the root of the plant protects the liver from the damage caused by the toxicant.

c. DIAJIV - I, a plant and mineral based indigenous formulation against hyperglycemia :

DIAJIV - I, a plant and mineral based indigenous formulation was studied for its anti-diabetic activities

using experimental animals against Alloxan induced hyperglycemia. The preliminary data shows positive response. Further work on this is in progress.

d. Bone fracture healing work :

Bone fracture healing work was taken up during this period with the help of Regional Dental College, Guwahati. The plants used for the purpose shows very significant and promising results on experimental animals in respect of bone fracture healing, analgesic and anti-inflammatory properties. The toxic effects of the formulation on the skin of the effected area of the body on using the remady have to be studied and evaluated. The work is in progress.

e. Bioprospecting and biodiversity of medicinal plants of North-Eastern India :

In India, leafy vegetables or greens from many plants are used in the diet since ancient times. They are nutritionally very important and are rich in vitamins and minerals. The Northeastern region is one of the world's twenty mega biodiversity regions and hence this region is abundant in many kinds of plants. People of this region have been eating large varieties of leafy vegetables in their daily diet since long past.

In this report nutritional evaluation of eleven commonly used leafy vegetables of the Northeastern region of India has been done. The medicinal values of these leafy vegetables are alrady evaluated and are available in the literature.

Many micronutrients such as iron, nickel, copper, zinc and manganese are found to be present in sizable amount in these leafy vegetables. Many of these elements function as components of enzymes and often get lost from the vegetable parts when subjected to processing. As most of the leafy vegetables are eaten without processing, these are excellent sources of micronutrients for human.

For the second project two medicinal plants, *Clerodendron colebrookianum* and *Sida cordifolia* are selected for bio-prospecting studies. Previous reports from this institute point to the cardio protective action of *C. colebrookianum* and hepatoprotective action of *S. cordifolia*. Currently the pharmacological safety of *C. colebrookianum* has been evaluated and is found to be non allergic and non-toxic in mice. In studies of the hepatoprotective activity of the root extract of *Sida cordifolia* against experimental liver injury by d-galactosamine in rats, the root extract was found to be protective against the liver injury.

ii. Sericulture Unit :

a. Indoor rearing of muga silkworm :

Rearing of muga silkworm in indoor condition is being continued at the rearing house of the institute. A typical blue (larval colour) colour variety (seems to be wild) has been collected from southern part of Garo hills and the 2nd generation of the same has been completed at laboratory condition.

b. Bacterial flacheri in muga silkworm : Biochemical basis and its control :

The term flacheri refers to infection of silkworm by pathogenic bacteria. The muga silkworm, *Antheraea assama* WW. is indigenous to northeast India and has a high incidence of flacheri. Out door rearing makes it

more susceptible to the disease. Through a series of experiments, one of the causal bacteria of flacheri was identified as *Psseudomonas aeruginosa* strain AC-3. The economically handicapped muga rearer is always at the mercy of nature and faces serious problems on account of flacheri. Effective remedial measures that can be easily afforded by the silkworm growers are urgently required to combat the disease. Attempts have been made to find out the agent to combat the disease causing bacteria using various plants that are known to contain therapeutic value, both under *in vitro* and *in vivo* condition.

c. Eri silkworm :

The project entitled 'Developing isozyme marker for different stocks of eri silkworm' has been completed and the report has been submitted to the DBT,GOI, New Delhi on 5th December, 2002. The result obtained from the project has been recommended by the member of the task Force committee and the report has been handed over to the CSB's Head office at Mysore as suggested by the committee. The germ plasm of eri silkworm has been handed over to the eri research centre, Central Silk Board, Mendipathar, Meghalaya.

iii. Bio-fertilizer unit :

The Unit of Bio-fertilizer has been continuing with a DBT, Govt. of India sponsored adhoc project entitled "Studies of *Rhizobium* bio-fertilizer for improvement of pulse production in Assam", completed during 1994-95 to 1997-98.

Another poject proposal entitled " Proposal for Upgradation of Bio-fertilizer Production Unit" has been submitted to the NEC, Govt. of India, Shillong through the Agriclutural Department, Govt. of Assam for financial support. In this project we propose to get infrastructural facilitted mostly instruments chemicals and glasswares with an aim to produce biofertilizer with our locally developed and preserved strains of Rhizobia, Phosphotica, Azotobacter, etc. along with some introduced strains and thereby to transfer technology development from lab to field.

Besides the above activities, this unit has also been continuing works on biocontrol since 1996 with an adhoc project proposal entitled" Survey, collection and study of phytopathogenic fungi on cultivated crops of Assam". The project has been completed in March, 2000 and thus a new project proposal on "Studies on *Pseudomonas* mediated induced resistence and biocontrol of Blast of rice caused by *P. oryzae* has been submitted to the ICAR, Govt. of India, New Delhi for their financial support.

Further one research project proposal on "Microbial diversity of Manas and Dibru-Saikhowa biosphere reserve of Assam", submitted to the Ministry of Environment & Forest, Govt. of India, New Delhi is under active consideration of the said Ministry.

iv. Molecular biology unit :

Molecular Virology of Muga silkworm

In the area of characterization of Muga silkworm viruses recently a novel double stranded DNA virus has been detected from virally infected Muga silkworm larvae from two recent epidemics. Infected Muga silk worm samples were collected from two epidemics that occurred in Hahim and Khanapara, the two Muga

rearing farms in the neighborhood of 100 Km of Guwahati, Assam. The infected silkworm were showing the symptoms of viral infection. Viral nucleic acid was prepared following the procedure as described in Maniatis et al (in Molecular Cloning' by Maniatis et.al). For extraction of DNA from virus-infected cells infected Muga silk worms were maceratd in PBS solution and filtered. The filtrate was pelleted by centrifugation at 3,000 rpm for 15 minutes and the pellet was washed with PBS. The pellet was resuspended in cellysis buffer containing 50mM Tris-HCI,pH 8.0, 0.5% 2-mercajptoethanol, 0.4% w/v SDS and 10mM EDTA, proteinase K was added to the lysate and incubated at 37°C for 30 min. The aqueous fraction was removed and the DNA samples were run on a 1% agarose gel with /Hind III marker. The viral DNA is found to exist as super coiled form. Analysis with restriction enzyme proves it to be double stranded. Keeping in mind that the two other DNA viruses of silkworm the presently isolated Muga silkworm virus appears to be novel. The previously known silkworm DNA virus have different genome sizes i.e NPV has a double stranded DNA of size 80-200Kb and the DNV has a single stranded DNA of size 8-9 Kb. On the basis of available information it appears that this Muga virus is a new one. Current work is aimed at purification and quantification of the virus. In the future efforts will be made to clone and sequences the virus by cloning the restriction sub fragments of the viral genome in appropriate vectors. Attempts will be made to develop a cell culture method to propagate the virus for further studies on molecular mechanism of infection by this virus.

2.4. Resourch Management & Environment division :

Faculty

Name	Field of Interest
Dr.(Mrs) S. C. Bordoloi Associate Professor and In-charge,	Ecology , Developmental Biology and Exploration of Faunal Diversity in North East India.
Dr. S. Deka, M. Sc., Ph.D. Assistant Professor	Environmental biology (Biodegradation and Waste Management)
Dr. A. Barua, M. Sc., Ph.D. Assistant Professor	Environmental biology (Phyto-remediation and Hydrocarbon)
Dr.(Mrs). A. Devi, Assistant Professor	Environmental Chemistry (Heavy metal and Hydrocarbons)

Ecology, Developmental Biology and Exploration of Faunal Diversity in North East India.

The division is conducting research on various environmental problems of the North Eastern India since its inception in 1990. Recently the division has ventured into yet another field of research regarding the exploration of faunal diversity of this region. Though not virgin, the field of faunal diversity of the region has practically remained under explored and in some remote areas unexplored. Exploration of faunal diversity in biodiversity hot spot areas of North Eastern region has been planned. The study will include preparation of developmental history of selected rare and endangered species endemic to the region . In view of global climatic change and deterioration of natural habitats due to anthropogenic stress, study of ecosystems

has become very important. Detailed physicochemical characteristics will be assessed in some of the potential habitats of rare and endangered endemic fauna of the region. Eco-biological study of some of the rare fauna has already been taken up.

Environmental biology (Biodegradation and Waste Management) :

Utilization of lime sludge waste of Jagiroad paper mill for fish culture

The project on "Utilization of lime sludge waste of Jagiroad paper mill (Morigaon) for fish culture" sponsored by the Indian Council of Agricultural Research (ICAR), New Delhi has been started on July13, 2001, under the supervision of Dr. S. Deka, Assistant Professor as Principal Investigator. The project has been sanctioned for a period of three years w.e.f. July13, 2001 to July 12,2004. The main objectives of the project are:

i. To analyse the physicochemical properties of lime sludge waste of Jagiroad paper mill, Assam
ii. To assess important physicochemical parameters of soil and water of selected fishponds of the river Brahmaputra velley.
iii. To assess the efficacy of lime sludge waste in correcting acidity of soil and water in experimental ponds/tanks.
iv. To evaluate the effect of application of lime sludge waste on quality and quantity of plankton in fishponds.
v. To determine the dosage of lime sludge waste required for maintaining an alkalinity within desirable range.
vi. To study the effect of application of lime sludge on fish production and fish quality.
vii. To study the bioassay of fish on application of lime sludge.

Achievement during the year 2002-2003

Soil and water samples were collected from some selected ponds, beels, Govt. fish farm and private fish farms of Barpeta, Darrang and Sonitpur district of Assam. The collected soil and water samples were analysed and the results are given below :

Water samples :

i. pH of the water samples collected from beels, public ponds, private ponds and Govt. fish farm were ranged from 6.29 to 7.21, 6.50 to 7.95, 6.42 to 7.94 and 6.31 to 8.23 respectively.
ii. Conductivity (mS/cm) of the water samples were ranged from 0.051 to 0.59 in Govt. fish farm, 0.036 to 0.099 in beels, 0.056 to 0.724 in public fisheries and 0.086 to 0.372 in private fisheries.
iii. Dissolved oxygen (mg/l) of water samples ranged from 4.24 to 13.93 in govt fish farm, 6.60 to 11.55 in beels, 3.03 to 10.1 in public fish farm and 5.65 to 12.24 in private fish farms.
iv. Total alkalinity (mg/l) of water samples ranged 10 to 205 in Govt. fish farm, 25 to 60 in beels, 30 to 255 in public fish farm and 5.65 to 12.24 in private fish farm.
v. Total hardness (mg/l) of water samples ranged 0 to 116 in Govt. fish farm, 2 to 36 in beels, 6 to 212 in public fish farm and 6 to 156 in private fish farm.
vi. Amount of free carbon dioxide (mg/l) of water samples was found to be 4.58 to 9.04 in Govt. fish farm, 2.38 to 4.77 in beels, 2.07 to 13.74 in public fish farm and 4.14 to 24.64 in private fish farm.

Soil Samples :

i. pH of the collected soil samples were found from 5.30 to 7.50 in Govt. fish farm, 5.08 to 6.17 in beels, 5.83 to 6.93 in public fish farm and 5.70 to 7.75 in private fish farm.

ii. Conductivity (mS/cm) of the soil samples were ranged from 0.022 to 0.215 in Govt. fish farm, 0.020 to 0.054 in beels, 0.029 to 0.409 in public fish farms and 0.030 to 0.947 in private fish farms.

Analysis of other parameters like organic carbon, water holding capacity, available phosphorus, nitrogen, sodium, potassium, soil texture etc. of the collected soil samples are going on.

Moreover, during the year, analysis of marketed lime and lime sludge waste collected from Jagiroad paper mill have been done and the results have been listed below :

Analysis of lime sludge waste of Jagiroad paper mill, Assam and marketed lime

Parameter	Marketed lime	Lime sludge waste
pH	13.96	10.80
Water holding capacity	158.1 %	70.43%
Organic Carbon	0.029%	0.12%
Calcium Carbonate	99.0%	66.5%
Chloride	4615 ppm	56 ppm

The presence of heavy metals and other toxic substances, whether present or absent in the lime sludge waste of Jagiroad paper mill was investigated and found that there is no such types of toxic substances above the permissible level as per WHO's standard. The findings encourage using lime sludge waste as alternative source of marketed lime for fish culture.

The other investigations of the project as envisayed in the objectives are progress.

Environmental biology (Phyto-remediation)

Dr. A. Barua is looking after phyto-remediation and bioremediation aspect of 'Environmental problems in Tea Garden' sponsored by the Ministry of Environment and Forest, GoI. The project was started in May 2002,

The objectives of the project is to generate detailed database on environmental problems created by tea gardens as well as faced by tea garden's, and to disseminate the information to researchers, students, industry, government bodies and to entertain the queries coming from abroad.

Data are being collected, edited, and put in the project Website http://www.nei-envis.org which can be accessed by anybody to download any type of information on tea industry, in particular, the environmental problems in the tea garden. In addition to the website a quarterly newsletter is being published and circulated to concerned bodies/agencies/houses free of cost. The website also gives direct link to almost all the important online database in the world in the subject area.

Dr. A. Barua is also the P.I. of the project ' Phyto-remediation of oil and heavy metal polluted soil and water n and around oil fields of Upper Assam sponsored by M/S Oil India Ltd, Dulijan.

Preliminary investigation of the sites and analysis of the sample have given some interesting results about the co-relations between oil and heavy metal content of the soil with succession of phyto-communities of different grades on resistance. The findings will lead to development of the following:

) Development of a combination of phyto-remediation process for safe remediation of petroleum and heavy metal contaminated soil and water leading to permanent restoration of petroleum and heavy metal contaminated soil and water which in turn will lead to permanent reclamation of polluted areas in and around oil field areas.

) The evaluated plants can also used for developing green belts in and around the oil and fields and refinery campuses as a permanent and self sufficient remedy.

i) The evaluated plants and optimized self-sufficient phyto-remediation process would be useful in detoxifying soils and water polluted by other industry like coal, paper, plywood etc.

Environmental Chemistry (Heavy metal and Hydrocarbons)

Environmental Impact of long-term coal mining in Assam with particular reference to heavy metal pollution of water bodies.

Though not a major coal producing state of India, extraction of coal has considerable impact on Assam.

The Borail range in the extreme northeastern corner of Assam, covering the district of Dibrugarh and Tinsukia, s one of the chief sources of oligocene tertiary coal in the country.

Two important coalfields, namely Dilli-Jaipur coal fields and Makum coal fields constitute the Barail range.

Most of the coalfields in Dilli-Jaipur belt have now been closed down due to declining production but Makum oalfields have been in operation since 1882. These coalfields have produced more than 25 million tonnes of oal so far.

Though the mining activities in the coal fields of upper Assam has been reported to cause environmental damage, lack of data on the possible impact of long term coal mining has underlined the need to undertake a ystematic study of water and soil quality in the active coal mining area with particular emphasis on leaching of eavy metals to the surrounding water bodies and soil.

Five sets of water and soil samples were collected till date from a large number of different sources from the rea under study. The random samples were collected from an area stretching about 60 km . in July, 2001 , anuary, 2002, May, 2003, October, 2002, January, 2003.

The samples were brought to the laboratory within 24 hours of collection and the analysis was taken up mmediately.

Fourteen sampling stations were covered during the first four batches of sampling. Out of these, ten samples were from rivers and rivulets, two were from public ponds, one from tube-well and one from municipal upply. For the soil and sediment analysis as many as twelve samples were collected from the banks of rivers nd rivulets. Two samples were directly from paddy fields.

During the fifth batch of sampling, more samples were collected covering fifteen ground water samples, twelve pond water samples, fifteen river water samples, two municipal supply water, and twenty soil samples stretched over the coal mining area.

The ranger of water quality parameters are given below:

Bicarbonate-(0.0-272.0) mg dm^{-3}
Carbonate——(0.0-1.8) mg dm^{-3}
Phosphate—(0.0-0.023) mg dm^{-3}
Sulphate—(0.36-0.52) mg dm^{-3}
Sodium——(4.5-49.5) mg dm^{-3}
Potassium-(1.7-14.7) mg dm^{-3}
Calcium——(0.8-440.0) mg dm^{-3}
Magesium-(4.9-791.9) mg dm^{-3}

The ranges of soil quality parameters are given below :

PH——(3.7-7.9)
EC—(10-740)
Moisture
Content —(3.6-14.8)%
W.H.C.924.5-66.5)%
Particle density (1.81-2.700)g cm^{-3}
Bulk Density-(0.8-1.5) g cm^{-3}
Organic carbon-(0.10-3.12)%
Bicarbonate-(0.0-608.3) mg kg^{-1}
Phosphate-(0.0-0.0060 mg kg^{-1}
Sodium—(22.0-64.0)mg kg^{-1}
Potasium-(13.0-108.00) mg kg^{-1}
Calcium—(208.4-1843.7) mg kg^{-1}
Magnesium (68.3-956.3) mg kg^{-1}

The preliminary study reveals

a) The water and soil of the coalfield area are sufficiently degraded in quality due to the entry of minimum wastes.
b) A major finding of the study is the growing acidity of some surface water sources due to input of acid mine drainage pH as low as 1.1 was detected in a few water samples from the area indiating highly acidic nature of water in some areas.
c) During the mining process and after reclamation, soils are not stable and erode quite easily. This eroded soil might have been responsible for large silt contents at some of the soil sampling stations and would be responsible in the long run for clogging streams and rivers and for adversely affecting aquatic life.

2.5 COMPUTER SCIENCES DIVISION

Faculty :

Name

A. Barman, B.E, M.S,
Assistant Professor & In-charge

Mrs. L.B. Mahanta, M.Sc, DCA
Assistant Professor

Ms. A. Dutta, MCA,
Assistant Professor

K. Kr. Baishya, BE (CSE)
Assistant Professor

Computer Sciences Division :

During the year 2002-2003, the Computer Science Division of IASST has imparted computer training to research scholars and students of the institute through the following courses :

Sl. No.	Name of the Course	Total Intake	Examination Status	No. of passed students
1.	DOEACC "CCC"	a) Apr 2002 : 17 b) Sep 2002 : 16	17 16	Apr 2002: **5** pass Sep 2002: **3** pass
2.	DOEACC "O" Level	Jan 2002 : 21	**July 2002 exam :** 21 (first batch) \	**17**
		Jul 2002 : 26	**Jan 2003 exam :** 38 (including old batch)	**20**
3.	DOEACC "A" Level	Jan 2002 : 38	**July 2002 exam :** 79 (including old batch)	**50**
		Jul 2002 : 20	**Jan 2003 exam :** 87 (including old batch)	**51**
4.	PGDCA Course	No intake this year	**April 2002 exam :** 19 (back from Feb 2001 - Mar 2002 batch)	**19**

Workshop on Oracle 9i Database Administration :

For the first time in the north- east, a high level workshop was held at the Computer Science Division of the institute during February 10 - 15, 2003. An expert panel comprising of Dr. Gautam Baruah, IIT Guwahati delivered the inaugural lecture of the workshop and Md. Khaleeq Ahmad, Software Engineer (OCP), IIT

Kanpur imparted the professional training on Oracle 9i Database Administration during this workshop. The workshop was intended for programmers wanting to switch to a career as DBA, system administrators, database administrators, technical support professionals and also students who are interested in acquiring expertise in Oracle Database Administration using Oracle 9i. Participants from various colleges, universities, industry and software development firms attended this workshop. The feedback of the workshop was encouraging as shown below:

Feedback Analysis of the Workshop on Advanced Oracle 9i Database Administration

10th to 14th February 2003

Feedback :	**Count :**				**Percentages :**			
Parameters	**Excellent**	**Good**	**Fair**	**Not-Answered**	**Excellent**	**Good**	**Fair**	**Not-Answered**
Course content	10	5	0	0	66.67	33.33	0.00	0.00
Course material	3	11	1	0	20.00	73.33	6.67	0.00
Machine confg. /performance	4	10	1	0	26.67	66.67	6.67	0.00
Lab session	1	13	1	0	6.67	86.67	6.67	0.00
Theory session	14	1	0	0	93.33	6.67	0.00	0.00
Quiz session	8	6	0	1	53.33	40.00	0.00	6.67
Guidance	14	1	0	0	93.33	6.67	0.00	0.00
Food	2	10	3	0	13.33	66.67	20.00	0.00
Accommodation	0	2	0	13	0.00	13.33	0.00	86.67
Other facility	1	6	0	8	6.67	40.00	0.00	53.33

The Computer Science Division has extended INTERNET facility under the supervision of Mr. A. Barman, Asstt. Professor and In-charge for all the divisions of the IASST and students of the institute through its own Local Area network (LAN). Altogether 50 computers have been connected to the LAN to access the Internet connection.

The CSD has also extended its service in computerization of the IASST Library. Also, around 1000 Information Technology related books have been procured by the CSD for the students and research scholars of IASST.

Apart from the above, the CSD has extended its consultancy services to the Gauhati University, Indira Gandhi National Open University, College of Veteninary Science, etc for various purposes viz., project evaluation, paper examination, statistical analysis, etc.

2.6 LIBRARY & INFORMATION CENTRE :

The Library and Information Centre of the Institute of Advanced Study in Science and Technology, continued to cater to the information needs of the scientists, students, research scholars, of the institute as well as of outside.

The library and information centre of the institute is concentrating for procuring of printing and non-printing documents like books, booklets, journals, publication reports, compact disk in the discipline of Plasma Physics, Polymer science, Computer Science & Technology, Mathematics, Queueing theory, Distribution Theory and Application, Harmonic Analysis, Statistics, Life Sciences, Medicinal Plants, Biotechnology, Sericulture, Bio-prospecting, Bio-fertilizer, Virology, Immunology, Agriculture, Microbiology, Pathology, Genetics, Physiology, and Environmental Sciences pertinent to wastes, environmental pollutants ecology, sewers pollution and its related aspects.

Library has subscribed for 77 numbers of journals both Indian and Foreign in the subjects of Plasma Physics, Polymer Science, Life Science, Mathematics & Statistics, Resource Management & Environment, Computer & Information Technology. Besides these, a number of Review, Popular scientific journals, newspapers, magazines etc., are subscribed for the faculty and staff.

Expeditious Photostat service has been provided to the clients through Cannon Xerox, machines. During the year 2002-2003, 12,806 Photostat copies of reading material, symposium materials, project etc were made.

The library has continued to provide classified information services such as Current Awareness Service (CSA), Selective Dissemination of Information Service (SDI), Indexing, Reference & Information service, Referral service, Reprographic service, Computerized Information service, where database search service through SOUL software, internet search service, E-mail service, circulation service and inter library loan (ILL) to the users,

During the financial year April 2002 to March 2003, the new addition of the institute library is books 513, journals 4, Bound periodicals 227, Thesis & Dissertation 15, Research papers 10, Bulletin, Annual Report, News letters etc. 25, Compact disk 10, through purchase and complementary and *gratis* copies from some renowned personalities and organizations.

At present the collection of the library is - books 6784, current journals (77 including foreign and Indian), Bound periodicals 806 , Thesis & Dissertation 150, Research Papers 132, Bulletin, Annual Reports and News letters etc. 446. Library automation is going on. The catalogue entries are being prepared by SOUL library Management Software. It is planned to prepare a computerized database of S&T documents available in NE India for scientists and technologists. Moreover, the process is going on to prepare database of science reading materials available in greater Guwahati. The process is going on for preparation of a list of institutes library database which will be available on the institute WEB Site: http://iasst.res.in shortly. It is planned to introduce Bar-code Systems for searching the library documents through Bar-code reader.

3. RESEARCH PUBLICATIONS IN SCIENTIFIC JOURNALS

1. A. R. Pal, D. Boruah, H. Bailung and Joyanti Chutia, Influence of low energy ion beam on sheath characteristics in Plasma, *Physics Letter A,* **305** (2002) 419 - 426

2. D. Boruah, A. R. Pal, H. Bailung and Joyanti Chutia, Investigation of sheath properties in Ar / sF_6 dc discharge Plasma, *J. Phys. D: Appl. Phys,* **36** (2003) 645-652

3. Neelotpal Sen Sarma and N. N. Dass, Vinyl Polymer as solid state ionics , *J. Polymer Materials*, **19**, (2002) 179-182

4. R. Saikia and P. Azad, Effect of Different elements in sugarcane during infection with *Colletotrichum falcatum* Went, *J. Environment & Ecology*, **19(3)** 2001, 614-616 appeared in 2003

5. R. Saikia and P. Azad, Effect of certain carbon and nitrogen sources on the antagonistic activities of some bio-control agents against *Colletotrichum falcatum* Went, *J. Environmental and Ecology*, **19(4)** 2001, 849-852 appeared in 2003.

6. R. Saikia and P. Azad, Effect of some biological and chemical agents on *Colletotrichum falcatum* Went, *Asian J. of Biotech Env. Sc.*, **4** (2001) 393-399 published in 2003.

7. G. Choudhury, A batch arrival queue with a vacation time under single vacation policy, *Computers and Operation Research*, **29** (2002), 1941-1955.

8. G. Choudhury, Analysis of the $M^x/G/1$ queueing system with vacation times, *Sanakya*, Ser-B, **64** (2002), 37-49.

9. G. Choudhury, Analysis of $M^x/G/1$ queueing system with vacation times under multiple vacation policy, *Stochastic Analysis and Applications*, 20 (2002), 901-909.

10. G. Choudhury, A note on moments of waiting time for $M/G/1$ queue with random setup time, *Far East Journal of Theoretical Statistics*, **6** (2002), 81-85.

11. S. Kalita and G. Choudhury, some aspects of batch arrival Poisson queue with N-Policy, *Stochastic Modelling and Application*, **5** (2002), 21-32

12. B. C. Tripathy and P. Chandra, On Generalised Kotha- Toplitz Duals of Some Sequence Spaces, *Indian J. Pure Appl. Math.*, **33 (8)** (2002) 1301-1306.

13. B. C. Tripathy, A Note on Statistical Convergent Sequences, *Bull. Gauhati University Math. Assoc.*, **7** (publ. Sept 2002), 39-44.

14. B. C. Tripathy, On Statistical Convergence, *Proc. Conf. On Rec. Develop. In Math. and Appl.* (2002), 90-97.

15. B. C. Tripathy, On some Class of difference paranormed sequence spaces associated with multiplier sequences, *International J. Math. Sci.,* Vol. 2 (vo.1) 2003

4. RESEARCH PAPERS PRESENTED IN NATIONAL/ INTERNATIONAL CONFERENCES / SEMINARS

1. D. Boruah, N. C. Adhikary and H. Bailung, Influence of electron beam on ion sheath characteristic, Power Beams and Material Processing PBAMP-2002, held at BARC, Mumbai, September 2002.

2. G. C. Das and P. Kalita, Effect of trapped charges in sheath formed in isothermal plasmas, Power beams and Material Processing PBAMP-2002, held at BARC, Mumbai, September 2002.

3. A. R. Pal and Joyanti Chutia, Sheath modification by injection of low energy beam in plasma, Power Beams and Material Processing, PBAMP-2002, held at BARC, Mumbai, September 2002

4. J. Chutia, A. R. Pal, D. Boruah, N. C. Adhikary and H. Bailung, Observation of instability in magnetron discharge plasma, International Conference on Frontiers of Plasma Science, Bangalore, December 2002.

5. H. Bailung, D. Boruah, A. R. Pal, N. C. Adhikary and Joyanti Chutia, Seath characteristics in multi component plasma science, International Conference on Frontiers of Plasma Science, Bangalore, December, 2002

6. G. C. Das and P. Kalita, Clustering of dust grains atmosphere in magnetized plasma, International conference on Frontiers of Plasma Science, Bangalore, December 2002.

7. Neelotpal Sen Sarma, A. Dutta and N. N. Dass, Conductivity of polymers, National Conference on High performance Polymer and its application ,Jadavpur University, Kolkata.

8. B. C. Tripathy, On Statistical Convergene, Proc. Conf. Rec. Develop. In Math. and Appl. (2002), 90-97.

9. G. Choudhury, A two phases heterogeneous Poisson input queue with modified Bernoulli vacation model, on Stochastic Modelling and IV International Workshop on Retrial, Queue, held at Cochin University of Science & Technology, during 17th - 21st December, 2002.

10. G. Choudhury, Recent development of queueing system under Bernoulli vacation schedule, International Conference on Recent trends in Probability and Statistics: Theory and Applications, held at Gauhati University, during Dec 31st 2002 - 2nd Jan 2003.

11. M. Paul and G. Choudhury, A batch arrival queueing system with second optional service and vacation time, International Conference on Recent trends in Probability and Statistics: Theory & Applications, held at Gauhati University, during Dec 31st 2002 - 2nd Jan 2003.

12. S. Kalita and G. Choudhury, Analysis of the M/M/1 queueing system with an exponential setup time under N-policy with finite capacity, International Conference on Recent trends in Probability and Statistics: Theory and Applications, held at Gauhati University, during 31st 2002 - 2nd Jan 2003.

13. S. Deka, A. Devi, L. C. Kagti and H. P. Borthakur, Impact of oil exploration on physicochemical

properties in rice fields soil at Moran Assam, National Conference on Environmental Biology. 17th - 18th October 2002, Saurastra University, Rajkot (Gujrat).

14. P. Baruah, B. Deuri, S. Bhattacharya and A. Baruah, A study on vegetational composition in some oil fields of upper Assam - a potential resource for phytoremediation of petroleum pollutants, International Congress of Plant Physiology on Sustainable Plant Productivity Under Changing Environment, in New Delhi, 8th - 12th January 2003.

15. B. Choudhury, P. Azad, Symbiotic properties in dual inoculation of *Rhizobia* and VAM fungi for enhancement of pulse production in Assam. Indo-US workshop and National Congress on Molecular Biology and Biotechnological Symbiosis, held at Jawaharlal Nehru University, New Delhi, March 23 - 28, 2003.

16. B. Das, M. Nesa and P. Azad, Studies on avirulent *Pyricularia oryzae* mediated bio-control of blast of rice, Indo-US workshop and National Congress on Molecular Biology and Biotechnological Symbiosis, held at Jawaharlal Nehru University, New Delhi, March 23 - 28, 2003.

17. V. Jagdeesan, J, Kotoky, S. Quadri and K. Krishnaswami, Hepatoprotective Activities of certain Medicinal Plants of North Eastern Region of India, Annual Conference of Indian Pharmacological Society, Gwailor, held in Nov. 2002

18. J. Kotoky, N. Deka, Study of trace metals and nutritional value of some commonly used plants in the North Eastern Region, Annual Session of Indian Science Congress Association, Part III, Section Chemistry, held at Bangalore, January 3 - 7, 2003.

5. WORKSHOP ATTENDED :

Dr. A. Baruah and Mr. U. Kalita participated in the workshop on "Strategies and Implementation Mechanisms for ENVIS Wide Area Network Programme" sponsored by Ministry of Environment & Forests, GoI, and organised by National Ship Design and Research Centre (NSDRC), Visakhapatnam at Visakhapatnam during 8 - 10 July, 2002.

Dr. M. K. Kalita participated at the workshop on " Web Design and E-Governance Application in respect of Environmental Planning for ENVIS Network in India" organized by Ministry of Environment & Forests, GoI at the National Ship Design and Research Centre (NSDRC), Visakhapatnam at Chennai during 21 - 24 Decmeber, 2002.

Dr. M. K. Kalita participated at the 2nd Delhi Sustainable Development Summit, 2003 organised by TERI, New Delhi during 6 - 9 February, 2003

Mr. U. Kalita attended the training program on "Web Designing and Database Management" sponsored by Ministry of Environment & Forests, GoI organized by Forest Research Institute, Dehradun at Dehradun on 13 - 15 March, 2003.

Dr. P. Azad along with his students participated in at the Indo Workshop & National Congress on "Molecular Biology & Biological Symbiosis" held at School of Life Sciences, Jawaharlal Nehru University, New Delhi, Organised by School of Life Sciences & Centre for Advancement of Microbial Sciences on 23 - 28 March, 2003.

Mr. B. Chakravarty, participated at the workshop on 'Fresh water Scenario' at Jawaharlal Nehru University, New Delhi on 31st March, 2003.

Dr. G. Choudhury participated in IMS mini meeting, Instructional Workshop on Matrix Analytic Methods, Cochin University of Science & Technology, 22- 23 December, 2002.

Dr. J. Kotoky, Asstt. Professor, Life Sciences Division, participated as a Resource person in the workshop held at Duliajan, Assam from 28th - 29th December, 2002, on "Scientific Evaluation of Indigenous Medicinal practices of Assam" , sponsored by Deptt. of Environmet council, Govt. of Assam and organized by Assam Science Society, Assam.

Dr. J. Kotoky, Asstt. Professor, Life Sciences Division, participated as a Resource person in the workshop held at Bio-resource Centre, Madan Kamdev, Baihata Chariali, Kamrup, Assam in September 2002 on " Organic Cultivation and Semi-processing of High Valued medicinal plant involving women in Assam" sponsored by Assam Science Technology & Environment Council. Govt. of Assam.

D. Barua, A. R. Pal, P. Kalita, B. Sinha, H. Gogoi and A. Adhikary åttended SERC School arranged by DST, Govt. of India and held at Saha Institute of Nuclear Physics, Kolkata during 3 - 21 February, 2003.

6. AWARDS :

Dr. (Mrs) R. Devi, Research Assistant of Life Sciences Division, was awarded DBT - Postdoctoral Fellowship, funded by Dept of Biotechnology, Govt. of India to work with Dr. S. K. Mallik, AIIMS, New Delhi with effect from 1st August, 2002.

Dr. (Mrs) A. Choudhury joined the IASST as a CSIR Postdoctoral fellow in Life Sciences Division. She is working under the guidance of Dr. (Mrs) D. Devi, Sericulture Unit, Life Sciences Division.

Mr. N. Adhikary, SRA and Ms. P. Kalita of Material Sciences Division were awarded with PSSI Fellowship '2002 to do research work in SINP, Kolkata and IPR, Gandhinagar respectively.

7. DISTINGUISHED VISITORS

Several distinguished visitors like Prof. J. Medhi; Prof. P. I. John, FCIPT, Institute for Plasma Reseach, Dr. N. Venkatramani, Head, Thermal Plasma Division, BARC, Mumbai, Prof. V. S. Ramamurthy, Secretary, DST, Govt. of India, Prof. R. Chidambaram, Principal Scientific Adviser to the Prime Minister of India, Prof. A. Sen, Institute of Plasma Research, Prof. Rabindranath Pal, SINP, Kolkata, Dr. H. C. Pant, CAT, Indore, Prof. Jaivis Anjara, former Professor and Head, Department of Pharmacology, Gujrat Agricultural University, presently adviser (R & D) Torrent Laboratories Pvt. Ltd., Dhanbad, Prof. D. Dutta Majumder, Former Professor of Indian Statistical Institute, Kolkata, Prof. Dutta Gupta, SINP, Dr. D. Bandyopadhyay, Director (EI), Ministry of Environment & Forests, Govt. of India, Prof. Dilip Kr. Dutta, Professor of Mathematics, University of Rhode Islands, USA, Dr. Praveen Asthana, Dept. of Science & Technology, Dr. B. D. Acharaya, DST, Dr. H. K. N. Trevedi, Prof. Paramanada Mahanta, Dibrugarh University, Mr. Pradyut Bordoloi, Minister of State, ST & E, Prof. Dilip Choudhury, Gauhati University, Prof. K. K. Bhatia, Scientist - F, National Institute of Hydrology, Roorkee, Mr. B. C. Patowary, Scientist - E, National Institute of Hydrology - North East Regional Centre, Guwahati, Prof. Tanmoy Bhattacharjee, H.O.D, Zoology, Vidyasagar University, Prof. (Mrs) Vina Tandon, NEHU, Prof. Gautam Barua, Director, IIT, Guwahati, Mrs. T. Y. Das, Commissioner and Secretary, DST visited the IASST during the period.

Prof. Anjara during his visit met the scientists and delivered a talk on 'Validation and Standardisation of Ayurvedic drugs', He stressed on the proper validation of the drugs prepared by the people or companies in the name of Ayurvedic drugs. Only then herbal medicines can compete and survive in the competitive markets of drugs. Students, researchers and faculty members of the IASST interacted with him on many aspects of herbal remedy, preparation, standardisation and validation.

Prof. Dilip Kr. Dutta addressed the faculty members, students and researchers of the IASST on the16th August 2000 . He stressed on the honesty, truthfulness and integrity of the scientists. Tracing back the history of Indian Mathematics he glorified the works of Ramanujan and other Indian scientists . He also spoke highly about the Indian scientists. Laboratory facilities and higher education cannot be the constrains for talented workers. He cited the works of Kaprekas , the inventor of Kaprekas constant 6147 .Kaprekas was just a high school teacher . He also spoke highly of Ramanujan, who wrote a book on calculus and played with the numbers .He was just a bank clerk and his talent was brought into limelight by the mathematician Prof Hardy. He spoke about the works of some of the Indian scientists like Subrahmanyan Chandrasekhar, US astronomer. His theoretical work has led to a greater understanding of the evolution of the stars, especially white dwarf.

Prof. D. Dutta Majumder of Indian Statistical Institute Kolkata addressed the distinguished scientists and elaborated the emergence of the new field of Cybernetics and the System Theory. The subject cybernetics emerged through the interaction of the traditional sciences with machines when the scientists were confronted with a set of problems concerned with communication, control and computation in machines and living tissues. The man made machine interfaces with a natural mode of communication can be integrated by unitary approach of General System Theory. The information related to speech, sound, printed characters, cursive scripts, photographic images, ECG, EEG, EMG, X-ray photograph, business management, neuro-computation, immuno-computation, biological photographs are connected to Cybernetics & Systems Theory.

Dr. D. Bandyopadhyay, Director (EI), Ministry of Environment & Forests, Govt. of India during his visit on 24th August 2002 described the background of the Environmental Information System (ENVIS) and responsibilities of the ENVIS Centres and Nodes. The selection of organisations for awarding the responsibilities to the Nodes and the Centres of ENVIS is based on recognized expertise of the organisation in the concerned thematic area and one organisation is given the responsibility of one thematic subject area only. Parallel to that every State Government will run ENVIS Node for generation of general environmental database specific to that region or state. He made his comments on the ongoing ENVIS projects as a whole and also on the ENVIS project of the IASST. He also suggested to follow some guidelines for the ENVIS node at the IASST based on secondary data..

8. ON GOING PROJECTS :

1. Upgrading of IASST

Total assistance : Rs. Rs. 9,55,00,000.00 (Rs. Nine crores fifty lakh) only.
Amount received so far : Rs. 7,70,00,000.00 (Rs. Seven crores seventy thousand) only
Period : From 9th April 1999 to 31st March, 2004.
Transaction : Through Director, IASST.

2. Development of Plasma Physics Division, IASST, sponsored by the Department of Science & Technology, Govt. of India

Total assistance : Rs. 83,29,800.00 (Rs. Eighty three lakh twenty nine thousand eight hundred) only. *(revised)*
Period : From 1st May 1997 to 30st June, 2003
Research group :

i. Prof. J. Chutia, Principal Investigator
ii. Prof. G. C. Das, Co-Investigator
iii. Dr. H. Bailung, Co-Investigator
iv. B. Singha, SRF
v. D. Boruah, SRF.
vi. A. R. Pal, SRF.
vii. Ms. P. Kalita, SRF.

3. Microwave reflectometry for plasma density measurement in Tokamak plasma, sponsored by DST, Govt. of India

Total assistance : Rs. 13,65,000.00 (Rs. Thirteen Lakh sixty five thousand) only
Period : From 21st Sept, 2002 for 3 years
Research group :

i. Dr. H. Bailung, Principal Investigator
ii. Prof. J. Chutia, Principal Co-Investigator
iii. H. K. Gogoi, JRF

4. Studies on some batch arrival queueing models with vacations, sponsored by Department of Atomic Energy, Govt. of India

Total assistance : Rs. 3,33,780.00 (Rs. Three lakh thirty three thousand seven hundred eight) only
Period : 1st April 2002 for 3 years
Research group :

i. Dr. G. Choudhury, Principal Investigator
ii. Ms. M. Paul, JRF.

5. **Utilization of lime sludge waste of Jagiroad paper mill for fish culture, sponsored by ICAR, New Delhi.**

   Total assistance : Rs. 9,34,144.00 (Rs. Nine lakh thirty four thousand one hundred forty four) only
   Period : From 13th July, 2001 to 12th July, 2004.
   Research group :

   iii. Dr. S. Deka, Principal Investigator
   iv. Dr. (Mrs) A. Devi, Co-P.I
   v. Mrs. Shabeena Yasmin, JRF
   vi. Ms. Abhilasha Mohan Bora, JRF

6. **Studies on native VAM fungi and their combined *Rhizobia* for enhancing pulse production in NE states**

   Total assistance : Rs. 8,31,000.00 (Rs. Eight lakh thirty one thousand) only
   Period : From 15th March 2003 for 3 years
   Research group :

   i. Dr. P. Azad, Principal Investigator
   ii. Ms. B. Choudhury, JRF

7. **'Phyto-remediation of oil and heavy metal in polluted soil and water in and around oil fields of upper Assam' sponsored by Oil India Ltd. Duliajan, Assam**

   Total assistance : Rs. 11,82,000.00 (Rs. Eleven Lakh eighty two thousand) only
   Period : February, 2002 to February, 2004
   Research group :

   i. Dr. A. Baruah, Principal Investigator
   ii. Mr. S. Bhattacharya, JRF
   iii. Ms. B. Deuri, JRF

8. **Environmental problems in Tea Gardens, sponsored by Ministry of Environment & Forests, Govt. of India.**

   Total assistance : Rs. 7,95,000.00 (Rs. Seven Lakh ninty five thousand) only
   Period : From 1st April 2002 to 30th June, 2003
   Research group :

   i. Dr. A. Baruah, Programme officer
   ii. Mr. U. Kalita, IT Assistant
   iii. Mr. B. Chakravarty, JRF
   iv. Md. Fareed, JRF

9. **Employment generation training scheme for ST/SC/OBC students of North East, sponsored by Ministry of Information Technology, MPD Division, Govt. of India**

   Total assistance : Rs. 15,00,000.00 (Rs. Fifteen lakh) only
   Period : From 1st april 2001 for 5 years
   Project Incharge : Mr. A. Barman

9. OTHER SCIENTIFIC ACTIVITIES :

Professor N. N. Dass delivered the 4th Rohini Barua Memorial Lecture at Gauhati University. He spoke about ***Industrial Polymer*** there. He also talked on *Higher Education in Science and Technology in India with special reference to Assam* in Gauhati University Teachers Association forum . He delivered an invited talks on ***Liquid crystals and dedrimers*** in Jadavpur University and on **Polymers** in the Society of Analytical Chemistry, N.E. Chapter, Shillong.

Professor Joyanti Chutia delivered an invited talk on ***Observation of instability in Magnetron Discharge Plasma*** in the International Conference on Frontiers of Plasma Science in Bangalore in December 2002. Prof. Chutia attended the meeting of the Advisory Committee on DST's Scholarship for Women Scientists and Technologist on the 7th May 2002 in New Delhi. She was elected as a member of the Subject Expert Committee for Technical evaluation of the proposals submitted for assistance. She attended the subject expert committee meeting of the DST, GoI in new Delhi on the 27th-28th March 2003.

Dr. P. Azad delivered an invited talk on **'Performance of Rhizobium inoculants at farmers field in NE region'** in the Bio-fertilizer seminar organized jointly by RBDC, Imphal, Manipur and NE Biotechnological Association, Guwahati at the Deptt. of Biotechnology, Gauhati University, Guwahati on February 26 - 27, 2003. He also delivered a talk on **'Bio-fertilizer Research and Development in NE Region'** in the Indo-US Workshop & National Cohgress on Molecular Biology and Microbial Biotechnology held during March, 23 - 28, 2003 in the School of Life Sciences, JNU, New Delhi.

Dr. Kotoky delivered a Seminar talk on the **Development of herbal remedies for liver ailments** at DRDO, GoI, Tezpur. He also interacted with the scientists of DRDO, Tezpur for collaborative works. Collaborative project on the study of Antioxidative properties of certain medicinal plants of the N.E Region with Dr. V. Jagadea, Deputy Director & Head, Food & Drug Toxicology centre, National Institute of Nutrition, Hyderabad and collaborative study on the Assessment of Risk due to intake artificial colours through food stuff available in the N.E Region including Sikim are in the pipe line.

In the area of characterization of Muga silkworm viruses recently a double stranded DNA has been detected from virally infected Muga silkworm larvae from two recent epidemics. Infected Muga silkworm samples were collected from Haihim and Khanapara. The previously known silkworm DNA viruses have different genome size i.e NPV has a double strande DNA of size 80-200 kb and DNV has a single stranded DNA of size 8-9 kb. Therefore the characterized Muga virus appears to be a new one.

The Patent Awareness work organised by Tezpur University on the 9th September 2002 was attended by Dr. Dipali Devi, Life Sciences Division and Dr. Neelotpal Sen Sarma, Material Sciences Division.

At our Institute, two enzyme esterase and amylase have been analysed in PAGE of the seven ecorces of silkworm (*Philosemia ricine*) of the N.E. Region four have been identified may be utilized to evolve better silkworm races in future . The findings appeared in the Annual report of Department of Biotechnology, Ministry of Science & Technology, GoI (2001-2002)

Prof. P.K. Roychoudhury, I.S.I Kolkata, Dr. D. Devi, Mathematics Deptt., Cotton College and Dr. J. Sarma, Mathematics Deptt. R.G. Baruah, Cotton College, Guwahati have started collaborative works with Professor G.C. Das

Dr. S. Deka, Asstt. Professor, RM&ED chaired the Young Scientist Award Session of the National Conference on Environmental Biology on 18th October, 2002 at Sourastra University, Rajkot. Dr.. Deka and Dr. N. S. Sarma attended the training progremme on FTIR and Microwave Digester organised by NULAB Equipment Co. Pvt. Ltd. Mumbai from the 27tyh to 31st January, 2003.

The Institute published TEA ENVIRONMENT: ENVIS news letter which brought laurels to the Institute. Dr. Anuj Baruah , RM&ED edited the letters.

Dr. N.S. Sarma attended the training progremme on GC/MS, LC/Ms conducted by the Varian India Pvt. Ltd on 29th November 2002 at Guwahati

Br. B. C. Tripathy, Associate Professor of Mathematical Sciences Division, delivered an invited talk entitled **'On statistical convergence of sequences'** in the Department of Mathematics; Berhampur University, Orissa on April 11, 2002. He also delivered three lectures on the topic On Density of Subsets of Natural Numbers and Sequence Spaces as resource personnel in the Refresher Course, conducted by the Department of Mathematics ; Berhampur University ; Orissa on 3rd and 4th March, 2003. He is on the Editorial Board of the periodicals (*a*) Far East Journal of Mathematical Sciences (*b*) Journal of the Indian Academy of Mathematics.

Dr. B. C. Tripathy has collaborated with Prof. P. Chandra of Patna University on Generalised Kothe-Toeplite duals. He has collaborated with Prof. T. Salat and Prof. M. Zimon of Commeneces University, Slovakia with Prof. Mikail ET and Prof. Y. Altin of Firat University, Turkey in the direction sequence spaces defined by orlicz Function.

Dr. G.Choudhury, Assistant Professor of Mathematical Sciences Division, attended the work shop on IMS mini meeting Instructional workshop on Matrix Analytic Methods, held at Cochin from 22nd - 23rd December 2002 , organized by Department of Mathematics, Cochin University of Science and Technology and sponsored by International Mathematical Society (USA). He was nominated as one of the editors of the periodical " Far East Journal of Theoretical Statistics " and for the Journal " Sankhya" for year 2002.

10. EQUIPMENT / FACILITIES AVAILABLE AT THE IASST

	Name of the Equipment	Make & Model	Funding Agency
1.	Phase contrast Microscope	Leica Letiz biomed	DBT, Govt. of India
2.	U. V. spectrophotometer Japan, UV - 1601	Shimadzu corporation	Institute Fund
3.	Atomic Absorption Spectrophotometer	Shinmadzu - 850	Institute Fund
4.	GLC	CHEMITO, 8510	Institute Fund
5.	HPLC	Waters, 600E	Institute Fund
6.	Microwave digester	Prolabo, Ethas 900	Institute Fund
7.	FTIR	Bruker, Veetar 22	Institute Fund
8.	Electrophoresis Gel Documentation	Pharmacia Biotech	Institute Fund
9.	Cold centrifuge	Sorvall Rc 26 plus	Institute Fund
10.	Deep Freeze (quickfreezer)	Remi, UDF - 165	Institute Fund
11.	Auto analyser	Merck, Microlab 100	Institute Fund
12.	M300 Monochromator Model: M300	Bentham, UK	DPPD Project, DST, GoI
13.	RF & D.C. Sputting Unit Model: MSPT 12	Hind high Vacuum, India	Upgrading, DST, GoI
14.	LECROY Lectroy, USA, Model: LT 264	LT 264 DSO	DST Project, GoI
15.	Mass Flow Controller with accessories	316 SS USA	Upgrading, DST, GoI
16.	Ultra Centrifuge	Sorval Model utltra 80	Upgrading, DST, GoI
17.	Deep freezer - 20^0	UDF - 165	Institute Fund

There are altogether 30 computers with present market values about Rupees Four and half lakhs. The computers are Intel 486 Pentium 233 MHz, Intel 466 MHz, Intel Pentium -III, intel P-IV, Intel 500 Mhz.

11. SYMPOSIUM / SEMINAR TALKS ORGANISED BY THE IASST :

The IASST has an inhouse seminar forum where the scientists of IASST normally present their scientific findings.

Dr. B. C. Tripathy, Associate Professor of Mathematical Sciences Division, delivered a seminar talk on *Understanding Mathematics* on 17th May 2002. Ms. Bornali sinha, SRF, Material Sciences Division, talked about *Sheath phenomena in magnetised plasma* on 31st July 2002. Mr. Jayanta Deka, SRF, Life Sciences Division, delivered a talk on *Eri Culture in N. E. Region: Present status and prospects* on 23rd Aug 2002. Mr. M. Fareed, Research Fellow, RM & ED, talked about *Tea, Environment and Pollution* on 20th Sept. 2002.

12. CONSTRUCTION OF THE IASST CAMPUS :

The IASST is presently housed in rented premises. The Department of Science and Technology, Govt. of India had sanctioned of sum of Rs. 9.55 crore in 1999 for the development of the Institute under a project 'Upgrading of the IASST' and out of the sanctioned fund, an amount of 6.80 crore had been sanctioned towards the construction of the campus of the Institute(first phase) which consists mainly the Academic-cum-Administration Building, Research Scholars' Hostel, Boundary walls, Approach road etc. The construction work has been carried out since December, 1999. Till the end of the financial year, 2002-03, 90% of the job of the construction of the Academic-cum-Administration Building has been completed and the construction of the same is expected to be completed by 31st August,2003. The main building of the Institute is proposed to be inaugurated sometime in November 2003. The construction work of the Research Scholars' Hostel is expected to be completed by 30th September, 2003. The construction of the boundary walls had already been completed. All the building components, sanctioned under the project 'Upgrading the IASST' are to be completed by 31st March, 2004.

13. COUNCIL OF THE INSTITUTE OF ADVANCED STUDY IN SCIENCE & TECHNOLOGY (2002-2003) :

1. **Prof. K.M. Pathak,**
   Chairman, Council of IASST,
   Guwahati 781 022

2. **Prof. N.N. Dass,**
   Director, IASST, Guwahati 781 022

3. **Prof. Asis Datta,**
   Vice-chancellor,
   Jawaharlal Nehru University,
   New Delhi 110 067

4. **Dr. R.C. Srivastava,**
   Ministry of Sci. & Tech.,
   DST, Govt. of India, Technology Bhavan,
   New Mehrauli Road, New Delhi- 110 016.

5. **Ms. T.Y. Das,**
   Commissioner & Secretary
   to the Govt. of Assam,
   Deptt. of Science, Technology and Environment,
   Dispur, Guwahati 781 006

6. **Prof. J. K. Datta Gupta**
   Saha Institute to Nuclear Physics,
   1/AF, Bidhan Nagar, Kolkata 700 064.

7. **Prof. Paramananda Mahanta**
   Physics Department,
   Dibrugarh University, Dibrugarh - 786 004

8. **Prof. H.C. Pant,**
   Head, Laser Plasma Division,
   Centre for Advanced Technology,
   Indore- 452 013

9. **Dr. G. Barua,**
   Prof. & Head, C.S.E., IIT Guwahati,
   North Guwahati, Guwahati 781 039.

10. **Dr. P.C. Deka,**
    Dean, Faculty of Agriculture,
    Assam Agricultural University,
    Jorhat 785 013

11. **Prof. B.C. Kalita,**
    Deptt. of Mathematics,
    Gauhati University, Guwahati 781 014.

12. **Sri J.K. Borooah,**
    Baruanagar Tea Estates Pvt. Ltd.,
    Maniram Dewan Road,
    Chandmari, Guwahati 781 003.

13. **Prof. G.C. Das,**
    Head, Mathmatical Sciences Division,
    IASST, Khanapara, Guwahati 781 022.

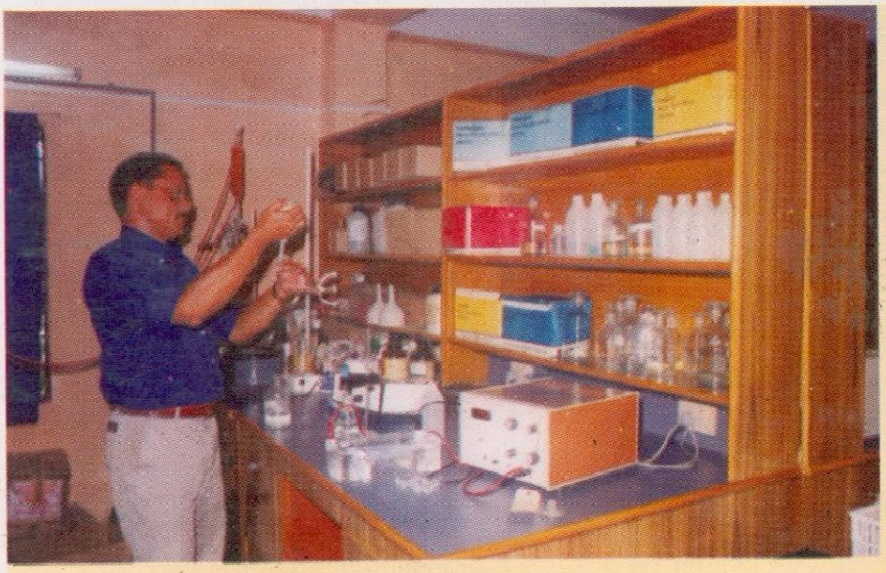
14. **Dr. (Ms.) Joyanti Chutia,**
    Professor and Head,
    Material Sciences Division,
    IASST, Khanapara, Guwahati 781 022

15. **Dr. M.K. Kalita,**
    Registrar, IASST, Khanapara,
    Guwahati 781 022

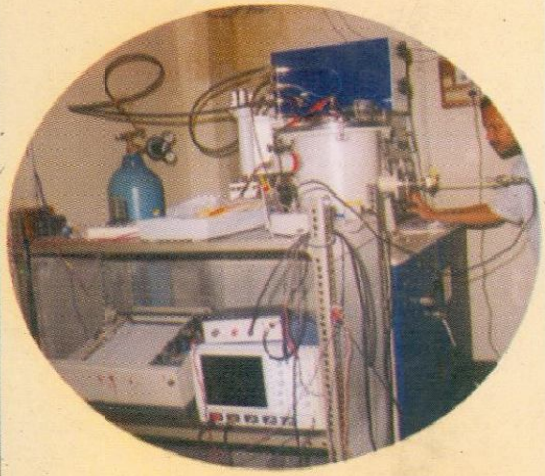
ANNUAL ACCOUNTS OF 2002 - 2003

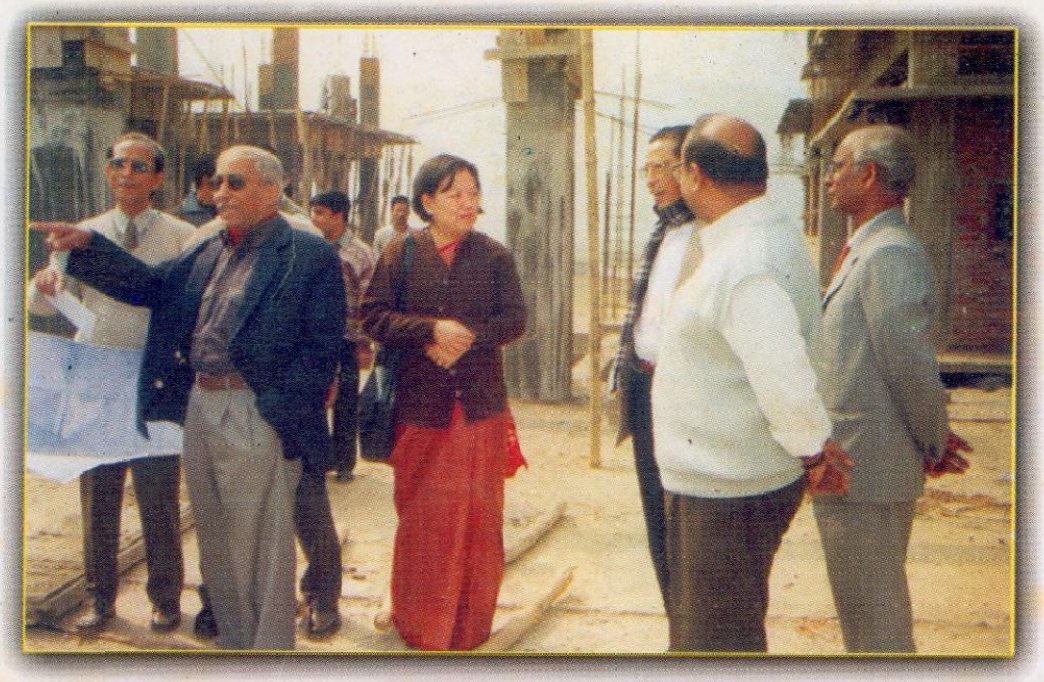
Project Division-wise summary of Receipt and payment Accounts of the IASST
for the year ended 31st march 2003 (2002 - 2003)

Sl.No	Head of Accounts	Opening balance as on 1st April 2002	Receipt during the year 2002-03	Total Amount	Payment during the year 2002-03	Closing balance as on 31st March 2003
1.	Development of Plasma Physics Division	6,37,260.90	1,00,000.00	7,37,260.90	9,16,439.00	(-)1,79,178.10
2.	Study on the performance of students of the University in N.E. Region in selected National Eligibility Test	(-) 1,77,940.00	1,77,940.00			
3.	Upgrading the IASST	(-) 43,24,514.00	3,00,00,000.00	2,56,75,486.00	2,03,44,815.00	53,30,671.00
4.	Entry of Polycyclic aromatic hydrocarbons into the soil from oil field effluent and their natural degradation	(-)24,908.00	80,000.00	55,092.00	72,183.00	(-) 17,091.00
5.	General Management	(-) 82,89,855.48	40,00,000.00	(-)42,89,855. 48	59,93,130.00	(-)1,02,82,985.48
6.	IASST General Fund	108,26,078.31	18,97,548.25	1,27,23,626.56	11,22,121.63	1,16,01,504.93
7.	Land & Building	11,23,356.00	10,00,000.00	21,23,356.00	19,87,346.00	1,36,010.00
8.	'O' level Employment Generated Training Scheme(EGTS) for North East	1,476.00		1,476.00	1,01,543.00	(-)1,00,067.00
9.	Utilization of lime sluge waste of Jagiroad paper mill for fish culture	1,82,838.00	2,50,700.00	4,33,538.00	2,69.401.00	1,64,137.00
10.	Studies on some Batch Arrival Queuing models with vacation.	1,08,500.00		1,08,500.00	1,16,042.00	(-) 7,542.00
11.	Silk Industries	33,833.00		33,833.00	20,668.00	13,165.00
12.	ENVIS Problems in Tea Garden		3,87,500.00	3,87,500.00	5,84,818.00	(-) 1,97,318.00
13.	Phytoremediation of oil and heavy metal polluted soil and water in and around oil field of Upper Assam		4,62,871.00	4,62,871.00	3,21,092.00	1,41,779.00
14.	Microwave reflectometry for plasma density measurement in Tokamak Plasma		9,00,000.00	9,00,000.00	77,493.00	8,22,507.00
15.	Meeting for the project 'Development of Plasma Physics Division'		1,20,000.00	1,20,000.00	1,25,132.00	(-) 5,132.00
	Total	**96,124.73**	**3,93,76,559.25**	**3,94,72,683.98**	**3,20,52,223.63**	**74,20,460.35**
16.	Reserve Fund (Fixed Deposit)	11,54,800.00	30,000.00	11,84,800.00		11,84,800.00
17.	Corpus Fund for leaves salary encasement	2,00,000.00		2,00,000.00		2,00,000.00
	Grand Total	**14,50,924.73**	**3,94,06,559.25**	**4,08,57,483.98**	**3,20,52,223.63**	**88,05,260.35**



IASST Scientists in the Laboratories





DST Expert Team with the Commissioner & Secretary, Department of Science & Technology, Govt. of Assam and some members of BWC, IASST

Dr B.D. Acharya, Adviser of DST, GOI and Prof. K.B. Sinha, Director, ISI, Kolkata with the officials of IASST