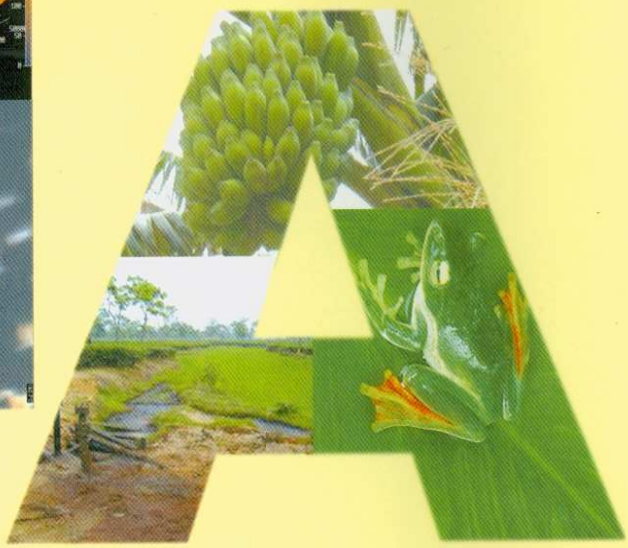
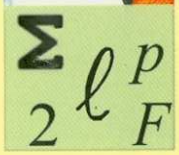
ANNUAL REPORT

2007 - 2008





INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

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CONTENTS

Preamble

It is my pleasure to present this annual report of the Institute of Advanced Study in Science and Technology (IASST) for the period from April'2007 to March'2008. This Institute is the premier, multidisciplinary research institute in the whole North Eastern Region. IASST, with small number of dedicated scientists, negligible infrastructure and constant financial problems has been able to carry out good research activities in few important areas of Physical and Life Sciences. To develop the infrastructure facilities, manpower and to implement the research programmes, the Institute needs adequate funds.

IASST can rise up to the national level only if it is taken over as a grant-in-aid institution by the Department of Science and Technology, Government of India. I am very happy to mention that the proposal for taking over of IASST has been actively considered by the Central as well as the State Government. The Institute has entered the twenty-ninth year of its existence and the scientists have made good efforts to establish it as a dedicated research center of the region, in spite of all the constraints. They have been regularly publishing their research papers in different cited journals and their contributions have been acclaimed by scientific awards and fellowship.

I am very much confident that rapid development of infrastructure and facilitating the talented workers will help build up the capacity of the Institute to reach its prime goal. I briefly highlight the research activities undertaken by different divisions over the last year.

Material Sciences Division:

In Material Sciences Division, Plasma Physics section studied the Ion-acoustic waves in multicomponent plasmas as well as dusty plasmas. In multicomponent plasmas the velocity of the soliton increases with increase in amplitude while the width of the soliton is larger at low wave amplitude. The modifications of propagation characteristics of ion-acoustic solitary waves in dusty plasma have also been observed. In plasma processing the EXB rotation in RF and cylindrical DC magnetron device has been investigated to understand the diffusion mechanism. In case of RF magnetron drift velocity attains maximum value at the race track region. It is important to note that crystalline aluminum oxide films could be deposited at low temperature in rf magnetron while titanium nitride films grown by DC magnetron sputtering shows nanostructure of average radius of 32.6 nm.

Real time studies of surface roughness development and reticulation mechanism of advanced photoresist materials during plasma processing is another important investigation.

The Polymer section of Material Science Division has been engaged in synthesizing and developing high polymers like solid polyelectrolyte, conducting polymers, polymer foams, liquid crystalline polymers, nano polymers etc. With the help of plasma processing better conducting nanostate of Polyacrylamide films has been developed. A catalyst is also synthesized for solution of Polyvinyl alcohol. Study of A.C. conductivity of some polymers is also another important study while the synthesis of low density polymer foams reveals good properties to be used as laser targets.

Life Sciences Division:

Activities in Biochemistry and Medicinal Plant section are evaluation of antioxidant properties of some selected fruits of North Eastern India. Local ripe fruits like *Musa balbisiana* (Athia Kal), *citrus grandis* (Robab Tenga) and *Garcinia pedunculata* (Thekera Tenga) etc. are selected and fresh/ dried pulps of these fruits are extracted to evaluate the antioxidant properties. It is found that these fruits have high amount of antioxidant properties.

The important studies of Seri-biotech unit are Phylogenetic study and Protein analyses of colour variants and wild moths of Muga silk worm. A package for identification of pure silk with some methods of physical examination like burning, microscopic and solubility tests, has been developed.

Medicinal Plants:

In-vitro and *in-vivo* studies of some plants against some specific dermatophytes, namely *Trichophyton, Microsprorum* and *Epidermatophyton* have been carried out with some selected plants of the region. Two compounds from two different medicinal plants have been taken up for molecular and crystallographic studies.

Resource Management and Environment Division:

In Resource Management and Environment Division, the biodiversity section has been working on exploration of fish and amphibia from different states of North-East India (Assam, Manipur and Nagaland). The investigation of different types of fish fauna and amphibian species in the unexplored system is very important for ecological research. A major achievement of this section during 2007 is publication of a species of frog "*Rhacophorus Suffry*" which is a new addition to the global list of amphibia. The chemical section undertook some study on the major contributors of different contaminants to environment due to petroleum industries. On the other hand the biotechnology section has collected the hydrocarbon-contaminated soil samples from different oil fields, analysed their physico-chemical characteristics. Another study on utilization of bio-waste for production of vermicompost manure has also been undertaken.

Mathematical Sciences Division:

The Mathematical Science Division is concerned with the problems of Sequence Spaces, Fuzzy Real Numbers in Pure Mathematics and Stochastic Models, Distribution Theory in Statistical unit.

I thank all the members of the institute for their support and efforts in bringing out this annual report.

Joyanti Chutia
Director

2.0 Governing Council

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3.0 Objectives of the Institute:

The Govt. of Assam and the Scientific Community of Assam desire to make the IASST a centre of excellence, with the full support from the Go I, in some frontier areas of S&T including the interdisciplinary fields and on the problems concerning utilization & development of natural resources of the North Eastern Region of India.

The primary objectives of the institute are as follows:

- To build up a research centre with facilities for fundamental and advanced studies in different selected fields of pure and applied science with a view to enlarge the frontiers in these fields.

- To promote original and /or applied and interdisciplinary investigations in areas considered appropriate.

- To sponsor project in selected fields in science and technology including projects concerning the development and utilization of resources of the NE Region and on environmental science involving wherever possible in collaboration with advanced research centre both within and outside the country and also collaboration among academic and industrial research centre.

- To diffuse knowledge by organizing discourses, lectures and colloquia, demonstrations, special courses and workshops, seminar and summer/winter school etc. in areas of interest to the Institute.

- To institute visiting Professorship, Research Associates and maintain chairs and research fellowships.

- To collect information in regard to research and development on various disciplines of science and technology and establish a Data Bank for use by the research workers.

- To establish and maintain a research and reference library in pursuance of the objectives of the institute.

- To establish and maintain a 'Sophisticated Instrumentation Centre' primarily to cater to the needs of the Institute as well as for project sponsored on inter institutional collaborative basis and to meet the demands of other academic, Industrial and Government Institute and Department, etc. for such facilities.

4.0 Glimpse of the Institute

The Institute of Advanced Study in Science and Technology (IASST) was set up by the Assam Science Society, the premier scientific academy of Assam, in 1979 with the objective of generating infrastructure for carrying out high quality research on some selected areas of S&T which will have a significant bearing on the development of the natural resources of the State of Assam as well the NE region. The Institute was formally inaugurated by Nobel Laureate, Prof. Dorothy C. Hodgkin on 3rd Nov.'79. The long standing demand of the Scientific Community of Assam for setting up a well equipped and financially viable National Institute for Advanced research in Science & Technology with full support from the Government of India has, therefore, arisen as a rational aspiration of the Scientists of the state which was reflected as one of the demands agreed to under clause 7 of the ASSAM ACCORD.

The Institute has been carrying out fundamental as well as applied research on the following areas:

(a) Material Sciences Division (Plasma Physics & Polymer Sciences)
(b) Life Sciences Division (Bio-fertilizer, Bio-Chemistry/Medicinal Plants and Seri-biotechnology)
(c) Resource Management and Environment Division (Biodiversity, Environmental chemistry and Environmental Biotechnology)
(d) Mathematical Sciences Division (Mathematics and Statistics)

The Materials Sciences Division of IASST has been working on few frontline areas of research in basic plasma physics as well as plasma processing and also has been engaged to synthesize and develop high value polymers.

The Life sciences Division have taken up the work for standardization, efficacy study and toxicity evaluation of some important remedies/plants, genetics study of Eri, Muga silkworm, Bio-chemical basis of fibre production etc. and microbial technology with special reference to Bioinoculants.

The Resource Management and Environment Division has been carrying out basic research on different environmental issues of North East India like study on remediation and reclamation of contaminated areas, exploration on flora and fauna of N.E. region and eco-biological study of threatened organisms.

The Mathematical Sciences Division is carrying out basic research works on Pure Mathematics, Applied Mathematics and Statistics. Some research works for preparation of database is also done.

5.0 Progress in Research and Development Activities :

5.1 Material Sciences Division

The Materials Sciences Division of IASST has been engaged in research in two frontier areas namely Plasma Science & Technology and Polymer Science. The division is comprised of two units: (1) Plasma Physics Section and (2) Polymer Science Section.

(A) Plasma Physics Section:

The Plasma Physics Section has been working on few important areas of research in basic plasma physics as well as plasma processing. The areas covered under the basic plasma research are: Ion-acoustic waves in multicomponent plasma as well as in dusty plasma, production of low temperature and low density plasma, studies on sheath phenomena, development of diagnostics for different plasma environment etc. In plasma processing, both radio frequency and direct current discharge plasma reactors are used to achieve high quality metal oxide and nitride films. Plasma polymerization is another area that has been taken up in this section for protective coating on bell metal and muga silk fibre.

a. Investigation on ion acoustic soliton in a double plasma device

Propagation characteristics of ion acoustic solitons have been investigated in a medium size (55 cm in diameter and 110 cm long) new double plasma device of IASST. The details of discharge parameters and plasma parameters of the device are presented. An initial positive pulse (~10 μs duration) is found to steepen initially and form solitons as time passes by. The velocity, width and amplitude of the solitary wave are measured and compared with the K-dV equation.

A soliton is a self reinforcing solitary wave that maintains its shape while it travels at constant speed. The soliton phenomenon was first described in 1834 by John Scott Russell who observed a solitary wave in the Union canal. Solitons are caused by a delicate balance between non-linear and dispersive effects in the medium. Theoretical explanation on soliton theory was given by Korteweg and de Vries in 1895. Ion acoustic solitons in plasma are first observed by Ikezi et al in a double plasma device.

The experiment is carried out in a medium size new double plasma device of IASST with an inner diameter of 55 cm and a length of 110 cm. Base pressure of the chamber is brought down to 10^{-6} Torr by using an oil diffusion pump baked by a rotary pump. Argon plasma is produced at 3×10^{-4} Torr of Ar. Two magnetic cages with multidipole magnet arrangement for surface plasma confinement are used. Independent discharge is maintained in both the cages with 10 hot tungsten

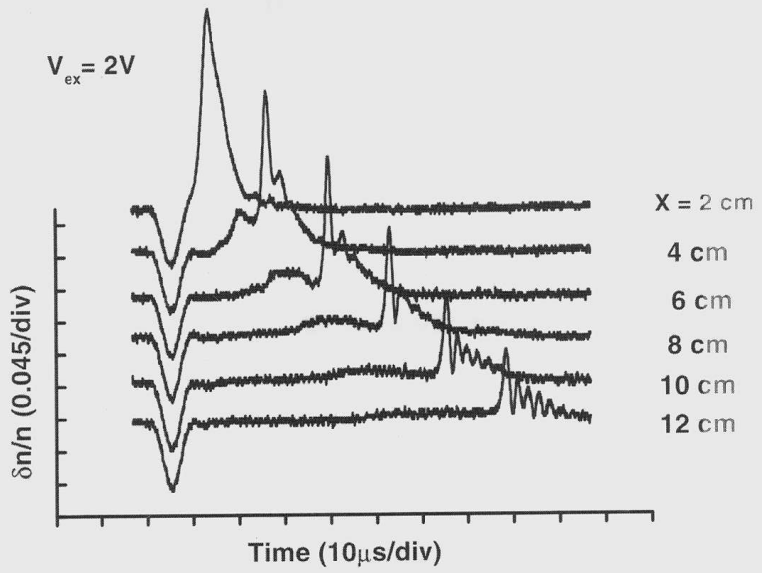


Fig a.1 Signals observed at different distances from the grid with applied positive voltage 2V.

filaments as cathode and magnetic cages as anode. The plasma volume is divided into source and target plasma using a fine mesh grid. The discharge voltage and discharge current are fixed at 60 V and 50 mA respectively. Typical plasma parameters are: electron density n_e ~10^8-10^9 cm^{-3}, electron temperature Te ~1-2 eV and ion temperature ~ Te/10.

Ion-acoustic perturbations are excited by applying a positive sinusoidal tone burst signal (~microsec duration) into the anode of the source plasma. Density perturbations are detected in the target plasma by the Langmuir probe biased positively with respect to the plasma potential. Signals are then recorded in a digital storage oscilloscope. The velocity and width of the soliton for different amplitude of initial pulse is measured. A typical oscilloscope data taken by Langmuir probe for a fixed excited voltage (2 volt) at different distances from the grid are shown in Fig. a.1.

It is observed that the velocity of the soliton increases with increase in amplitude. The width of the soliton is larger at low wave amplitude and it becomes narrow with increase in amplitude. Observed experimental results closely agree with the predictions of K-dV equation.

b. Collective Processes in laboratory dusty plasma

An observation on the modification of propagation characteristics of ion-acoustic solitary waves in dusty plasma is observed in the dusty double plasma device.

Compressive solitons in two component plasma are described by K-dV equation. Rarefactive solitons in multicomponent plasma with negative ions are also described by K-dV equation with negative nonlinear term. In dusty plasma, however, the situation becomes more complex as presence

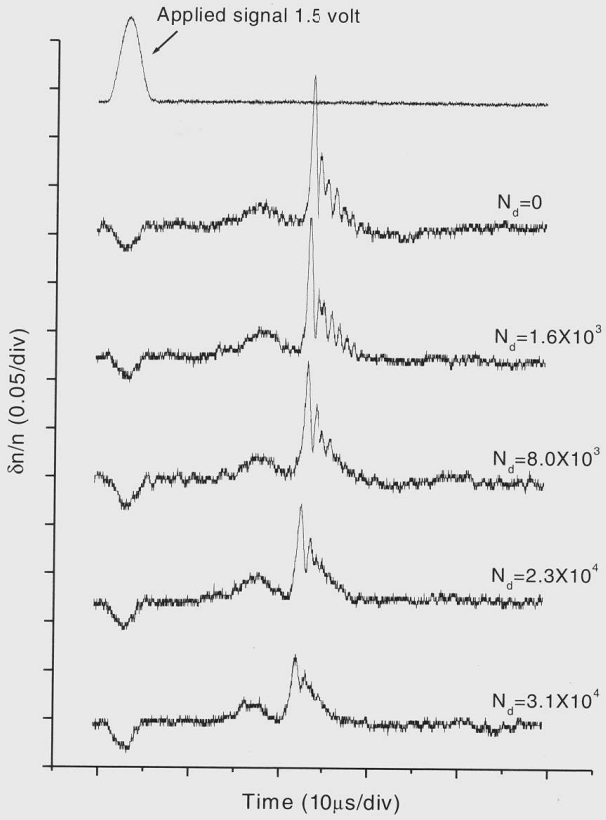


Fig. b.1 Probe signals at a distance 6 cm from the grid showing the modified propagation characteristics of the compressive ion acoustic soliton with increasing dust density.

of dust particle modifies not only the dispersive characteristics but introduces strong damping. In Fig. b.1, typical oscilloscope data showing the ion-acoustic compressive solitons propagating through dusty plasma with different dust density are shown. The solitons are found to travel faster in dusty plasma.

The situation is however, different in case of rarefactive solitons. The negatively charged dust grains introduce strong damping and the wave amplitude becomes smaller at sufficiently high dust density.

c. Investigation of the E×B rotation in RF magnetron discharge

Electron drift velocity caused by E×B motion is measured with the help of a Mach probe in a rf planar magnetron sputtering discharge at an axial distance of 2.5 cm from the target and at power 25W is shown in Fig. c.1.

The investigation reveals a radial variation of the electron drift velocity in the discharge. The drift velocity increases as we move away from the center and attains maximum value at the racetrack position and then again decreases outside the racetrack position. Peak of drift velocity at racetrack in the radial profile is found to be sharpened as the power increases. The drift velocity of electrons is also determined radially at an axial distance of 1.5 cm for applied power 50 W. It is seen that

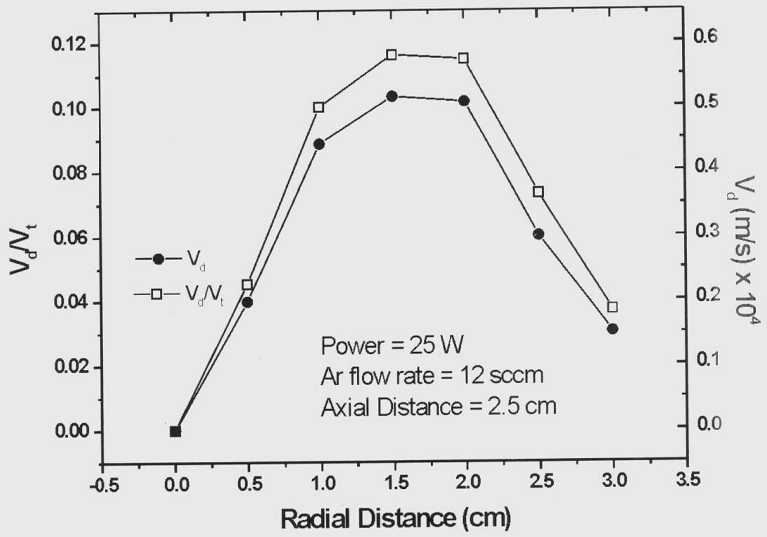


Fig. c.1: Radial variation of drift velocity at power 25W

the value of drift velocity at all the radial distances increases as axial distance decreases from 2.5 cm to 1.5 cm from the target. The maximum value of drift velocity is ~ 1×10^5 m/sec at the racetrack position at 1.5 cm from the cathode. The drift velocity of electron is measured from the sheath structure is found to be ~ 2.1×10^5 m/s, which is close to the value determined from the Mach probe characteristics.

d. Crystalline aluminium oxide deposition at low temperature in rf magnetron plasma

Aluminium oxide coatings are deposited on bell metal by rf magnetron sputtering technique at low temperature in both metallic and reactive modes. X-ray diffraction patterns for all the films A, B, C and D are as shown in Fig. d.1. Film A, B, C and D corresponds to deposition at oxygen flow rate of 4 sccm, 6 sccm, 8 sccm and 10 sccm respectively at constant argon flow rate of 12 sccm, applied power 100 W and deposition time of 45 minutes. The target to substrate distance is fixed

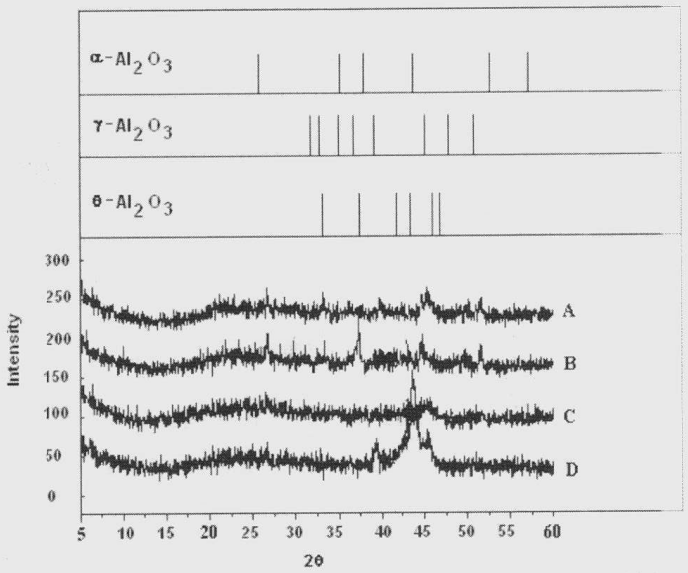


Fig. d.1: X RD pattern for films A, B, C and D

at 6 cm. It is difficult to get crystalline alumina deposition at low temperature by sputtering technique. However, it is seen that at high oxygen flow rate of 10 sccm and in the poisoned mode, there can be formation of crystalline alumina formation on the bell metal substrates.

The growth of the crystalline alumina films without any substrate heating may be due to following reasons. Firstly, the substrate is very near the target (6 cm from the target) and also the magnetron used here is unbalanced type II magnetron whose outer magnets have higher strength than the inner one and thus enabling confinement of higher energy electrons near the substrate. These two factors combine for improvement of ion current near the substrate, which accounts for the growth of crystalline alumina film. However, the intensity of the peak is very low, which suggest the possible existence of amorphous region in the film.

e. *E×B* electron drift velocity in a cylindrical DC magnetron device

Electron drift velocity caused by *E×B* motion is measured directly with the help of a Mach probe in a DC cylindrical magnetron sputtering device at different plasma discharge parameters like discharge voltage, gas pressure and applied magnetic field strength. Measurement of *E×B* drift in DC magnetron device is important to understand the electron diffusion mechanism and also for its influence on plasma characteristics. Drift velocity is found to vary with discharge voltage, pressure and magnetic filed. Strong radial variation of the drift velocity is noticed and is found to be maximum near the cathode and decreases slowly with increasing radial distance from the cathode. The radial variation of the electron drift velocity measured using the Mach probe at different distances away from the target cathode at three different discharge voltages is shown in Fig. e.1.

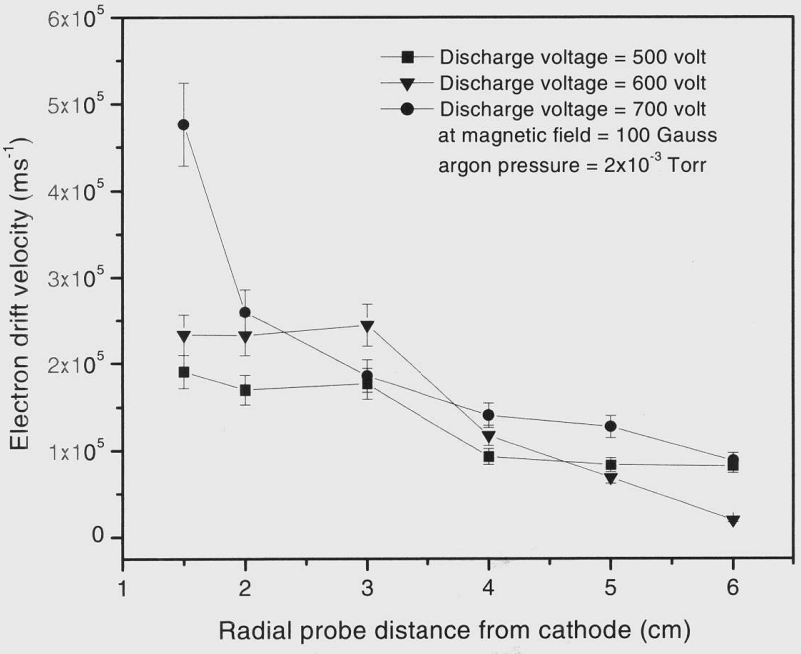


Fig. e.1-Plot of radial variation of electron drift velocity by Mach probe at different discharge voltages.

f. Titanium nitride nano-structure by DC magnetron sputtering plasma

In recent years, rapid developments in the field of nanotechnology have been witnessed due to the existing as well as potential applications of nanomaterials in diverse technological areas such as electronics, catalysis, ceramics, magnetic data storage and structural components. The reduction in size leads to increased mechanical strength, enhanced diffusivity, higher specific heat and electrical resistivity as compared to their coarse grained counterparts. Atomic force microscope picture of TiN thin film deposited on bell-metal substrate is shown in the Photo No. 1. The picture shows the formation of TiN structures resembling white dots distributed throughout the scanned film surface. The measured dimensions of the TiN structures show that they are nano-structures in nature. The measured average radius of these nano-structures is 32.6 nm. The presence of nano-structure in the deposited TiN film is of great importance and utility as it will lend a very hard coating to the substrate material. No inter-metallic phase peaks are found in this study using SEM EDX.

g. Real-time studies of surface roughness development and reticulation mechanism of advanced photoresist materials during plasma processing:

Surface roughness development of photoresist (PR) films during low pressure plasma etching has been studied using real-time laser light scattering from photoresist materials along with ellipsometry and atomic force microscopy (AFM) characterization. We show that evolution of the intensity of light scattered from a film surface can be used to study the development of surface roughness for a wide range of roughness starting from sub-nanometer to few hundred nanometers. Laser light scattering in combination with ellipsometry and AFM was also used to study the reticulation mechanism of 193 nm and 248 nm photoresists during argon plasma processing. We employ a three-layer model (modified layer, rough layer and bulk film) of the modified photoresist surface (193 nm and 248 nm PR) to simulate and understand the behavior of ellipsometric Y-D trajectories. Bruggeman Effective Medium Approximation is employed to estimate the roughness that develops on the surface after reticulation.

When the glass transition temperature of the organic materials is reached during Ar plasma processing, the PR films reticulate and roughness develops rapidly (Photo No. 2). Roughness development is more pronounced for 248 nm PR than for 193 nm PR. Simulation of Y-D shows that the growth of roughness is accompanied by strong expansion in the materials and the expansion is stronger for 248 nm PR than 193 nm PR. The leading factors responsible for reticulation are found to be compressive stress that develops in the modified surface layer as it is created along with strong molecular chain motion and expansion of the material when the temperature is increased past the glass transition. Reticulation leads to a significantly different surface morphology for 248 nm PR as compared to 193 nm PR, and can be related to differences in molecular structure and composition leading to different responses when a modified surface layer is formed by ion bombardment accompanying plasma etching.

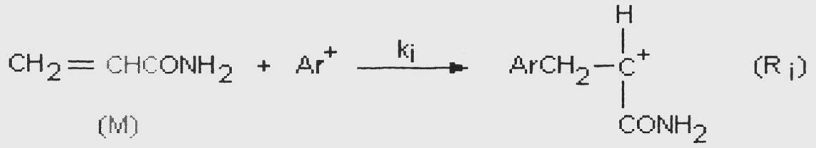
(B) Polymer Science Section:

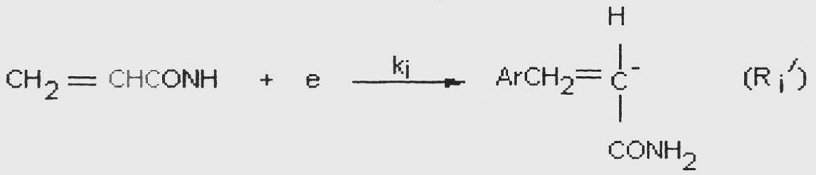
The Polymer Science Section of Material Sciences Division has been engaged to synthesize and develop high polymers. The section is committed to synthesize and characterize new solid polyelectrolyte, conducting polymers, polymer foams, liquid crystalline polymers, nano-polymers and other high value polymers.

i) Synthesis and Conductivity Measurement of PAA in Nano State

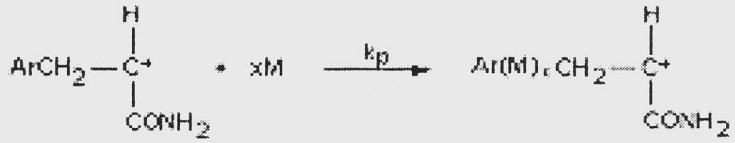
Polyacrylamide (PAA) was synthesized from its monomer by plasma polymerization technique in a direct current cylindrical magnetron device (CMD). The polymerization is initiated by ionic polymerization. The cationic initiation of AA by the Ar^+ and anionic initiation by electron can be represented in the following mechanism.

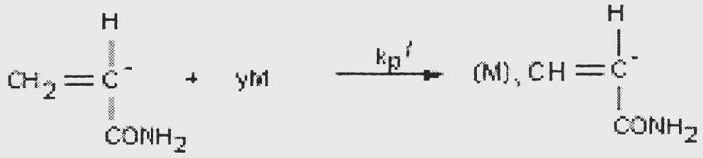
Initiation:



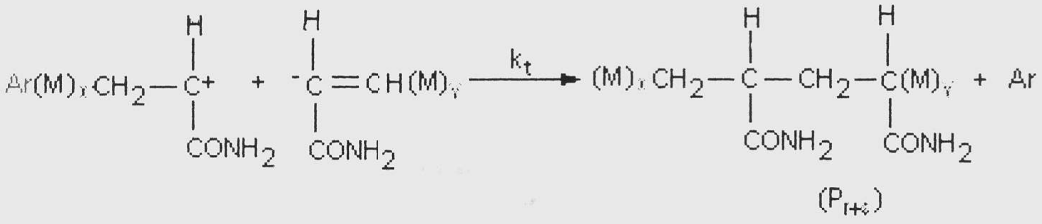


Propagation: The primary cationic species (Ri) and anionic (Ri') take part in the propagation step as indicated :





Termination: The termination is by head-to-head collision regenerating Argon.



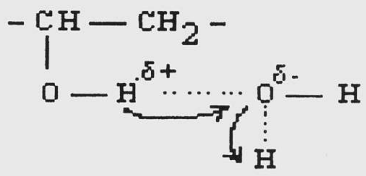
Plasma processes provide a cost effective and environmentally friendly alternative to many important industrial processes because the method produces no unwanted waste products and in most cases expose operators to no significant hazards. To compare and study the ionic conduction behaviour of this nano material a bulky PAA was also synthesized in the laboratory. The conductivities were determined for both nano and bulky PAA from 30 to 200°C with a frequency ranges from 42Hz to 1MHz in solid state. Investigation showed that the nano state has better ionic conductivity than that of the bulky one. Nano PAA is completely insoluble in water indicating cross linking of the polymers.

ii) Development of a catalyst for Solution of PVA in non-aqueous medium

Practically water is the only solvent in which Poly (vinyl alcohol) (PVA) can be dissolved. PVA is not soluble in non-aqueous medium due to strong intermolecular and intramolecular hydrogen bonding. Due to this solubility problem some important derivatives of PVA like esters, ethers, acetals are difficult to prepare from PVA and most of the derivatives of PVA are synthesized in aqueous medium. To solve this problem a catalyst chloro ethane dimethyl sulfoxide (ECl·DMSO) was synthesized in our laboratory which can help PVA to go into solution in an organic solvents or in a mixed solvents.

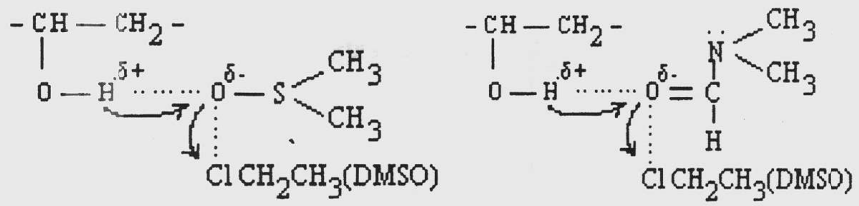
The formation of the compound was confirmed by spectral and analytical methods. The molecular weight of the catalyst was determined by cryoscopic method. An orthorhombic structure D_{2h} was predicted for the catalyst based on the X-ray powder diffraction (XRD) pattern. The amount of solubility of Poly (vinyl alcohol) (PVA) in different solvents or mixed solvents at 40°C, 50°C and 60°C temperature in the presence of 0.01% of ECl·DMSO are also reported.

We also predicted a mechanism for dissolution of PVA in the presence of ECl·DMSO. When PVA dissolves in water, PVA go into solution due to the minimization of the hydrogen boding as follows:



PVA in water

The same type of hydrogen bonding is also formed when ECl·DMSO is added either to DMSO



So, this way ECl·DMSO helps PVA to go into solution in DMF and DMSO. Some esters and acetals of PVA are synthesized using this catalyst and are reported in International journals.

iii) Studies of A.C. Conductivity of PVBO and its Calcium Derivative in solid state

An attempt has been made in this work to prepare a poly electrolyte, poly(vinyl borate), PVBO and its Calcium derivative by homogeneous esterification of PVA with boric acid in non-aqueous medium in the presence of a catalyst ethyl nitrate dimethyl sulfoxide. The compounds were characterized by IR and ^{1}H-NMR spectra. Conductivities were determined from 30 to 90°C in solid state within a frequency range 42Hz to 100kHz.

The compounds so formed showed ionic conductivity and their conductivities were dependent on frequencies used. It is found that the addition of Ca^{2+} ion increases the ionic conductivity of PVBO appreciably. The conductivity of PVBO-Ca increases rapidly after 50° C. The behaviour of the material can be visualized with the help of Log of σT vs. 1/T plot (Fig. 1). The total ionic transport number and activation energy of the copolymers were also determined.

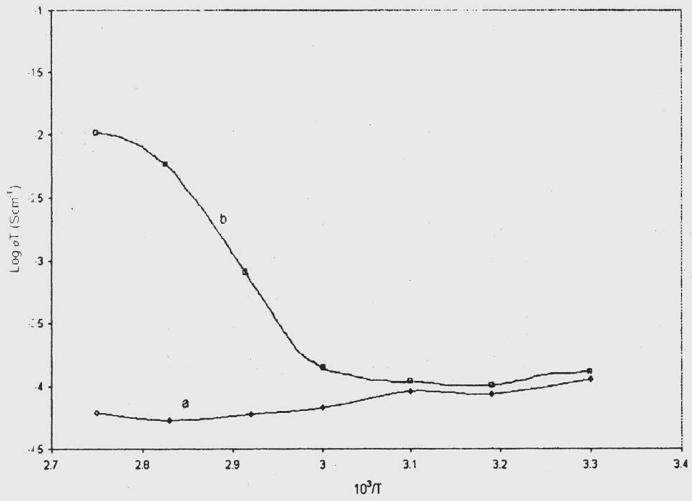


Fig. 1. Log of σT vs. 1/T plot for : a. . PVBO, b. PVBO-Ca

iv) Synthesis and characterization of Poly-DMDAP and its use as foam

In recent years synthesis of plastic foams has been attracting the attention of scientists of high-pressure and laser target laboratories. Low-density foams can be potential candidates for producing a uniform energy deposition in direct drive in Inertial Confinement Fusion (ICF) and enhancement

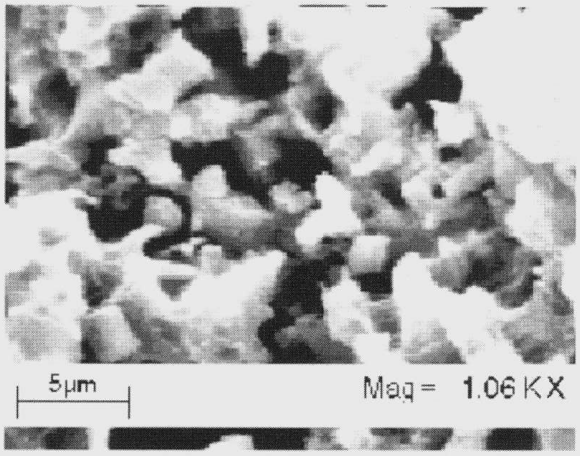


Fig. 2. Scanning Electron micrograph of P-DMDAP foam

of pressure. Plastic foams of density 30 to 200 mg/cc and thickness 60 microns appear to be useful for such experiment. In our polymer section 1,3-dimethylol diacrylate propane-2-ol (DMDAP) is used to produce polymeric foam, Poly-DMDAP, which may be a potential candidate for the laser plasma experiments. Poly-(DMDAP) was prepared by the homogeneous esterification of glycerol with acrylic acid. The polymer P-DMDAP shows appropriate foam character for laser target, if the density range lies 5-200mg/cc. The pore size of the polymer was determined by SEM analysis (Fig. 2). The thermal behaviors were studied by thermogravimetric analysis (TGA) and differential thermogravimetric (DTG) technique.

The control of various parameters like porosity, density, adhesive character is very vital for technical use of these of high valued materials. The P-DMDAP foam prepared in our laboratory (Photo No. 5) shows good properties and so the foam is sent to BARC for further investigation.

5.2 Life Sciences Division

(A) Biochemistry and Medicinal plant section

Since the time immemorial in India and particularly in Assam medicinal plants, herbs etc are being used for the treatment of different types of diseases. These remedies have not yet been properly and scientifically documented and studied.

The Division of Life sciences have taken up this work for standardization, efficacy study and toxicity evaluation of some important remedies/plants particularly used for treatment of skin diseases, liver ailments, heart diseases etc.

a] Dermatophytic studies:

In-vitro and *in-vivo* studies of some plants against specific dermatophytes, namely, *Trichophyton,*

Microsporum and *Epidermatophyton* have been taken up. The plants selected have shown encouraging results both in the *in-vitro* and *in-vivo* models. The work is in progress. (Photo No. 9, 10).

b] Base material:

Toxicity study of a complete natural origin base material is being taken up and the toxicity studies in Rabbits and Guinea pigs show that the product is not toxic and found to be suitable for using as a base material in a skin ointment.

c] Phyto-constituents study:

Two interesting compounds, isolated from two different medicinal plants have been taken up for molecular and crystallographic studies.

d] Food plants and Foodstuffs:

Many people add artificial colours for making the food stuffs attractive for selling. We have collected the food colours used in the foodstuffs from Kamrup District for study if there are any non-permitted colours or synthetic colours used above the permitted limits. Also, we have taken up some uncommon food plants for their food value and their toxicity against the animal models.

Evaluation of antioxidant property of some selected fruits of North East India

Free radicals are responsible for cellular damages, which cause several diseases and advancement of aging. Such oxidative damages can be controlled by food supplements rich in antioxidants. Fruits and vegetables are rich source of natural antioxidants. The most thoroughly investigated natural antioxidants in fruits are flavonoids, polyphenols, carotenoids, vitamins, calcium and selenium. NE region of India is rich in many fruits and vegetables but their utility, as antioxidants are not adequately investigated. Therefore an attempt has been made to investigate the *in- vitro* and *in- vivo* antioxidant activity of different fruits of northeastern region of India (Photo No. 11).

Plant materials

Ripe fruits of *Musa balbisiana* (Athia Kol), *Citrus grandis* (Robab Tenga) and other common citrus fruits viz mouchumbi, lime, orange were collected from local market.
Fresh pulp of these fruits was used for experimental analysis.
In case of *Garcinia pedunculata* (Thekera Tenga) dried pulp were used.
Three varieties of *Citrus grandis* were selected for study.

Extraction

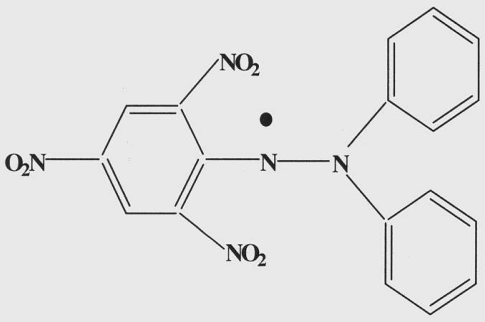
Ripe banana pulp and dried pulp of *Garcinia pedunculata* were extracted with methanol. The extracts were dried over anhydrous sodium sulfate, filtered and the solvent was removed to recover soluble components of the pulp. Antioxidant property of the soluble part was evaluated. In case of citrus fruits, pulps were squeezed mechanically to extract juices. Juices were filtered through Whatman-42 filter paper and the antioxidant properties of the filtrates were estimated.

Determination of Total Antioxidant Activity

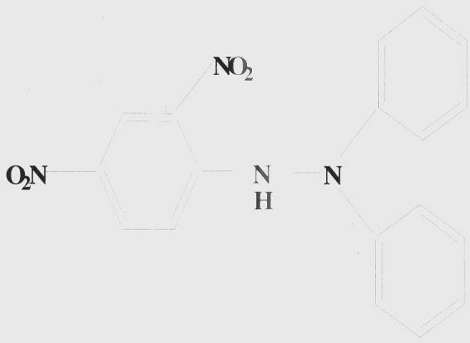
DPPH assay:

The effect of plant extracts and trolox on the DPPH radical was estimated according to the procedure described by Brand-Williams et al. (1995).

A freshly prepared solution of DPPH in methanol (6×10-5M) was used.



Diphenylpicrylhydrazyl (free radical)



Diphenylpicrylhydrazine (nonradical)

$$Z\bullet + AH = ZH + A\bullet$$

Samples were added to DPPH solution in 1:1 ratio, and was followed by vortexing.

Results:

Pulp from ripe fruits of *Musa balbisiana* is found to possess high antioxidant property. 5g of pulp in 100 ml methanol shows antioxidant activity as high as 82%, which is equivalent to 0.043 mM trolox solution.

In case of *Garcinia pedunculata* the activity in 5g /50 ml methanol is 92% and trolox equivalent is 0.0485 mM.

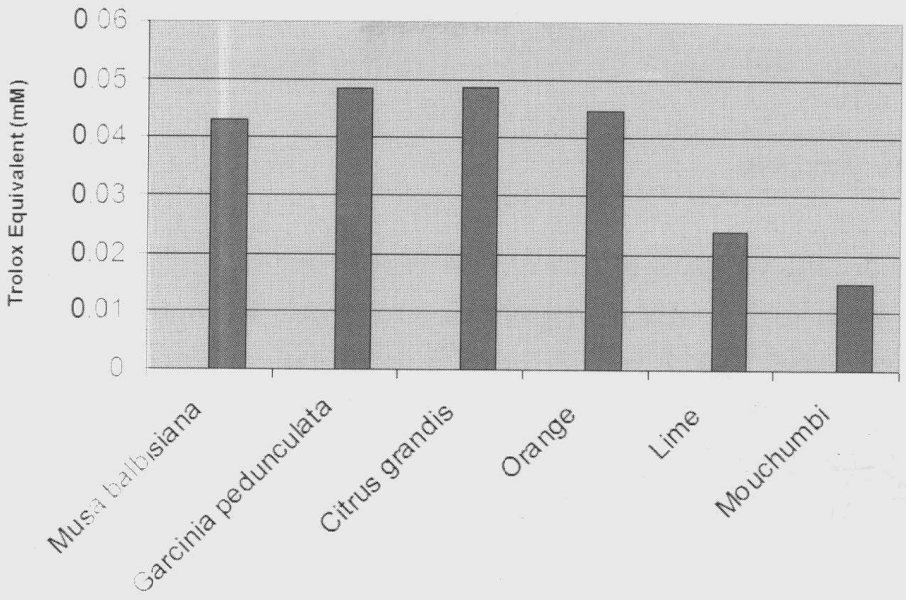


Fig: Trolox Equivalent of fruits

Citrus grandis shows higher antioxidant activity i.e. 92% and TE 0.0485 mM as compared to other citrus fruits.

Phytochemical analysis of the leaves of *Clerodendron colebrookianum* (CC).

Polyphenols are a broad family of naturally occurring physiologically active nutrient and literature has shown that they possess a wide spectrum of biological actions including hypotensive, hypoglycemic, spasmolytic, anti-inflamatory, and anti-lipidemic and antioxidant activities. In the past few years' tannins have shown potential antiviral, antibacterial and anticancer activity. Therefore an attempt has been made to determine the phytoconstitutents like total polyphenol, tennins, flavonoids etc of CC leaf. The presence of polyphenol in high concentrations in the CC leaf extract may account for its hypolipidemic effects.

Medicinal plant garden

The institute has developed an arboretum of medicinal plants where different types of medicinal plants are planting. A simple beginning has been initiated so that in near future we can take up some projects with the following objectives

a. To preserve and propagate rare, threaten and endanger plant species with medicinal value.
b. To familiarize people with different plants and herbs having curative and preventive qualities for different diseases.
c. Establishment of research units to take up research activities relating to the medicinal

plants.

d. To rejuvenate the traditional medicinal system by applying modern technology.

(B) Seri Biotech Section.

Silk produced by silkworms is nature's most highly engineered structural material and is a combination of softness, lusture and strength that could not be reproduced by artificial means. North Eastern region is well known for silk producing insects especially for non-mulberry or wild insects, Muga and Eri. The golden hued silk produced by *Antheraea assamensis* (muga silkworm) is indigenous to this region, more specially to the Brahmaputra valley region. The quality of Eri silk produced in this region is superior compared to the eri silk of the other parts of the country. For the people of N.E region, silk is much more than just a textile commodity. It is inextricably interwoven in the lifestyle of the people, it is an art, a livelihood, and a tradition and for the farmers and weavers, it is a way of life. As such research on Seri biotechnology has been included as one of the thrust areas of the Institute. Some programs on basic research and application of biotechnology are continuing and the major achievements during the year 2007-08 are as follows:

- Phylogenetic study of colour variants and wild moths of *A.assamensis* has been completed (Photo No.7).
- Protein and RAPD profiles of color variants and wild moths have been analyzed (as shown in Figure a).

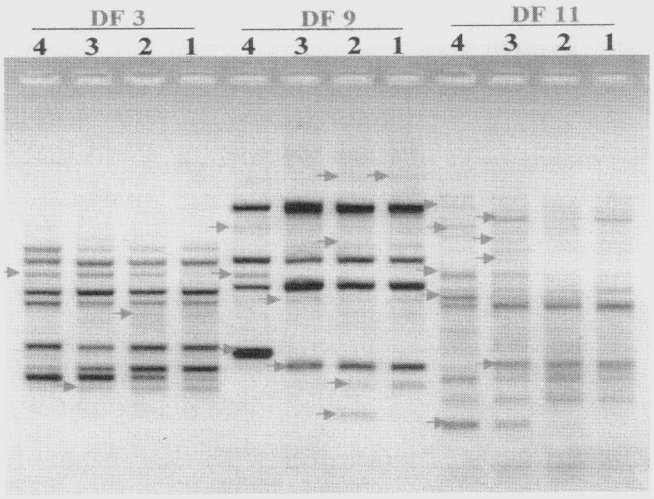


Fig a: RAPD profile of three colour morphs and wild larvae *A.assamensis* (1.5 agarose gel photo)

- Study on development of grainage technology of *A.assamensis* has been continuing. Some physiological and biochemical parameters at embryonic stages have been observed (Photo No. 8).

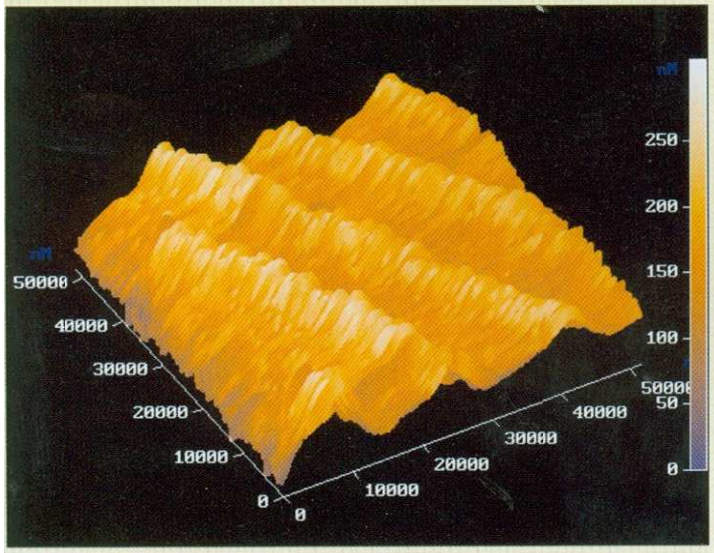


Photo 1. AFM picture of TiN film coating on bell-metal at discharge voltage 600V, Magnetic field 100 Gauss, Ar:N_2 gas pressure is 1:1

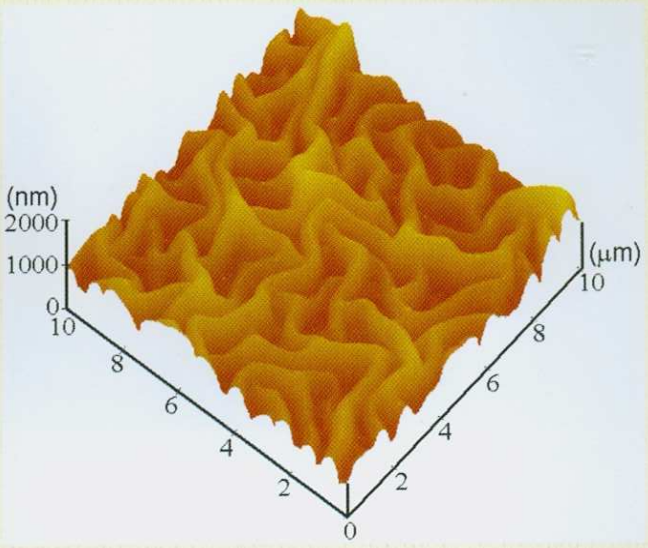


Photo 2. AFM image of the reticulated 248nm photoresist treated in argon plasma at a power density of 0.435 W/cm^2.

Photo.3. Contamination of Hydrocarbon in Tea garden due to spillage of Crude Oil from the pipeline of ONGC at Lakowa Oilfield GGS6

Photo 4.Hydrocarbon Contaminated water body due to spillage of Crude Oil from the pipeline of ONGC at Lakowa

Photo 5. P-2VP-HIO_4 foam seen under microscope

Photo 6. *R.Suffry* – a new species discovered from Assam

Photo 7. Diseased larvae of *A.assamensis* 1-Flatchery, 2-Pebrine, 3-Rectal Protrusion

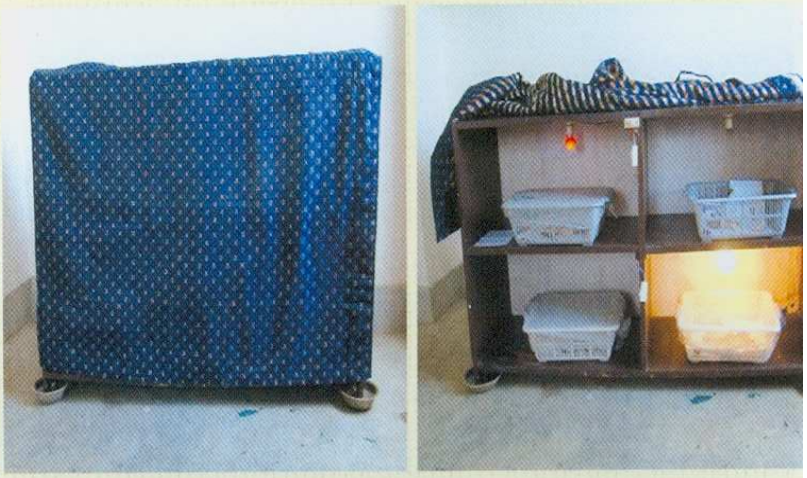


Photo 8. Arrangement for photoperiodic effect on cocoon of *A. assamensis*

Photo 9. Partially healed infection of infected animal

Photo 10. After applying the 7% SG2 against the fungus

Photo 11. Photograph of some local fruits of N E region of India on which experiments are going on

Research Scholars busy with their Experiments in the Laboratories

Plasma Processing Laboratory

Multicomponent Plasma Laboratory

Polymer Laboratory

Biodiversity Laboratory

Research Scholars busy with their Experiments in the Laboratories

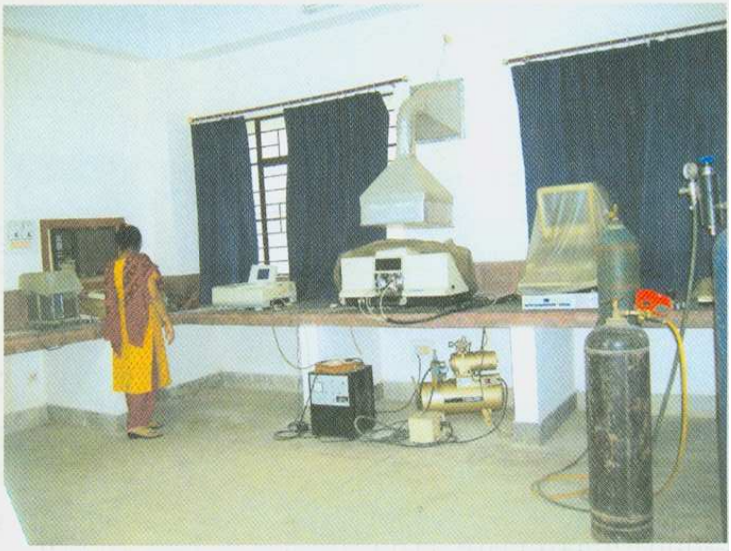
Seri Biotech Laboratory

Bio Fertilizer Laboratory

Biochemistry and Medicinal Plant Laboratory

Biochemistry and Medicinal Plant Laboratory

Mathematics



Instrumentation Division

Photo 12.Surrounding area of BRPL

Photo 13. Banana trees affected by Oil Exploration at Rudrasagar oil field

Photo 14. Samples being collected at Multichora beel, Kokrajhar

Photo 15. Part of the training of Identification of Silk

Photo 16.Mr. Pranab Gogoi, Hon'ble Minister of Sericulture and Handloom observing the tests at the stall of 'Identification of Silk' at NEDFI hut

Differernt Events of CMFT Workshop

Photo 17. Distinguished guests of the inaugural function on the dais.

Photo 18. The participants and the audience of the inaugural function

hoto 19. The cultural troupe of Govt. of Assam performing dance in the inaugural function

Photo 20. Prof. S. Ruscheweyh, Convener (ACC) lighting the inaugural lamp in presence of dignitaries

Photo 21. A moment of interaction with the dignitaries

Photo 22. The participants in the class room

Photo 23. Prof. J. Studing, Germany delivering lecture

Photo 24. Prof. R. Fournier, Canada delivering lecture

- Physicochemical properties of *A.assamensis* and other silk fiber of N.E.region have been analyzed (Fig.b) and a package for identification of silk has been developed. The same has been disseminated to the actual user of silk through exhibition, training etc. (as shown in Photo No.16).

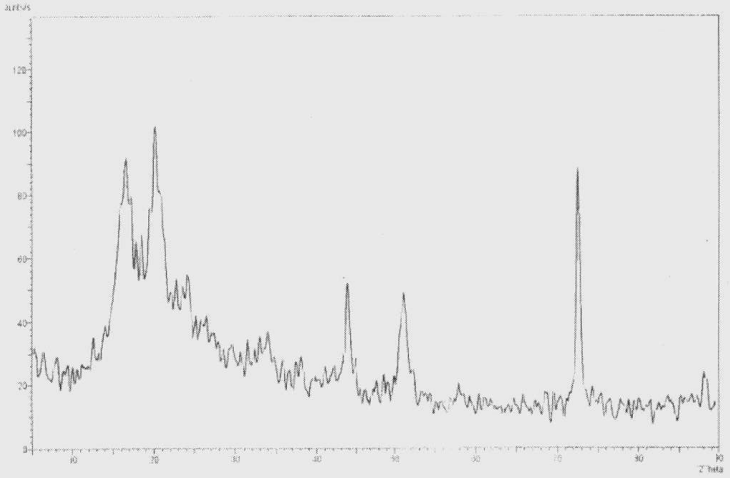


Fig b: XRD of Muga Fibre

- Survey and documentation of food plants (primary and secondary) available at N.E region have been made. Garden for food plants at IASST's campus is maintaining.
- Biological manures have been produced using vermi-compost technology and the manure produced from these techniques has been utilized in food plants of silkworm at IASST's campus.

(C) Bio-Fertilizer Section

The Biofertilizer Unit of the Life Sciences Division has been conducting works on Biodiversity of microbes and their biotechnological applications with special reference to integrated nutrient and Pest Management and agro-eco system development.

"Rehabilitation of degraded soil of Upper Assam due to excessive mining of coal"

Under this study chemical and physical property of mine spoils and water has been studied along with the assessment of heavy metals therein. Besides microbial organisms present in the bared land and sparse vegetations have been entrapped, characterized and identified with special reference to potential symbiotic fungi and Plant Growth Promoting Rhizobacteria (PGPRs). Rhizobia and AM fungi have been identified for their functional characters and are using with leguminous plants like chiratro and leguminous crops like Black Gram and Green Gram for nutrition acquisition in degraded soils by producing secondary plants with the above microorganisms to be used for regreening the degraded areas.

5.3 Resource Management and Environment Division

The division since its inception has taken up various projects related to different environmental issues of North East India. Study of hydrocarbon pollution of oil field soil and their possible remediation (Microbial, chemical and with plants), exploration of faunal biodiversity in Assam, Arunachal Pradesh, Nagaland and Manipur and their publication, Study of wetland biota and their ecobiological study, preparation of vermicompost from waste plant material are some of the important achievements of this division.

The Division has three sections
(A) Bio-Diversity Section,
(B) Environmental Chemistry Section
(C) Environmental Bio-Technology Section

(A) Bio-Diversity Section

The Biodiversity Section of the Division has been working on exploration of fish and Amphibia from different states of North-eastern India (Assam, Manipur and Nagaland). Achievements have been made on studies related to Exploration and eco-biological study of species of conservational importance.

Major achievement of this section during the year is publication of a new species of frog *Rhacophorus suffry* (Bordoloi, Bortamuli, Ohler, 2007) (Photo No. 6) which is a new addition to the global list of frogs. New record of a fish species for the state of Assam *Clupeisoma montana* has been reported (Bordoloi and Saha, 2007). 25 species of amphibian has also been reported from Manipur with 10 new records from the state (Ningombam and Bordoloi, 2007).

Ichthyofaunal diversity and fishery potential in the wetlands of Hajo, Kamrup district, Assam and study of socioeconomic status of fisherman community.

Assam abounds in a large number of flood plain wetlands (1.12 lakh hectares). These wetlands are mainly enriched by the river Brahmaputra and its tributaries. Wetlands offer a range of hydrological and ecological benefits to the entire life support systems and livelihood of rural communities depend on them. In the present study these beels were monitored for a period of over three years (2004-2007).

During present investigation 70 fish species could be recorded including *Puntius ornatus* which is a new record for the Brahmaputra drainage. Most of this system is underexplored and there is possibility of finding fish species not reported earlier. The fish fauna includes fishes of Lotic as well as lentic ecosystems.

Study of ecological parameters of beel water has revealed that the area is free from pollution. In the fringe areas paddy cultivation is done and insecticides are used. Water for analysis was normally collected from area away from cultivated land. Fishing is the only source of livelihood for the families inhabiting the neighboring areas of beels. Overdependence on fishing is causing fast depletion of natural resources. There is urgent need of alternative income generation activities and associated technologies. Different types of gears are used to exploit all the size ranges of fishes during different seasons. This causes damage to the ecosystem as along with fishes other non target organisms are also removed from the system. As a result natural food organisms of fish characteristic of this type of ecosystem are lost. Replenishment through flood or release of fingerlings of cultured fishes is necessary to check depletion of fish in these natural waters. The study has revealed that these beels are shrinking at an alarming rate due to heavy siltation. Fish stock is depleting at an alarming rate. Various causes can be attributed for depletion of fish stock viz. over exploitation of fish fauna in all seasons, fishing holiday during breeding season is not followed strictly, heavy weed infestation, gradual change in precipitation pattern, flash flood in place of timely flood etc. Detailed socio economic survey of the fisherman community was done during the period.

(B) Environmental Chemistry Section

Theme of Research

The petroleum Industry is the major contributor of different contaminants to the environment. The Assam oil fields (India) are in operation for more than a hundred years and they are located amidst areas where people cultivate rice-paddy extensively. Oil is collected from different wells in the area, brought to the Oil Collecting Stations, treated for segregating oil from the formation water, stored in huge tanks to be pumped to the distant refineries for processing. During these processes, oil spills and leakage of formation water have been quite frequent and the receiving soil as well as the plants of the nearby areas gets contaminated.

On the other hand, the refineries yield large quantities of effluent in the form of wastewater. The untreated or partially treated effluents from the refineries are directly sent to the nearby water reservoir or available lands. In the field adjacent to the refinery area, farmers are constrained to use this wastewater, which may not be suitable for irrigation purpose and may contain some contaminants. Two major classes of contaminants of refinery effluent are heavy metals and petroleum hydrocarbons. These compounds are highly toxic due to their genotoxic, mutagenic and carcinogenic potential.

Assessment of Oil Field Soil (With Special Reference to Polyaromatic Hydrocarbons) For Their Eventual Remediation and Reclamation

To assess the impacts, soil samples were collected from the agricultural fields from the areas close to two Group Gathering Stations of ONGCL in Rudrasagar Oil Field (Photo No. 13) and

characterized with respect to the most important physicochemical properties of soil with a view to detect and estimate the spread of the contaminants with respect to direction, depth and distance from a GGS. For this purpose, sample collection has been carried out at distances of 50 and 100 m from the GGS along the four principal directions at depths of 0-15, 15-30 and 30-45 cm for each position. Soil samples collected from a distance of more than 500 m is considered as the Control sample without any impact of the GGS operations. The oil field contributions have been evaluated with respect to pH, Electrical Conductivity, Water Holding Capacity, Total Organic Carbon (TOC), Chloride, Sulphate, Phosphate, Sodium, Potassium, Heavy Metals and Total Petroleum Hydrocarbons (TPH). The results are discussed in the light of possible adverse effect with respect to the control sample. The accumulation of heavy metals and other contaminants including TPH in the soil near the two GGSs is not surprising considering discharge of the effluents from GGSs and emissions from gas flaring. The results obtained from the analyses are important for working out the possibility of reclaiming the soil for safe agriculture.

Impact of Oil Refinery Wastes on Soil Quality With Particular Reference To Enzymatic Activities

Refinery contaminants penetrating the soil disturb its structure and modify its physico-chemical properties. They also affect the biological properties of the soil by modifying the populations of particular microorganisms. This in turn, affects the soil enzymatic activity and the content of assimilable macro and microelements forms in it. Under such conditions, the uptake of macro elements by plant changes, which affects the growth and productivity of the arable crops. It can be presumed that crops grown in these polluted soils may accumulate heavy metals and petroleum hydrocarbons to such an extent that it causes health hazards to human beings and animals. Besides, soil enzymatic activities are sensitive biological indicator of soil pollution and could be changed under pollution stress.

In recent years several reports have appeared documenting the harmful effects of long-term use of refinery wastewater on agricultural soil. Many investigators have studied the pollution level due to accumulation of heavy metal and petroleum hydrocarbon on soil physico-chemical properties. However, not many works have been done on the impact of heavy metals and petroleum hydrocarbons on soil enzymatic activity at national level. At international level, the impact of heavy metals on soil enzymes have been previously reported, but the effects of petroleum hydrocarbon on soil enzymes have been scarcely studied. The main aim of the ongoing research is to assess the physico-chemical properties, heavy metals and petroleum hydrocarbon content of the soil receiving refinery effluent. The study also includes effect of heavy metals and petroleum hydrocarbon on soil enzymatic activities as well as on the crop produced in that particular area.

The area chosen for the study is in the vicinity of Bongaigaon Refinery and Petrochemicals Limited (BRPL), Dhaligaon, Assam in India. The effluent of BRPL refinery drains into a small rivulet, the Tunia nala originating from BRPL complex and ultimately draining into river Tunia

This river passing through the outskirt of Bongaigaon Township is a receiving channel for municipal sewage, wastewater from railway colony and effluent from small industrial units. It is expected that the polluted water of this river may have contaminated the agricultural lands of several villages like Dhaligaon, Kukurmari, Dolaigaon, Mulagaon along its way. Photo No. 12 represents the surrounding study area of BRPL.

As a preliminary step, soil samples have been collected from the paddy fields in the vicinity of BRPL refinery at two different depths (0-25 cm and 25-50 cm) during November 2007. Ten different locations have been identified to collect those samples. Mechanical properties like soil texture and physico-chemical properties like water holding capacity, pH, conductivity, redox potential, organic carbon, Na^+, K^+, phosphate, sulphate, petroleum hydrocarbon and heavy metal content have been investigated. Further study includes assessment of some enzymes present and the impact of heavy metals and petroleum hydrocarbons on these enzymes activity and also on the crops grown in this area. The study also includes correlating soil heavy metals and petroleum hydrocarbons with soil enzyme activities. The present work although preliminary in nature, has established that the effluent discharge from the refinery is definitely altering the soil properties of the adjacent agricultural land.

(C) Environmental Bio-Technology Section

Biotechnological methods are being explored for remediation of Environmental problems like pollution due to hydrocarbon in soil and water of oil field areas. A number of projects were completed earlier and work on the same problem is being continued in this division.

Phytoremediation of hydrocarbon contaminated soil of Upper Assam

Oil contaminated soil in and around exploration and spillage areas in and oil refineries are still remaining a major environmental problem. The affect of oil spill has been frequently felt in the mining areas in the North Eastern Region of the country. The wastewater generated in oilfields is generally mixed with crude and oily sludge and are kept in earthen pits made especially for the purpose. From these pits the effluent finds way into the cultivated fields and pollutes the adjoining areas.

Bioremediation of petroleum in soil using indigenous microorganisms has proven effective; however, the biodegradation rate of more recalcitrant and potentially toxic petroleum contaminants, such as polycyclic aromatic hydrocarbons (PAHs), is rapid at first but declines quickly. Biodegradation of such compounds is limited by their strong adsorption potential and low solubility. Vegetation may play an important role in the biodegradation of toxic organic chemicals in soil. For petroleum compounds, the presence of rhizosphere microflora may accelerate biodegradation of the contaminants. The establishment of vegetation on hazardous waste sites is an economic, potentially effective and

low - maintenance approach for remediation and stabilization of waste.
The following work of the project has been completed

(1) Survey and collection of hydrocarbon contaminated soil samples of oil field situated at Lakowa, Sibasagar (Photo No. 3, 4).
(2) The analysis of physico-chemical characteristics of collected soil samples.
(3) The extraction of total oil and grease present in the contaminated soil samples.

A study on utilization of bio-waste for production of vermicompost manure

Bio-waste, which includes agricultural waste, household waste, farmwaste etc, is available in our state particularly in rural areas. In urban area it (especially household waste) causes serious problem by blocking drainage system, creating nasty odour ultimately polluting the environment. Proper utilization of bio-wastes for production of vermicompost manure will be helpful to solve the problem.

The process in which bio-wastes are converted into nutrient rich organic manure using earthworms is known as vermicomposting. Extensive use of chemical fertilizer degrades top layer of soil besides, causing heavy damage to the adjacent aquatic body. Vermicompost manure is free from chemical input and has no side effect. It improves soil aeration, texture, and water retention capacity of soil and promotes the root growth and nutrient absorption. The process is simple, free of cost and easily handled by farmers. The present investigation is to carry out the economical solution of the pollution caused by chemical fertilizers and bio-wastes and to produce organic manure at low cost.

The following work of the project has been completed

1) To select the suitable verms for production of vermicompost manure.
2) To study the suitable material for production of vermicompost manure.
3) To evaluate the nutrient status of different vermicompost manure.

Computer application in environmental aspects

Statistical analysis for confirmation of species and presentation of biodiversity and ecobiological data are being carried in the Resource management and environment division. The statistical works that are mainly carried out includes analysis of standard measurements and maturity cycle of different species of amphibian and fish using different test statistic like Mann Whitney test, chi-square test, t-test for confirmation of species and for studying the differences of male and female species.

5.4 Mathematical Sciences Division

The Mathematical Sciences Division is carrying out basic research works on Pure Mathematics, Applied Mathematics and Statistics. Some research works for preparation of database is also done.

(A) Pure Mathematics Section

Work done on Sequence Spaces, Series, Summability Theory and Fuzzy Mathematics

Generalized Difference Sequence Spaces:

The notion of difference sequence spaces was introduced by *H. Kizmaz* [*Canad. Math. Bull.* 24(1981), 169-176]. The notion was generalized by *M. Et* and *R. Colak* [*Soochow J. Math.* 21(1995), 377-386]. Then another type of difference sequences spaces were introduced by *B.C. Tripathy* and *A. Esi* [*Internat. J. Sci. Tech* 1(2006), 11-14]. In the paper by *A. Esi, B.C. Tripathy* and *B. Sarma* [*Math. Slovaca*, 57(5)(2007),475-482], both the notions have been combined to study the new type of generalized difference sequence spaces $\ell_\infty(\Delta_m^n)$ $c(\Delta_m^n)$ and $c_0(\Delta_m^n)$,the classes of bounded, convergent and null generalized difference sequences. On taking m=1 one will get the class of generalized difference sequences of Et and Colak type. If one takes m=n=1, then one will get the difference sequence of Kizmaz type. If one takes n=1, then one will get the class of difference sequence of Tripathy and Esi type. Different algebraic and topological properties of these spaces have been studied. Some inclusion results have been established.

Sequence Spaces Associated with Multiplier Sequences :

The notion of sequence spaces associated with multiplier sequences was introduced by *G. Goes* and *S. Goes* [*Math. Zeift.* 118(1970), 93-102]. Since then many classes of sequences have been investigated by different workers associated with multiplier sequences. In the paper by *A. Esi* and *B.C. Tripathy* [*Math. Slovaca*, 57(4)(20007), 339-348], the paranormed strongly summable sequence spaces $w_0[A,\Delta^m,\Lambda,p]$, $w_1[A,\Delta^m,\Lambda,p]$, $w_\infty[A,\Delta^m,\Lambda,p]$ associated with a multiplier sequence relative to a non-negative regular matrix $A=(a_{nk})$ have been introduced and studied in detail. Also the Δ_Λ^n statistical convergent sequences have been introduced and some inclusion relations between $w_1[A,\Delta^m,\Lambda,p]$ convergence and Δ_Λ^m -statistical convergence have been established. These classes of sequences generalize and unify several existing classes of sequences.

function M is mapping $M:[0,\infty)\to[0,\infty)$ such that it is *continuous, non-decreasing* n $M(0) = 0$, $M(x) > 0$, for $x > 0$ and $M(x)\to\infty$, as $x\to\infty$.

gent [*J. London Math Soc.*, 35(2)(1960), 161-171] introduced a class of sequences ated to the class of p-absolutely summable sequences. In the paper by *B.C. Tripathy a* [*Math. Slovaca*, 57(2)(2007), 171-178], the difference sequence space $m(M,D,f)$ function have been investigated in detail.

onvergent Paranormed Double Sequence Spaces :

ion of statistically convergent double sequence space was introduced by *B.C. Tripathy Iath.*, 34(2003), 231-137]. In the paper by *B.C. Tripathy* and *B. Sarma* [*Math.* 2007), 179-188], different classes of vector valued paranormed statistically convergent e have been introduced on considering $p=(p_{nk})$, a bounded double sequence of positive Their different properties have been investigated and some inclusion relations have l.

Fuzzy Real Numbers :

real number X is a fuzzy set on R, i.e. a mapping $X: R\to I$ (=[0,1]), associating each with its grade of membership $X(t)$.

onvergent and Cesàro Summable Double Sequences of Fuzzy Real Numbers.

per by *B.C. Tripathy* and *A.J. Dutta* [*Soochow J. Math.*, 33(4)(2007), 835-848], the rent types of statistically convergent and statistically null fuzzy real-valued double s. We study their different properties like solidness, symmetric, convergence free, a etc. The Fuzzy real-valued Cesàro summable double sequence space is introduced. veen strongly p-Cesàro summability and bounded statistically convergent double een established.

ued Double Sequence Space $_2\ell_F^p$

fuzzy real-valued double sequence space $_2\ell_F^p$. is introduced in the paper by *B.C. .J. Dutta* [*Math. Computer Modelling*, 46(2007), 1294-1299]. For d a metric on all upper semi-continuous, normal, convex fuzzy real numbers a metric ρ is defined shown that "The class of sequences $_2\ell_F^p$ is a complete metric space with respect ". Its different properties like completeness, solidness, symmetricness, convergence

Pointwise Statistical Convergence of Sequences of Fuzzy Real Numbers.

The notion of pointwise statistical convergence of sequences of fuzzy mappings is introduced in the paper by *Y. Altin, M. Et* and *B.C. Tripathy* [*J. Fuzzy Math.*, 15(2)(2007), 425-433]. Also the notion of statistically Cauchy sequences for fuzzy mappings is introduced. The equivalence of pointwise statistical convergence of sequences of fuzzy mappings and statistically Cauchy is proved. Different properties of the class of pointwise statistical convergence sequences of fuzzy mappings like solidness, monotonocity, symmetricity etc have been examined.

(B) Statistics Section

(i) Applied Stochastic Process

Queueing theory is a branch of Applied Stochastic Process. It is an important area of current research. In this context some important contributions have been made on different types of queueing models.

Work done on Vacation Models :

Classical vacation scheme with Bernoulli service discipline was originated and developed significantly by *J.Keilson* and. *L.D.Servi* [*Journal of Applied Probability*, 23 (1986), 790-802] and co-workers *O. Kella* [*Operations Research*, 38, (1990), 724-728] suggested a generalized Bernoulli scheme according to which a single server goes on k- consecutive vacations with probability p_i (say), if the queue upon his return is empty, where $\sum_{i=1}^{k} p_i = 1$. In this context we have developed recursive scheme for computation of limiting probabilities for two phases of heterogeneous service systems with Bernoulli vacation schedule under multiple vacation policy in which after two successive service i.e first phase of service followed by the second phase of service or first vacation the server may go for further vacations till it finds at least one unit in the system, see *G.Choudhury et. al* [*Applied Mathematical Modelling*, 31 (2007), 1079-1091] (for the case of batch arrival queueing system). One of the important observation has been made for these type of model is that the queue size distribution at a departure epoch can be decomposed into distributions of two independent random variables viz.-

(i) The stationary queue size distribution of an *M/G/1* type queue with two phases of heterogeneous service with Bernoulli vacation schedule and single vacation.
(ii) The number of arrivals during the residual life of the vacation time.

Work done on Control of Queues:

Control of queues is one of the most significant areas of the queueing theory. Its progress and development both in methodology and in applications are ever growing. As number of published

papers on control of queueing system is extremely vast, for the sake of easiness we shall often refer to the basic classified bibliography by *T. Crabill et. al* [*Operations Research*, 25 (1997), 219-232] to mention some early and fundamental papers. In this context, *G. Choudhury* and *K.C. Madan* [*International Journal of Operational Research*, 2 (2007), 81-97] have obtained various operating characteristics for a batch arrival Bernoulli vacation queue with a random set-up time, where they introduce the concept of restricted admissibility policy. According to this policy r% and p% of arriving units allowed to server's busy periods and vacation periods respectively.

Work done on Retrial Models :

Queuing system with repeated attempts (retrial queues) are characterized by the following feature: if the server is free then arriving customer enters service; if the server is occupied the customer must leave the service area and enter a pool of unsatisfied group of customers (retrial group or orbit). The pioneering studies of retrial models are to present the concept of retrial time as an alternative to the classical model of telephone systems. In this context each blocked customer generates a stream of repeated requests independently of the rest of the customers in the retrial group. Thus, in so- called classical retrial policy, the interval between successive repeated attempts is exponentially distributed with rate $\eta\mu$ (say), when number of customers in the retrial group is 'n'. This type of model have been studied by *T. Yang* and *J.G. Templeton* [*QUESTA*, 2(1987), 201-233] and *G. Falin* [*QUESTA*, 7(1990), 127-168]. In this context, we have investigated various processes such as embedded Markov chain at a departure epoch, orbit size distribution and joint distribution of the server's state and number in the orbit for an $M^X/(G_1,G_2)/1$ retrial queue under Bernoulli vacation schedule in *G. Choudhury* [*Applied Mathematics and Computation*, 188(2007), 1455-1466]. Concept of control of admission to the retrial group in the form of Bernoulli admission mechanism has been introduced in the study of retrial models, according to which each individual blocked customer is admitted to join the retrial group with probability 'r' (say) independently of the admission of the actual size of the retrial group. The consideration of the admission probability 'r' can be viewed as a first step to extend the existing control mechanism for admission of customers in the standard waiting lines to queue with repeated attempts. The Bernoulli admission mechanism can also be viewed as a device to model situations where a proportion of arriving packets are occupied and, consequently deleted. These types of queuing systems could be used as mathematical models of several computer systems: Packet switching networks, Shared bus local area networks operating under the carrier-sense multiple access protocol and collision avoidance star local area networks etc.

(ii) Distribution Theory

Work done on Estimation of parameters and fitting:

The type II of the Pearsonian System of Curves is an important curve as its distribution form finds application in many actuarial and demographic cases. The form of the distribution function

is

$$y = y_0\left(1-\frac{x^2}{a^2}\right)^m, \quad -a \le x \le a$$

with the origin at the mean of the distribution. The method of maximum likelihood is due to *R.A.Fisher* [*Phil. Trans.*, A., Vol. 222, pp. 309-368,1921]. The method of moments was regarded as efficient in fitting Pearsonian Curves, prior to 1921, when it was shown by Fisher, that its efficiency is restricted to a small region for which β_2 lies between the limits 2.65 and 3.42; and for which β_1 does not exceed 3.42.

Although the general theory, and the principle of its practical application, has thus been available for many years, the teaching and improvement etc. has lagged behind. This method has been successfully used to fit the parameters by many authors like *M.E. Glutany* et. al. [*J. Appl. Stat.* 29, no. 7, 955-965, 2002], *S.C. Das* [*Australian Journal of Physics*, 7, 298-304,1954], *A.K. Gupta et. al.* [*Canad J. Statist*, 27, no. 3, 599-606, 1999], *R.S. Koshal* [*Journal of Royal Statistical Society*, 96, 303-13, 1933], *J. Zhou et. al.*, [*J.Time Series Anal*, 26, no.6, 825-842, 2005] etc.

The difficulty of using the method of maximum likelihood in general curve fitting is the same as that mentioned in connection with the least squares; the equations reached cannot be solved directly and the constants have to be found by approximation. Also it sometimes happens that the method leads to complicated equations so that the solutions cannot be obtained directly. In such cases, that is when explicit solution of the equation are not possible, we use the method suggested by *C.R.Rao* [*Linear Statistical Inference and its Applications*. Wiley Eastern Private Limited, 1974], i.e. the method of scoring for approximate calculation of maximum likelihood estimators.

In this context here the equations required for the solution of Type II Pearsonian system of curves were developed and the scoring method was used. A computer program was written to test it out with actual data and the results compared with known results of estimation and fitting with the Method of Moments. It was observed that the results show a marked improvement due to the use of the scoring method.

The Generalised Lambda Distribution also known as the Asymmetric Lambda Distribution:

The generalized lambda distribution (GLD) is a flexible and manageable tool for modeling empirical and theoretical distributions. In empirical work the data on continuous variables are generally presented in one of two ways: individual observations are reported or the data are summarized in a grouped form with the frequency associated with each group being reported as is frequently the case for size distribution.

The Generalised lambda Distribution is an extension, first suggested by *J.S. Ramberg* & *B.W. Schmeiser* [*Commun. ACM* 17:78-82,1974], of Tukey's lambda distribution.

There are two parameterizations of the distribution, both defined by their inverse distribution function. The two inverse distribution functions are defined by *J.S. Ramberg* & *B.W. Schmeiser* and *M. Freimer , S. Mudholkar , G. Kollia , T. C. Lin* [*Commun. Statist. Theor. Math.* 17:3547-3567,1988].

It is of interest because of the wide variety of distributional shapes that it can take on.

(C) Database Projects

Status of Science Teaching in the Secondary School of Assam

The project has been completed as per schedule. Final report has been submitted. The salient findings are as follows:

1. Science is one of the three subjects where failure percentage is high. The other two subjects being English and Mathematics.
2. Science teachers need training. Currently trained teachers are few.
3. Introduction of practical examination at HSLC examination has been felt necessary.
4. Bifurcation of class IX and class X examinations have resulted in higher rate of pass.
5. At secondary level education, the dropout rate is high. About one third of the students admitted to class VIII quit studies before reaching class X.

5.5 Library and Information Centre

The Library and Information Center of Institute of Advanced Study in Science & Technology (IASST), strives to evolve as a model and leading multidisciplinary science library in the field of Plasma physics, Polymer science, Mathematics & Statistics, Chemistry, Biology (Medicinal plants, Sericulture, Bio-prospecting, Bio-fertilizers, Virology, Genetics, Physiology, Fishery etc.), Agriculture, Biotechnology, Environmental science, Nano science & technology, etc. Photo No. 25 shows a section of the Library.

The Library and Information Center is primarily intended for the scientists, research scholars, students and staff members of IASST. Besides this, the library also opens for outside users.

The library automation activity using the SOUL integrated library software package has been continued during the year. A Server, 4 PCs, 1 Scanner, 1 Printer, CD-Drives is the part of the set up of library computerization. The electronic databases at the library cover books only and for other documents the process is going on.

The library subscribed for 60 scientific journals both Indian & Foreign.and 7 newspapers. Out of 60 journals some are online accessibility. Besides this, library received the annual report, newsletter, bulletin, and progress report from different organizations as a gratis/exchange document.

Following are Library services and statistics.

1. New Additions

Books	.....	45
Reports	.....	43
Thesis/Dissertations.	.....	07
CD-ROMs	.....	24

2. Other Activities

Visitors using the Library	.....	476
Circulation of Books/Journals etc.	.....	314
Photocopying (No. of pages).	.....	47293
Number of Annual Reports mailed	.....	100
No. of INTERNET Searches provided	.....	43
Current Awareness Service.	.....	25
Selective Dissemination Information Service	.....	36
Referral Service.	.....	55

3. Total Library Collections

Books	.....	7268
Journals (Bound Volumes)	.....	1008
Journals subscribed for 2008	.....	60
Journals received (Gratis/Exchange)	.....	10
Reports	.....	1593
Reprints	.....	05
Thesis/Dissertations	.....	257
Current contents of Journals	.....	12
Misc. CD's	.....	541

6.0 Publications and Patents

Publications :

1. N. C. Adhikary, H. Bailung, A. R. Pal, Y. Nakamura and J. Chutia: Observation of sheath modification in laboratory dusty plasma. *Physics of Plasmas,* 2007; 14: 103705.
2. H. Kakati, A. R. Pal, H. Bailung and J. Chutia: Investigation of the E × B rotation of electrons and related plasma characteristics in a radio frequency magnetron sputtering discharge. *Journal of Physics D: Applied. Physics,* 2007; 40: 6865.
3. S. M. Borah, A. R. Pal, H. Bailung and J. Chutia: Titanium nitride nano-structure by DC magnetron sputtering plasma. *Indian Journal of Physics,* 2008; 82(2): 209.

4. P. Chetri, N. Sen Sarma, H. Bailung, J. Chutia and N. N. Dass: Synthesis of polyacrylamide in nano state. *Nano Science and Nano Technology: An Indian Journal,* 2007; 1(2): 73-76.

5. P. Chetri, N. Sen Sarma, A. R. Pal, H. Bailung, J. Chutia and N.N. Dass: Synthesis and conductivity measurement of polyacrylamide in nano state. *Asian Journal of Chemistry,* 2008; 20(6): 4413-4420.

6. P. Chetri, N. N. Dass and N. Sen Sarma: Development of a catalyst for Solution of Poly(vinyl alcohol) in non-aqueous medium. *Chinese Journal of Polymer Science,* 2008; 26(4): 399-404.

7. P. Chetri, N. Sen Sarma and N. N. Dass: Studies of A.C. Conductivity of Poly (Vinyl Borate) and its Calcium Derivative in solid state. *Chinese Journal of Polymer Science,* 2008; 26(4): 501-506.

8. P. Chetri, N.N. Dass, A.R. Pal, H. Bailung, J. Chutia and N. Sen Sarma: Synthesis of Polyacrylamide in Nano Fine state and Its Thermal properties. *Journal of Polymer Materials,* 2007; 24: 129-134.

9. B.C. Tripathy and A. J. Dutta: Statistically convergent and Cesaro summable double sequences of fuzzy real numbers. *Soochow Journal of Mathematics,* 2007; 34(4): 835-848.

10. A. Esi; B.C. Tripathy and B. Sarma: On some new type generalized difference sequence spaces. *Mathmatica Slovaca,* 2007; 57(5): 475-482.

11. A. Esi and B.C. Tripathy: Strongly almost convergent generalized difference sequences associated with multiplier sequences. *Mathmatica Slovaca,* 2007; 57(4): 339-348.

12. B.C. Tripathy and B. Sarma: Vector valued paranormed statistically convergent double sequence spaces. *Mathmatica Slovaca,* 2007; 57(2): 179-188.

13. B.C. Tripathy and S. Mahanta: On a class of difference sequences related to the ℓ^p space defined by Orlicz functions. *Mathematica Slovaca,* 2007; 57(2) : 171-178.

14. B.C. Tripathy and A. J. Dutta: On fuzzy real-valued double sequence spaces ${}_2\ell_F^p$. *Mathematical and Computer Modelling,* 2007; 46(9-10): 1294-1299.

15. Y.Altin; M.Et and B. C. Tripathy: On point wise statistical convergence of sequences of fuzzy numbers. *Journal of Fuzzy Mathematics,* 2007; 15(2): 425-433.

16. G. Choudhury: A two phase batch arrival retrial queueing system with Bernoulli vacation schedule. *Applied Mathematics and Computation,* 2007; 188: 1455-1466.

17. G. Choudhury and K.C. Madan: A batch arrival Bernoulli vacation queue with a random setup time under restricted admissibility policy. *International Journal of Operational Research,* 2007; 2(1): 81-97.

18. G. Choudhury, L. Tadj and M. Paul: Steady state analysis of an $M^X/G/1$ queue with two phase service and Bernoulli vacation schedule under multiple vacation policy. *Applied Mathematical Modelling,* 2007; 31: 1079-1091.

19. L. B. Mahanta and D. C. Nath: Maximum Likelihood Estimators for fitting the Pearsonian

Type II System of Curves. *International Journal of Science and Technology,* 2007; 2(2): 115-122.

20. J. Kotoky, M. Kalita, G. K. Sarmah and B. Das: Crystal & Molecular structure of 6 α-acetoxy azadiron. *Indian Journal of Chemistry,* 2007; 46(B): 1879-1882.
21. J. Kotoky, P. N. Das: Medicinal Plants used for Liver Diseases in some parts of Kamrup District of Assam, a North Eastern State of India. *Fitoterapia,* 2008; 79: 384-387.
22. J. Kotoky, B. Dasgupta and G. K. Sarma: Protective Properties of *Leucas lavendulaefolia* Walp against D-Galactosamine intoxicated rats. *Fitoterapia,* 2008; 79: 290-292.
23. R. Nath, S. Kumar Nath and D. Devi: Study and conservation of host food plants of muga silkworm *Antheraea assamensis* of Assam. *Nature, Environment and pollution Technology,* 2008; 7(1): 83-92.
24. B. Ningombam and S. Bordoloi: Amphibian fauna of Loktak, Manipur, India with ten new records for the state. *Zoos print Journal,* 2007; 22(5): 2688-2690.
25. S. Bordoloi, T. Bortamuli and A. Ohler: Systematics of the genus *Rhacophorus* (Amphibia, Anura): identity of red-webbed forms and description of a new species from Assam. *Zootaxa,* 2007; 1653: 1-20.
26. S. Bordoloi and S. Saha: Record of Clupisoma Montana (Hora) from Assam and comparative study with related species. *Journal of the Inland Fisheries Society of India,* 2007; 39(2): 23-31.

Patents :

1. Dr. Neelotpal Sen Sarma, Dr. Narendra Nath Dass and Dr. Prafulla Chetri have registered for a patent *"A Novel Polyelectrolyte and a Process for the Preparation thereof"*, Application No.1350/KOL/2006 dt.12/12/2006 in December 2006.

2. Dr. Narendra Nath Dass, Dr. Neelotpal Sen Sarma and Dr. Prafulla Chetri have registered for one more patent *"Synthesis of a Novel Adhesive Solid Polyelectrolyte"*, Application No. 966/KOL/2007 dt.06/07/2007 in July 2007.

3. Dr. Jibon Kotoky has applied for patent for *"A Herbal Skin Ointment Base"*, Application No.DRL/1009/TC dt.04/12/2007, jointly with DRL, Tezpur in December 2007.

7. Other Publications

1. S. Deka, "Phytoremediation of heavy metals: A new strategy for environmental decontamination" published in the book "Biodiversity and Environmental Biotechnology" (Ed. Dwivedi et al) *Scientific Publishers (India) Jodhpur* Chapter 16, Pp. 337-354 (2007).

8. Research Activities:

8.1 Research Papers presented in Conference/Seminars

1. "A study on two indigenous techniques of trapping fishes in the beels of Hajo, Kamrup district, Assam." **A. Baishya** and S. Bordoloi, was presented at *"Recent Advances and Rebuilding of Fish and Fisheries in North-East India"* held at Dept. of Pisciculture, St. Anthony's College, Shillong from 22nd- 23rd August, 2007.

2. "Ethnozoological practices related to fish fauna amongst the Lotha Naga tribe of Wokha district, Nagaland." **L. Nzano Humtsoe** and S. Bordoloi, was presented at *"Recent Advances and Rebuilding of Fish and Fisheries in North-East India"* held at Dept. of Pisciculture, St. Anthony's College, Shillong from 22nd- 23rd August, 2007.

3. "Impact of lime sludge waste of paper mill on water quality and fish growth" **S. Yasmine,** S. Deka and A. Datta, was presented in the *"Workshop on sustainability of Indian aquaculture industry"* held at Indian Institute of Technology, Kharagpur, West Bengal from 28th - 29th September, 2007.

4. "Study of discharge characteristics on transition from metallic to reactive mode in radio frequency magnetron plasma" **J. Chutia,** H. Kakati, A. R Pal and H. Bailung, was presented in *American Physical Society - 60th Gaseous Electronics Conference* held at Arlington, Virginia from 2nd-5th October, 2007.

5. "Wetlands of Sivasagar District of Assam as Congenial Habitat for Amphibia." **T. Bortamuli** and S. Bordoloi, was presented in *"Taal 2007" 12th World Lake Conference* held at Jaipur, India from 28th October-2nd November, 2007.

6. "Loktak Lake, Manipur, India a Congenial Habitat for the Amphibian Fauna." **B. Ningombam** and S. Bordoloi, was presented in *"Taal 2007" 12th World Lake Conference* held at Jaipur, India from 28th October- 2nd November, 2007.

7. "Effect of Anthropogenic Stress on the Production of Fish in the Wetlands of Hajo, Kamrup district, Assam" **A. Baishya** and S.Bordoloi, was presented in *"Taal 2007" 12th World Lake Conference* held at Jaipur, India from 28th October- 2nd November, 2007.

8. "Antioxidant Property of Some Selected Fruits of North East India" **T. Mudoi**, R. Devi and D. C. Deka, was presented in the *40th Annual conference of Indian Pharmacological Society* held at Mohali, Chandigarh from 1st - 3rd November, 2007.

9. "Conducting behavior of poly (2-vinyl pyridine)-I2 complex in nano fine state" **N. Sen Sarma,** P. Chetri and N. N. Dass, was presented in the *International Seminar on Frontiers in Polymer Science and Technology,* held at Guwahati from 1st-3rd November, 2007.

10. "Synthesis and characterization of poly-1, 3-dimethylol diacrylate propane-2-ol and its use as foam" **P. Chetri**, N. Sen Sarma and N. N. Dass, was presented in the *International Seminar on Frontiers in Polymer Science and Technology,* held at Guwahati from 1st-3rd November, 2007.

11. "Investigation on ion acoustic soliton in a double plasma device" **K. Devi**, S. K. Sharma, N. C. Adhikary and H. Bailung, was presented in *22nd National Symposium on Plasma Science and Technology,* Ahmedabad, India organized jointly by IPR (Gujarat) and PSSI from 6th-10th December, 2007.

12. "Knowledge portal: challenges before library and information professionals" **T. D. Goswami**, was presented in the *5th Convention PLANNER-2007* of INFLIBNET Centre, Ahmedabad, held at Gauhati University during 7th -8th December, 2007.

13. "Plasma parameters in a new double plasma device with strong multi-dipole magnets for surface plasma confinement" **S. K. Sharma,** K. Devi and H. Bailung, was presented in *22nd National Symposium on Plasma Science and Technology,* Ahmedabad, India organized jointly by IPR (Gujarat) and PSSI from 6th-10th December, 2007.

14. "Study of E×B electron drift velocity using Mach probe in a cylindrical DC magnetron device" **S. M. Borah**, H. Bailung and J. Chutia, was presented in *22nd National Symposium on Plasma Science and Technology,* Ahmedabad, India organized jointly by IPR (Gujarat) and PSSI from 6th-10th December, 2007.

15. "The influence of oxygen flow rate on deposition characteristics of aluminium oxide thin film in a rf magnetron plasma " **H. Kakati,** A. R Pal, H. Bailung and J. Chutia, was presented in *22nd National Symposium on Plasma Science and Technology,* Ahmedabad, India organized jointly by IPR (Gujarat) and PSSI from 6th - 10th December, 2007.

16. "Difference sequences of fuzzy real numbers defined by Orlicz functions" B.C. Tripathy and **S. Borgohain**, was presented in the *73rd Annual Conference of the Indian Mathematical Society* organized by the Department of Mathematics, University of Pune from 27th-30th December, 2007.

17. "The sequence space $m(\phi, \Delta_m, p)^F$" B.C. Tripathy and **S. Borgohain**, was presented in the *International Conference on Frontiers of Mathematics and Applications* organized by the Department of Mathematics, University of Burdwan from 16th-18th January, 2008.

18. "Lacunary I-convergent sequences of fuzzy real numbers" B.C. Tripathy and **A. J. Dutta,** was presented in the *International Conference on Frontiers of Mathematics and Applications* organized by the Department of Mathematics, University of Burdwan from 16th -18th January, 2008.

19. "Chemical Evaluation of Antioxidant Property of Some Selected Fruits of North East India" **T. Mudoi**, D.C. Deka and R. Devi, was presented in the *National seminar* held at

Chemistry Department, Gauhati University on 16th Feb, 2008.

20. "Studies on soil and water quality of Tipong, Tirap and Tikak Colliery of Makum coalfield due to mining activities" **N. Nesa** and P. Azad, was presented in the *National Symposium on contemporary environmental problems and Biotechnological applications in their management,* organized by School of Environmental Sciences, Jawaharlal Nehru University, New Delhi from 7th - 8th March, 2008.

21. "Trace elements status in eleven Medicinal plants of Northeast India" **D. C. Baruah,** D K Sharma and R. Devi, was presented in the *symposium- cum- training programme, Developing capacity building of young scientists for carrying out basic, clinical and operational research in the field of Nutrition,* R D Gargi Medical College, Ujjain (Madhya Pradesh) from 9th -11th March, 2008.

22. "A study of the traditional process of weaving of Muga silk fabrics" **M. B. Sharma** and D. Devi, was presented in the *53rd Annual Technical Seminar of Assam science society* held at College of Veterinary Science, AAU Khanapara on 15th March, 2008.

23. "Bio-chemical profile of Antheraea assamensis Helfer during embryonic development" **P. Choudhury** and D. Devi, was presented in the *53rd Annual Technical Seminar of Assam science society* held at College of Veterinary Seminar, AAU Khanapara on 15th March, 2008.

24. "Soil microbial diversity of Dibru-Saikhowa biosphere reserve with special reference to physico-chemical properties" **K. Das,** R. Saikia, S. Deka and P. Azad, was presented in the *53rd Technical Session of the Assam Science Society* at College of veterinary Science, Assam Agricultural University, Khanapara, Guwahati - 22 held on 15th March, 2008.

25. "Studies on tensile properties of natural silk fiber of North Eastern region, India " **B. Talukdar,** D. Devi and K.C. Baruah, was presented in the *53rd Annual Technical Seminar of Assam science society* held at College of Veterinary Science, AAU Khanapara on 15th March, 2008.

26. "An M/G/1 retrial queueing system with two phases of service with random breakdown" **K. Deka** and G. Choudhury, was presented in the *53rd Annual Technical Session of Assam Science Society* held at College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati on 15th March, 2008.

27. "Impact of coalmining activities in the soil and water of Makum coalfield, Tinsukia, Assam" **N. Nesa** and P. Azad, was presented in *53rd Annual Technical Session of Assam Science Society* held at CVSc, AAU, Khanapara, Guwahati on 15th March 2008.

28. "The sequence space $m(M,\phi,p)^F$ " B.C. Tripathy and **S. Borgohain,** was presented in the *53rd Annual Technical Session of Assam Science Society* held at College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati on 15th March, 2008.

8.2 Conference/Symposium/Workshop/Exhibition attended

1. Dr. J. Kotoky participated in the *"National Seminar on Recent Trends in Clinical Research"* organized by Pharmacology & Toxicology, Faculty of Veterinary, Assam Agricultural University, and sponsored by DST, GOI, & ASTEC, Govt. of Assam held at Regional Science Centre auditorium, Guwahati from 24th -26th May, 2007.

2. Dr.(Mrs) R. Devi has attended a presentation on *"Water chemistry and water purification Technology for Life Sciences Application"* organized by Department of Biotechnology, Gauhati University and Millipore India Pvt Ltd on 7th June 2007.

3. Dr. D. Devi has attended a presentation on *"Water Chemistry and Water Purification Technology for Life Sciences Applications"* organized by Dept. of Biotechnology, Gauhati University and Millipore India Pvt. Ltd. on 7th June, 2007.

4. Dr. D.Devi attended the Seminar cum meeting on *"G.I. Indication on goods organized by ASTEC and corporate law group"*, New Delhi held at Engineers Institute, Panbazar, Guwahati-1 on 24th August 2007. On the same occasion, the G.I. certificate for 'Muga silk' was handed over to Honble Chief Minister of Assam on behalf of People of Assam. It is worth mentioning that Dr. Dipali Devi was associated as resource person for obtaining G.I. of Muga silk, the first G.I. patent of Assam.

5. Dr. D. Devi has exhibited Biodiversity of Silkworm and Silk related items of *A. assamensis* at the seminar cum meeting on *"Geographical indication of goods"* held at Engineers Institute, Panbazar Guwahati-1 on 24th August, 2007.

6. Dr. L. B. Mahanta participated in the National Seminar on *"Dimensions of Human Deprivation"* jointly organized by Central Statistical Organisation, Ministry of Statistics and Programme Implementation, Government of India and Department of Statistics, Gauhati University, Guwahati, held during 27th -28th September, 2007.

7. Dr. (Mrs.) S.C. Bordoloi attended the Symposium on *"Industry and Ecology : Perspectives on Development in Northeast India"* organized by the Department of Humanities and Social Sciences, Indian Institute of Technology, Guwahati held at IIT, Guwahati on 26th October, 2007.

8. T.D.Goswami, Asst. Librarian attended a one day Sensitization-cum-Awareness Programme for *"Technology Information Facilitation Programme"*, organized by Dept. of Scientific & Industrial Research, Ministry of Science & Technology, Govt. of India in collaboration with Dept. of Library & Information Science, GU held in Guwahati University, Assam on 2nd November, 2007.

9. Dr. D. Devi had attended *"International Interactive meet on Ayurveda"* held at Guwahati

organized by SKM Ayurvedic Institute, Guwahati, collaborated with Aihore Pratisthanam, Ayurveda Kenkyusho, Osaka, Japan and International Vaidika Foundation, Delhi, India held at National Institute of Rural Development, Guwahati on 26th -27th November, 2007.

10. Dr. D. Devi had attended the training course on *"Bioinformatics tools and their application in biological research"* conducted by the Bioinformatics infrastructure facility, CvSc, Guwahati sponsored by Department of Biotechnology, GoI during 3rd -6th December, 2007.

11. T.D.Goswami, Asst. Librarian attended the 5th Convention, PLANNER-2007 on *"Library as a Global Information Hub: Perspective & Challenges"*, organized by INFLIBNET Centre, Ahmedabad in collaboration with Dept. of library & Information Science, GU held in Gauhati University during 7th -8th December, 2007.

12. Dr. (Mrs.) S.C. Bordoloi was selected to attend the course on the *"Amphibian Biodiversity Conservation (ABC)"* organized by the Durrrell Wildlife Conservation Trust, U.K. held at Periyar Tiger Reserve, Kerala from 10th -16th December, 2007.

13. Dr. (Mrs.) S.C. Bordoloi attended the N.E. Regional Workshop on *"Fisheries Conservation and Enhancement: Linking Researches and Stakeholders"* organized by National Bureau of Fish Genetic Resources, Lucknow at Guwahati, Assam held on 18th -19th December, 2007.

14. Mrs. S. Saha attended the N.E. Regional Workshop on *"Fisheries Conservation and Enhancement: Linking Researches and Stakeholders"* organized by National Bureau of Fish Genetic Resources, Lucknow at Guwahati, Assam held on 18th -19th December, 2007.

15. Ms. L. Nzano Humsoe attended the N.E. Regional Workshop on *"Fisheries Conservation and Enhancement: Linking Researches and Stakeholders"* organized by National Bureau of Fish Genetic Resources, Lucknow at Guwahati, Assam held on 18th -19th December, 2007.

16. B. Ningombam attended the Regional Workshop on *"Fisheries Conservation and Enhancement: Linking Researches and Stakeholders"* organized by National Bureau of Fish Genetic Resources, Lucknow held at Guwahati, Assam on 18th-19th December, 2007.

17. Dr. (Mrs) A. Devi attended the National Workshop on *"Green Chemistry Practices and their Applications"* organized by the Department of Chemistry, Cotton College, Guwahati, Assam from 1st -4th April, 2007.

18. Dr. (Mrs) A. Devi attended a presentation programme on *"Water Chemistry and Water purification Technology"* organized by the Department of Biotechnology, Gauhati University and Millipore India Pvt. Ltd on 7th June, 2007.

19. Dr. (Mrs) A. Devi attended the Symposium on *"Industry and Ecology : Perspectives on Development in Northeast India"* organized by the Department of Humanities and Social Sciences, Indian Institute of Technology, Guwahati held at IIT, Guwahati on 26th October, 2007.

20. Dr. A. R. Pal attended the *"American Physical Society - 60th Gaseous Electronics Conference"*, at Arlington, Virginia, USA during 2nd -5th October, 2007.

21. K. K. Sharma participated in the symposium on *"Advances and Strategies in Biotechnology, Global Perspective"*, cum annual conference of Biotechnology Society of India, organized by Industrial Toxicology Research Centre (ITRC), Lucknow from 17th-19th November, 2007.

22. R. Saikia participated in the symposium on *"Advances and Strategies in Biotechnology, Global Perspective"*, cum annual conference of Biotechnology Society of India, organized by Industrial Toxicology Research Centre (ITRC), Lucknow from November 17th-19th November 2007.

23. Dr. J. Kotoky participated in the symposium on *"Advances and Strategies in Biotechnology, Global Perspective"*, cum annual conference of Biotechnology Society of India, organized by Industrial Toxicology Research Centre (ITRC), Lucknow from 17th-19th November, 2007

24. Dr. J. Kotoky participated in the *"International Interactive Meet on Ayurveda"* organized by S.K.M. Ayurvedic Institute, Guwahati in collaboration with Aihore Pratisthanam, Ayurveda Kenkyusho, Osaka, Japan and International Vaidika Foundation, Delhi, India held at National Institute of Rural Development, Guwahati from 26th-27th November, 2007.

25. Dr.(Mrs) R. Devi has attended the *"International Interactive Meet on Ayurveda "* organized by S.K.M. Ayurvedic Institute, Guwahati in collaboration with Aihore Pratisthanam, Ayurveda Kenkyusho, Osaka, Japan and International Vaidika Foundation, Delhi, India held at National Institute of Rural Development, Guwahati from 26th-27th November, 2007.

26. Ms. S. Borgohain participated in the International Workshop *"Computational Methods and Function Theory 2008, Guwahati"* organized by the Institute of Advanced Study in Science & Technology, Guwahati-35, held at Don Bosco Institute, Guwahati during 3rd-10th January, 2008.

27. Dr. A. J. Dutta participated in the International Workshop *"Computational Methods and Function Theory 2008, Guwahati"* organized by the Institute of Advanced Study in Science & Technology, Guwahati-35, held at Don Bosco Institute, Guwahati during 3rd-10th January, 2008.

28. Dr.(Mrs) R. Devi has completed the Short term Hands on training on *"Molecular Biology & Bioinformatics Tools and Their Application in Biological research"* held at Bioinformatics Infrastructure Facility (BIF), College of Veterinary Sciences, Assam Agriculture University, Khanapara from 18th -21st February, 2008.

29. Dr D. Devi attended the Workshop on *"Biodiesel Towards Energy Security"* organized by TERI sponsored by Department of Biotechnology, Govt. of India held on 4th March 2008.

30. Dr. S. Deka attended a workshop on *"Biodiesel : Towards Energy Security"* organized by The Energy Resource Institute (TERI) in Association with Environment and Forest Department, Assam at Assam Administrative Staff College, Khanapara, Guwahati- 22 held on 4th March, 2008.

31. Dr. (Mrs) A. Devi attended the Workshop on *"Biodiesel: Towards energy Security"* at Administrative Staff College, Guwahati organised by TERI in association with the Environment and Forest Department, Government of Assam on 4th March, 2008.

32. Dr. N. Sen Sarma attended the workshop on *"Biodiesel: Towards Energy Security"* organized by TERI in association with the Environment and Forest Department, Government of Assam at Administrative Staff College, Khanapara, Guwahati on 4th March, 2008.

33. Dr.(Mrs) R. Devi has participated in the Workshop on *"Biodiesel : Towards Energy Security"* organised by TERI in association with the Forest Department of Assam, held at Assam Administrative Staff College, Guwahati on 4th March, 2008.

34. Dr. D. Devi has attended the *"53rd Annual Technical Seminar of Assam science society"* held at College of Veterinary Science, AAU Khanapara on 15th March, 2008.

35. K K. Sarmah participated in the *"53rd Annual Technical session of Assam Science Society"* held at the College of Veterinary Sciences, Guwahati on 15th March, 2008.

36. R. Saikia participated in the *"53rd Annual Technical session of Assam Science Society"* held at the College of Veterinary Sciences, Guwahati on 15th March, 2008.

37. Dr. J. Kotoky participated in the *"53rd Annual Technical session of Assam Science Society"* held at College of Veterinary Sciences, Guwahati on 15th March, 2008.

38. Dr. D. Devi has participated at the *"Pre Rongali Bihu Mela"* at NEDFI hut, organized by the Silk Mark organization of India and NABARD, Assam, held on 10th-16th March, 2008.

39. Dr. L. B. Mahanta participated in the National Workshop on *"Directional Data Analysis: Classical and Bayesian Methods"*, organized jointly by ISI, Kolkata (Applied Statistics Division) and Dept of Statistics, Gauhati University, held in Statistics Division, Gauhati University during 24th -26th March, 2008.

8.3 Nominations / Recognitions/ Achievements / Memberships / Honours

1. Dr. B. C. Tripathy was the convener of the International Workshop *"Computational Methods and Function Theory 2008, Guwahati"* organized during 3rd-10th January, 2008, at Institute of Advanced Study in Science & Technology, Guwahati.

2. Dr. B. C. Tripathy was the Co-chair person for Physical and Mathematical sciences section of *"53rd Annual Technical Session of Assam Science Society"* held at College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati on 15th March, 2008.

3. Dr. B.C. Tripathy is an Editorial Advisory Board Member of the journal *"International Journal of Science and Technology"*, Turkey.

4. Dr. B.C. Tripathy is an Editorial Board member of the periodical *"Far East Journal of Mathematical Sciences"* (Pushpa Publishing House), Allahabad.

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

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

7. Dr. B.C. Tripathy is an Editorial Board member of the periodical *"International Journal of Mathematical Sciences"*, New Delhi.

8. Dr. B.C. Tripathy is an Editorial Board member of the periodical *"Far East Journal of Mathematics"*, New Delhi.

9. Dr. B.C. Tripathy is an Editorial Board member of the periodical *"Advances in Mathematical Sciences Journal"*, Allahabad.

10. Dr. G. Choudhury is the Editorial Board member of *"Far East Journal of Theoretical Statistics"* (Pushpa Publishing House), Allahabad.

11. Dr. G. Choudhury is appointed as a Reviewer for *"Mathematical Reviews"*, a review journal of American Mathematical Society, U.S.A.

12. Dr. G. Choudhury acted as a rapporteur for Physical and Mathematical sciences section of *"53rd Annual Technical Session of Assam Science Society"* held at College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati on 15th March, 2008.

13. Dr. J. Kotoky, Asst. Professor, Life Sciences Division, participated as an Expert on the workshop on *"Conservation, Exploration & Dissemination of Potentials of Tribal, Folklore Medicine and Local Health Tradition in Assam"*, organized by Regional Research Institute (Ay), Guwahati and sponsored by Dept. of AYUSH, Ministry of Health, Govt. of India held at IIE, Guwahati from 9th-10th February, 2008.

14. Dr. J. Kotoky, Asst. Professor, Life Sciences Division, was nominated as a member to represent the Institute of Advanced Study in Science & Technology in the Sub-Committee on *"Forestry, Medicinal & Aromatic Plant"* constituted by the Dept. of Science & Technology, Govt. of Assam held on 24th May, 2007.

15. Dr.S. C. Bordoloi was selected as an advisory board member of *"Recent Advances and Rebuilding of Fish and Fisheries in North-East India"*, organized by Dept. of Pisciculture, St. Anthony's College, Shillong held on 22nd-23rd August, 2007.

16. Dr. S. C. Bordoloi was selected as a member of *Species Survival Commission of IUCN,* U.K.

17. Dr. S. Deka nominated as expert member for the selection committee of *research fellows under UGC scheme in Science* as approved by Honb'le VC, Gauhati University, Guwahati.

18. Dr. S. Deka submitted a *research report* on the research work carried out in the *University of Ulster, Northern Ireland,* U.K. as a DBT overseas associateship, to the DBT. Govt. of India for necessary action.

19. Prof. N.N. Dass chaired the technical session of the *2nd Mid Year Symposium of Chemical Society of India* at IIT (G), held on 21st July 2007.

20. Prof. N.N. Dass attended the intense group meeting for *"Acceleration of bulk dense targets to high velocities using intense lasers"* and also acted as a resource person in the National Workshop at Jadavpur University, Kolkata held on 22th-24th Jan, 2008. Prof. Dass also chaired a session.

21. Dr. N. Sen Sarma attended the intense group meeting for *"Acceleration of bulk dense targets to high velocities using intense lasers"* and also acted as a resource person in the National Workshop at Jadavpur University, Kolkata held on 22th-24th Jan, 2008.

22. Prof. K.C. Baruah attended the *All India Forensic Science Conference,* held at National Library Kolkata and acted as a Judge for the research papers on Physical Sciences during Nov. 2007.

8.4 Other Scientific Activities

1. Dr. (Mrs.) Dipali Devi conducted one month training on biochemistry to Mr. Pranab Kr. Nath a student of M.Sc Biotechnology, Faculty of Science, SRM University at Seri Biotech unit during the month of June, 2007.

2. Dr. (Mrs.) Dipali Devi arranged a daylong training on PCR technique in collaboration with the Bangalore genie for the faculty members and research scholar of IASST at Seri biotech unit on 11th July, 2007.

3. Dr. (Mrs.) Dipali Devi visited Textile Committee at Mumbai and had discussion with Dr. G.S. Nadigarh, Director of the Institute regarding degumming of silk etc on 24th October, 2007.

4. Mr. Samiul Haque visited IIT, Kharagpur for two week laboratory work under Professor A.K. Banthia in the project Development of Liquid Crystalline Polymer on November, 2007.

5. Dr. (Mrs.) Dipali Devi visited Gram dan udoyog at Tamulpur and observed the various method of process of Eri products on 24th December, 2007.

6. Dr. Neelotpal Sen Sarma visited Raman Research Institute, Bangalore for a week to interact with the scientists of that institute under the project Development of Liquid Crystalline Polymer on December, 2007.

7. Dr. (Mrs.) Lipi B. Mahanta visited the UGC office New Delhi for presenting the project proposal titled "Nutritional Status of the Children from 1-5 Years in the Low Socio Economic Areas in Kamrup District" at UGC, New Delhi on 14th February, 2008.

8. Dr. (Mrs.) Dipali Devi participated in the 'Press meet' held at Press club, Guwahati on 3rd March, 2008 organized by Silk Mark Organization for development of awareness for usages of silk mark and Identification of silk.

8.5 Ph.D. Awarded

1. Mr Dibyajyoti Boruah, Scientist B, Armed Forces Medical College, Pune-40 was awarded Ph.D. degree by the Gauhati University for his thesis *"Studies on Some Aspects of Plasma Surface Interaction in DC and RF discharge"* under the guidance of Prof. Joyanti Chutia, Director, IASST in the year 2007.

2. Sri Jitu Ranjan Chetia was awarded the Ph.D. degree from the Dibrugarh University for his thesis *"A study on poly (vinyl acetal)s, poly (vinyl ester)s and polyelectrolytes"* under the Co-guidance of Prof. N.N. Dass of IASST in the year 2007.

3. Ms. Sabita Mahanta was awarded Ph.D. degree from the Gauhati University for her thesis *"Studies on Some Sequence Spaces and Characterization of Some Matrix Classes"* under the guidance of Dr. Binod Chandra Tripathy in the year 2007.

4. Mr. Utpaljyoti Medhi was awarded Ph. D. degree from the Gauhati University for his thesis entitled *"Agropotentialities of paper mill wastes of Hindustan paper corporation limited, Nagaon (Assam) - a feasibility study"* under the guidance of Dr. S. Deka Associate Professor, Resource Management and Environment Division, IASST and Dr. A. K. Talukdar, Reader, Department of Chemistry, Gauhati University, Guwahati in the year 2008.

8.6 Visit Abroad

1. Dr. Arup Ratan Pal received the *BOYSCAST Fellowship 2006-07* awarded by the Department of Science and Technology, Govt. of India to carry out research work at the University of Maryland, USA for one year during 12th April, 2007 to 12th April, 2008. (DST award No. SR/BY/P-08/06 dated 19/12/2006).

2. Mr. Nirab Chandra Adhikary received the *DST-ICTP fellowship 2007* awarded by the Department of Science and Technology, Govt. of India to attend the Summer College on Plasma Physics -'New developments', at ICTP, Trieste, Italy during 30th July to 24th August, 2007. (DST award No.- INT/DST-ICTP(FELLOWS)-IITB,IMS/IASST/2007 dated 25-06-2007).

3. Prof. Joyanti Chutia attended the Annual Gaseous Electronics Conference during 2nd to 5th October, 2007 held at Arlington, VA, USA and delivered a talk on *"Study of Discharge Characteristics on transition from metallic to reactive mode in RF Magnetron Plasmas."*

8.7 Lectures delivered on Invitation

1. Prof. Joyanti Chutia, delivered *Dr. Bansidhar Barua Memorial lecture on "Plasma and Alternative Energy for future"* during July 2007 at ICMR, Dibrugarh branch, Dibrugarh.

2. Prof. Joyanti Chutia delivered *Dr. J. N. Baruah Memorial lecture on "Plasma technology for Nuclear Fusion Research"* held at Dibrugarh University on 1st September, 2007 organised by Dr. J. N. Baruah Memorial Trust.

3. Dr. (Mrs.) Dipali Devi delivered a talk on *"Grainage technology of Muga silkworm"* at NABARD (National Bank for Agriculture and Rural Development) on 21st June, 2007.

4. Dr. (Mrs.) Dipali Devi delivered an invited lecture on *"Silkworm and Seri culture, development in Assam"* as resource person at refreshers courses on Biology, at Department of Zoology, Cotton College on 5th July 2007.

5. Dr. (Mrs.) Sabitri Bordoloi delivered a talk on *"Anthropogenic stress and dwindling fish fauna in the beels of Assam"* in the seminar "Recent Advances and Rebuilding of Fish and Fisheries in North-East India", Dept. of Pisciculture, St. Anthony's College, Shillong, 22nd-23rd August, 2007.

6. Prof. Narendra Nath Dass delivered a talk, entitled *"Polymeric Foams for Laser Targets"* in the International Seminar on Frontiers in Polymer Science and Technology, held at Guwahati, 1st-3rd November, 2007.

8.8 Seminar/Training/Talk Programme Organized

1. Talk on "Plasma Surface Modification - From Computers to Diapers" :

A talk on "Plasma Surface Modification - from Computers to diapers" was delivered by Saswati Dutta, Procter & Gamble , Miami Valley Innovation Center, 11810 East Miami River Road , Cincinnati OH 45252 on 5th April, 2007. It was explained that Plasma processing has traditionally been used for high value products such as microelectronics components and various machine parts. Applications of this surface modification technique for lower value consumer goods, however, has been limited at best, due to the limitation of batch processing due to vacuum needs, lack of control in the chemistry of the plasma coating, and general absence of extensive studies and knowledge of coating chemistry systems that are compatible with plasma processing for polymeric substrates. Yet, the potential of this processing method for application to polymeric materials used in consumer goods has been recognized for some time - both for processing advantages and for environmental reasons. Recent advances in pulsed plasma polymerization have revived interest in plasma processing as a method for applying polymeric coatings to thermally sensitive substrates. Further, the development of atmospheric pressure plasma processing equipment and systems have opened up the possibility of applying plasma surface modification to continuous web processing without the need for expensive vacuum equipment.

The presentation focused on some specific examples of applications of plasma polymerization for surface modification of polymeric materials that are commonly used in consumer products, showing advantages of this process over conventional wet chemical processes. Novel applications, including the development of polymeric skin mimics were also highlighted.

2. Training for Silk Mark authorized users:

The intriguing silk produced by different types of silkworm retains its own distinct features and maintain a high market price as well. Consumers demand special individual characteristic from pure silk fabrics and blending products of pure silk only. So, it is necessary to have 'silk mark' in silk goods for their protection of purity and the Silk mark organization of India (SMOI) come forward for this purpose. Guwahati chapter of SMOI organized two training programs during the year 2007 for the authorized user of Silk Mark in association with the Seri biotech laboratory of IASST on May 25 and Aug. 29, 2007 (Photo No. 15 and 16). Prof. Joyanti Chutia, Director of IASST inaugurated the programs. Prof. K. C. Baruah, former Director of Forensic Science laboratory, Govt. of Meghalaya and presently Hony. Scientist of the institute also graced the occasion. Dr. Dipali Devi, Assistant Professor, Seribiotech Unit, IASST coordinated the programs along with Mamata B Sharma, Executive of SMOI, Guwahati chapter. All together 50 members from different parts of Assam and neighbouring states viz West Bengal, Tripura, Meghalaya, Nagaland and Manipur participated during the training. Series of lectures were delivered on biodiversity silkworms, food plants, their biology, strategy for conservation, and various types of textile fibers, especially, the natural silk for creation of awareness. They were also explained about the need and advantages of affixing silk Mark label on their products. Hands on demonstration of various methods of identifying pure silk with physical examination, burning, microscopic and solubility tests were also arranged for the benefit of the participants. They were also briefed about the importance of consumer's protection Act.

3. International Workshop on "Computational Methods and Function Theory - 2008 Guwahati":

An advanced level mathematics workshop on Computational Methods and Function Theory (CMFT) was organised by the Institute of Advanced Study in Science and Technology (IASST), during January 03-10, 2008 and the venue of the workshop was the Don Bosco Institute at Kharghuli, Guwahati (Photo No. 17 to 24).

The inaugural function was held at the premises of the IASST in Paschim Boragaon. The workshop was inaugurated by Prof. Devdas Kakati, former Vice-Chancellor of Dibrugarh University in the presence of a distinguished galaxy of guests including the foreign experts and distinguished academicians. The inaugural function was presided over by Prof. K.M. Pathak, former Vice-chancellor Tezpur University & Chairman, IASST council. Prof. J. Medhi, Emeritus Professor Gauhati University was the Chief Guest of the meeting while Dr. Prem Saran, Commissioner cum Secretary, DST(Govt. of Assam) and Dr. B. D. Acharya, Former Advisor, DST(GoI) were the Guests of Honour. Prof.

Stephan Ruscheweyh from Germany, Convenor of the Academic Coordination Committee, informed the audience that it was the first time that a CMFT workshop is being held in India. It is worth mentioning here that the CMFT conferences and workshops are high-level international programmes held at different places around the globe, and aims to bring together research workers and experts in the field, both from developed and developing countries. Prof. Joyanti Chutia, Director IASST & Chairperson Local Organising Committee (LOC) of the workshop welcomed the distinguished guests and Dr. B.C. Tripathy, convener, LOC delivered the vote of thanks. The inaugural function was followed by a cultural programme presented by the artists of the Assam State Government.

The principal sponsors of the programme were the National Board of Higher Mathematics, the Department of Science and Technology, the Council of Scientific and Industrial Research and the Forum D'Analyste of Chennai. While it was keenly felt that specialised and high-level programmes like this workshop would go a long way to improve the quality of mathematics teaching and research in the country.

Nine speakers and 30 participants drawn from as many as seven countries took part in the programme. The lectures were delivered by competent speakers of high international reputation. The speakers were Prof. Stephan Ruscheweyh, Prof. J. Studing, Prof. O. Roth and Dr. Daniela Kraus all from Germany, Prof. Lisa Lorentzen and Prof. F. Rønning both from Norway, Prof. R. Fournier, Canada, Prof. S. Ponnusamy and Dr. B.D. Acharya from India. The break up of the participants are 2 from Nepal, one from Nigeria, one from Finland and the rest 26 from different parts of India. The organizers are very grateful to these resource persons for accepting the invitation and putting lots of effort into the preparation and presentation of their course lectures.

There were 28 lectures and 4 problem sessions in during the workshop. Five mini-courses (and four one-hour lectures) were delivered. The lectures were on the topics "Inequalities for Complex Polynomials in the Unit Disc", "Conformal Metrices", Analytic Theory of Continued Fractions", Univalent Harmonic Functions", "Universal Convexity and Hausdorff Moments", "Aspects of Analytic Number Theory", "The Universality of the Riemann Zeta Function" , "Mathematical Knowledge: What is it and how can it be developed?". All the lectures and courses were focused on subjects in classical complex analysis. Those subjects were chosen to represent important and active areas of contemporary research.

Besides the courses offered by the experts during the week, a special open session on Mathematics Education was held on the 6th Jan. in collaboration with the Mathematics Education Trust of Assam (META). The lecture on Mathematical Education was delivered by Prof. F. Ronning of Norway. The programme evoked a lot of interest and response from mathematics teachers and teacher-trainers of this region. On 6th Jan. 2008 the Prof. V. Singh Memorial Session was held and went of very well, in the presence of family members of Prof. Singh. Besides a packed academic programme, some aspects of the social and cultural life of Assam were also presented at the workshop to the guests from all over the country and abroad. The cultural and social programme offered during the week was also hugely appreciated. There was a long lunch break each day to enable participants to

see something of Guwahati. The participants and the resource personnel were taken to the Assam State Museum, river cruise on the Brahmaputra, the Kaziranga National Park, the Book Fair and Srimanta Sankardev Kalakhetra.

The idea of a CMFT workshop is to present surveys of the most active parts of complex analysis (and its useful applications elsewhere) to (mainly) young researchers in the field, to widen their scientific horizon and to provide them with stimulation for their own work. Therefore this concept does not completely fit into the usual classification of mathematical meetings: teaching workshops ("summer school") for students to be introduced to one single subject and starting from scratch, or national or international congresses aiming at the exchange of the state of art in a field among proven scientists (the CMFT project also has international congress, which are held every four years at varying international locations). So the CMFT workshops are between these two categories and it seems that this concept fills a gap.

The participants of the Guwahati workshop reacted very positively to this idea. There were various discussions about it and the general opinion was that this is a very useful approach to update young (and not so young) scientists on the contemporary developments in their general field of interest. And there were various requests by participants to organize this kind of workshop at other locations in India as well.

On 10th January 2008, Thursday the workshop officially ended with the Concluding Function at lunch time. It was presided over by Prof. K.M.Pathak. He and Prof. J. Chutia felicitated the resource persons. Certificates to the participants were distributed by Prof. Liza Lorenzen. It ended on a very happy note.

It was recommended that such type of workshops should be organized frequently to give exposure to the young talents to the internationally renowned experts on Computational Methods and Function Theory. As a result of which they will be able to give their best and the will raise the status of the research of their country mainly India at the international level.

4. Talk on "Studies on Frogs" :

A talk on "Studies on frogs" (Photo No. 27) was delivered by Professor Annemarie Ohler of Museum national d'Histoire naturalle, Paris, FRANCE who visited the Institute on 9th January, 2008. This was the first of the series of lectures to be organized on the occasion of YEAR OF FROG, 2008.

Prof. Annemarie Ohler spoke at length about her exploratory surveys in South East Asia. She highlighted importance of survey work, proper documentation,verification of species preserved in different museums of the world and various issues related to Amphibian conservation.

She briefly described important methodologies used in taxonomy specially use of molecular studies and behavioural studies. Prof Ohler mentioned about recent results of Global Amphibian Assessment (GAA) for the benefit of amphibian researchers. Finally she summerised the work that lead to the discovery of a new species *R.suffry* from Assam in collabaration with IASST, Guwahati.

5. Seminar on Menace of Drug Addiction and Strategies for Control:

Indian Society of Analytical Scientists N.E Chapter, Shillong had held one important seminar on "Menace of drug addiction and strategies for control" at the IASST auditorium at Paschim Boragaon, Guwahati on 1st February 2008 (Photo No. 26). It was collaborated by IASST, ASTEC and also Directorate of Forensic Science, Govt. of Assam. A host of experts working in the field had participated in the seminar as resource persons.

Dr. Bipin Kr. Borgohain, former Regional Director of Health Services and advisor, health, NEC had given an alarming account of prevalence of drug abuse in the North Eastern states.

Dr. R.P. Gohain, Director of Forensic Science Laboratory, Assam, an eminent Chemist and Toxicologist had given an account of various types of drugs abused by the people through out the world.

Dr. Dhrubajyoti Hazarika an expert from Forensic Science Laboratory, Assam had given audiovisual accounts of various drugs which are prevalent in the country in general and North Eastern Region in particular.

Dr. Kamaleswar Goswami, retired Director of Forensic Science Laboratory had explained about the stringent provision of Drugs law i.e. NDPS Act 1985. He had also explained how drug peddlers try to camouflage the real substance to baffle the investigators.

Finally Dr. Jayanta Das, a practising psychiatrist of repute, had vividly explained the psycho physiological damage caused by drugs. He had mentioned that apart from Narcotic drugs, abuse of alcohol also causes great harm to the physical, mental and social status to the people.

In his concluding remarks Prof. K.C. Baruah, ex Director of Forensic Science Laboratory, Meghalaya and presently chairman of Shillong Chapter of ISAS had spoken about the use of Drugs and Psychotropic substances.

The seminar ended with the vote of thanks offered by Dr. G. C. Saikia, Secy. ISAS Shillong Chapter, with the message that "says no to Drugs". Parents, teacher and every well wisher should remain vigilant so that their son or ward never fall prey of these health hazarding and life threatening substances of abuse.

8.9 National Science Day Celebration

The National Science Day on 28th February'2008 was celebrated in the Institute by inviting Prof. Arun Chattapadhaya, Head, Dept of Chemistry, IIT(G) to deliver a talk on the occasion. Prof. Chattapadhya delivered a talk on "Present and Future of Nano".

In the presentation it was discussed about the recent developments in the field of nanoscale science and technology. Significant efforts are being put in the understanding of nanoscale science. On the other hand, there is a genuine requirement of rapid and concerted development of technology involving nanoscale materials.

The halo of nano has understandably given rise to a lot of hype and therefore has been subject to interpretation as all cure for various technological applications. However, there are genuine efforts to combine various advantages and develop suitable technology in the fields of heath care, modern materials, memory storage devices and advanced micro and nanoscale machines.

The development in the field in recent years has been rapid and all pervading. Globally a large number of research centers are now concentrating on the transfer of technology to real markets. How much of it would survive will be decided by the future. On the other hand, neglecting this powerful field may have negative consequences for the economic development of a country. This is especially true for the modern economy which is largely driven by development of science and technology and keeping the pace of growth in an extremely competitive environment. Hence, it is possibly prudent to develop this field of disruptive technology, not only from the point of science but also for the prosperity of nations using advanced technology.

8.10 Colloquium Organized

Name	Organization & Division	Title of the Talk	Date
Miss Stuti Borgohain	Project Fellow, Mathematical Sciences Division, IASST.	Fuzzy Set Theory and Its Applications in Sequence Spaces	13th April,2007
Dr. Suresh Deka	Associate Professor, Resource Management and Environment Division, IASST	Bio-surfactant and their commercial application	8 th June, 2007
Dr. B.K. Bhattacharyya	Formerly Professor and Head, Department of Agricultural Statistics, Assam Agriculture University, Jorhat and Honorary Professor, MSD, IASST.	Science at Scool Level-An Analysis	22nd June,2007
Professor N.N.Dass	Honorary Professor, Material Sciences Division, IASST	Liquid Crystals and its Applications.	27th July,2007
Miss Banita Ningombam	JRF of Resource Management and Environment Division, IASST	Amphibian Fauna in and around of Loktak Lake, Manipur	15th February,2008

9.0 Research Projects :

Sl No	Project Title	Funding Agency	Total Fund (in Lakh) & Period	Research Group
1.	Assessment of oil field soil (with special reference to poly aromatic hydrocarbons) for their eventual remediation and reclamation.	Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi	18.48 (2004-2007)	Dr.(Mrs)A.Devi,P.I Dr. K.G. Bhattacharyya, Co-PI Dr. A.Kumar , Co-PI Mr.M.Kalita, SRF
2.	Ichthyofaunal diversity and fishery potential in the wetlands of Hajo,Kamrup district,Assam and study of socioeconomic status of fisherman community.	G.B.Pant Institute of Himalayan environment and Development, Uttaranchal	7.09 (2004-2007)	Dr.(Mrs).S.C. Bordoloi, P.I Mrs.A.Baishya,SRF
3.	Status of Science Teaching in Secondary Schools of Assam	Department of Science and Technology (Govt. of India), New Delhi.	14.40 (2004-2007)	Prof B. K. Bhattacharyya,P.I Mr. S. K. Sinha, RI Mr. K.J. Barkotoki, RI Mr. N. Mohmad, RI Mr. D. Chakravorty, RI
4.	Conductivities of polymeric materials in solid state.	DST, Govt. of India	13.36 (2004-2007)	Dr. N. Sen Sarma,P.I Prof. N. N. Dass,Co-PI Dr. P. Chetri,RA
5.	Study of Post magnetron discharge plasma	DST, Govt. of India	30.20 (2004-2008)	Prof. J. Chutia, P.I Dr. H. Bailung,Co-PI Mr. S. M. Borah,JRF Mr. H. Kakati,JRF
6.	Fuzzy Real-Valued Convergent and Statistically Convergent Sequences Defined by Orlicz Functions	University Grants Commission, New Delhi	4.21 (2005-2007)	Dr.B.C.Tripathy,P.I Dr. P. Rajkhowa, Co-PI Ms. S. Boragohain, PF
7.	A systematic study of physico chemical properties of Muga Silk(Anthraea assama Ww) fibre produced in the north eastern region of India.	DST, GOI, New Delhi	20.85 (2005-2008)	Dr.(Mrs.)D.Devi,P.I Dr. K.C. Barua,Co-PI Prof. N. N. Dass,Co-PI Mr. B. Talukdar,JRF
8.	Rehabilitation of Degraded soils of Upper Assam Due to Excessive Mining of Soil.	Ministry of Environment and Forest, GOI, India	12.21 (2005-2008)	Dr. P.Azad,P.I Prof. A.K.Barma, Co-PI Ms.N.Nesha,JRF

9.	Fuzzy Real-Valued *I*-Convergent Sequences	Council of Scientific and Industrial Research, New Delhi	6.68 (2005-2008)	Dr. B.C. Tripathy,P.I Dr. B. Sarma, SRF Extended Dr. A.J.Dutta, SRF Extended
10.	Basic experiments on multicomponent plasma with negative ions.	DST, Govt. of India	32.00 (2005-2008)	Dr. H. Bailung,P.I Prof. J. Chutia , Co-PI Ms. S.K. Sharma, JRF Ms. K. Devi,JRF
11.	Study of Polymeric Foam and their uses in Laser-Plasma Experiment.	DAE, Govt. of India, BARC, Mumbai	28.90 (2005-2008)	Prof. N. N. Dass,P.I Prof. J. Chutia,Co-PI Dr. N. Sen Sarma,Co-PI Dr. H. Das, RA
12.	Grainage of *Antheraea assama* Ww (Muga Silkworm) using indoor rearing technique.	ASTEC, Govt. of Assam.	1.74 (2006-2008)	Dr.(Mrs.)D.Devi,P.I Prof. D.K.Sharma, Co-PI Miss P. Choudhury, JRF
13.	Studies on Some Retrial Models With Two Phase of Services	Department of Science and Technology (Govt. of India), New Delhi.	7.74 (2006-09)	Dr.G.Choudhury,P.I Dr. S. Kalita, Co-P I Ms. S. Biswas, JRF Mr. Kandarpa Deka, JRF
14.	Investigation on collective processes in laboratory dusty plasma.	ISRO, Department of Space, Govt. of India	13.50 (2006-2009)	Dr. H. Bailung,P.I Prof. J. Chutia, Co-PI Mr. M.K. Deka, JRF
15.	Development of Liquid Crystalline Polymers.	MIT, Govt. of India	20.73 (2006-2009)	Dr. N. Sen Sarma,P.I Prof. J.Chutia,Co-PI Mr. S. Hoque,JRF
16.	Development & Safety Evaluation of a Herbal carrier Substances for Skin care Ointments.	DRLT, DRDO, Ministry of Defence, Govt. of India	5.00 2007-2008	Dr. J. Kotoky, P.I
17.	Evaluation of antioxidant property of some selected fruits of North East India - a biochemical approach.	DST, GoI, New Delhi.	12.45 (2007-2010)	Dr (Mrs) R. Devi,P.I Prof. D.C.Deka,Co-PI Ms. T. Mudoi, JRF
18.	Study of the effect of leaf extracts of *Clerodendron colebrookianum* Walp (Nefafu) on lipid peroxidation, lipid profile and antioxidant status in cholesterol fed rat".	ICMR GoI, New Delhi.	7.98 (2007-2010)	Dr (Mrs) R. Devi,P.I Prof. D.K.Sarma,Co-PI Mr. D. Baruah,SRF

19.	Development of Broad Spectrum remedies from natural sources for health care with special reference to Skin diseases.	DRLT, DRDO, Ministry of Defence, Govt. of India	9.98 (2007-2010)	Dr. J. Kotoky, P.I Kaustav K.Sharma, JRF R. Saikia, Research Asstt.
20.	Phytoremediation of hydrocarbon contaminated soil of Upper Assam.	Ministry of Environment and Forests, Govt. of India	13.22 (2007-2010)	Dr. S. Deka, P.I Dr. N. Sen Sarma, Co-PI Mr. H. Deka, JRF
21.	Development of RF Plasma Polymerization Process for deposition on bell-metal and Muga silk fibre.	DAE(GOI)	24.00 (2007-2010)	Prof. J.Chutia, P.I Dr. D. S. Patil, PC Dr. A. R. Pal, Co-PI Dr. H. Bailung, Co-PI
22.	Study of sheath phenomena and instability in post magnetron discharge	DST, Govt. of India, New Delhi under DST-Women Scientist Scheme	10.32 (2007-2010)	Dr. P.Kalita Baruah, P.I
23.	Ab initio calculation of vibrational and thermodynamic properties of oxide under pressure	DST Govt. of India, New Delhi under Young Scientist Fast Track Scheme	10.92 (2007-2010)	Dr. M. Bora Saharia, P.I

10.0 Other Projects of the Institute

10.1 Consultancy Projects

1. "Biodiversity Assessment Of Beel Fisheries Under AACP"

A consultancy project titled "**Biodiversity Assessment Of Beel Fisheries Under AACP**" (Photo No. 14) is being carried out by Principal Scientist Dr.(Mrs) Sabitry Choudhury Bordoloi, Resource Management and Environment Division. This project was funded by Department of Fisheries,Govt.of Assam, from 9th May 2007 to 9th August 2008, with a budget allocation of Rs.10 lakhs (Rupees ten lakh only).

Beels are extensive water sheets fed by rivers and their tributaries. In Assam beels are mainly fed by river Brahmaputra and Barak and its tributaries. Beels contribute a major portion of the capture fishery resources of the state. At present the beels are plagued by various problems which turned them into unproductive waste areas. A list of 34 beels of Assam was provided by the Directorate of Fisheries, Govt. of Assam for Biodiversity assessment under Assam Agricultural Competitiveness Project (AACP).

A total of 34 beel were surveyed spread over twelve districts of Assam. Beels were visited along with the District Fishery Officials, B.D.C. members and members of N.G.O.s. Physico-chemical analysis of water and soil were carried out for all the beels. The faunal diversity specially the fish composition of the beels, amphibian fauna and water fowls has been surveyed. Most of the beels are in advanced stage of swampificaton. The study will help the Fishery Department, Government of Assam, to select certain beels for development activity and helping the fish farmers for taking up Pisciculture with modern techniques.

2. "Impact Assessment Study of Convergence Programme Under Early Childhood Education with Focus on its Effectiveness in Ensuring Enrolment in Class I"

A consultancy project titled *"Impact Assessment Study of Convergence Programme Under Early Childhood Education with Focus on its Effectiveness in Ensuring Enrolment in Class I"* was done by Professor B.K. Bhattacharyya, Mathematical Sciences Division. This project was funded by *AXOM SARBASIKSHA ABHIJAN MISSION* for period of 3(three) months (March 1 to May 31, 2007) with a budget allocation of Rs.1.50 lakh (rupees one lakh fifty thousand only). Relevant questionnaires developed, data was collected and was analysed. The final report was submitted. The salient findings is that the convergence programme has positive impact.

3. "5% Sample Checking of DISE Data 2006-07"

The consultancy project titled *"5% Sample Checking of DISE Data 2006-07"* funded by *AXOM SARBASIKSHA ABHIJAN MISSION* for period of 2(two) months (March 20 to May 20, 2007) with a budget allocation of Rs.3.50 lakh (rupees three lakh fifty thousand only) was completed Professor B.K. Bhattacharyya, Mathematical Sciences Division. Relevant data was collected and the data was analysed. The final report has been submitted. The salient findings are that the DISE data are found to have high reliability coefficient and high validity index.

10.2 Science Awareness Project

A Science Awareness project entitled "Plant-Diversity & Environment Education through Students of Assam" had been successfully organized at Kaziranga National Park High School, Kohora from 1st to 5th March 2008. It was carried out by Dr. J. Kotoky of Life sciences Division as Principal Investigator. This project was sponsored by DST, NSTMIS Division, Govt. of India for a period of one year from May 2007 with a fund of 10.73 lakhs.

The Programme was inaugurated and presided over by Prof. Joyanti Chutia, Director, IASST. The keynote address was delivered by Prof. Padmeswar Gogoi, Former Head of the Dept. of Botany, D.R.College, Golaghat, and a famous taxonomist of this region.

The Director, Defence Research Laboratory, Dr. R.B. Srivastava was invited as the chief Guest of the programme and he delivered a meaningful lecture. Also, Dr. M. Ahmed , Scientist, NEDFi was also invited as the guest of Honour along with Dr. Gunaram Khanikar, famous herbalist. Director, DST, NSTMIS, Mrs. S. Ahuja also participated in the entire programme and field work.

The mobile medicinal plant garden of Dr. Gunaram Khanikar had been invited and opened to the students and other local people, which pulled a large crowd.

From 2nd to 5th March 2008, the class room activities and field work etc had been continued. The Resource Persons like Dr. G. Sharma, Botany Dept., Gauhati University, Prof. P. Gogoi, NEDFi (present Address), Dr. I.C Barua, Assam Agricultural University, Jorhat, Dr. Gunaram Khanikar, VHAA, Guwahati and Dr. J. Kotoky, IASST, Ms. S. Ahuja, Director, DST, GOI delivered lectures and demonstrated on various subjects related to the programme.

Moreover, one model Herbal garden, developed by the K.N.P. High School under this programme had been inaugurated by the Director, IASST, Prof. Joyanti Chutia on 1st March 2008 by cutting a red ribbon and declared open for the students and other people.

A valedictory function was held on 5th March 2008, at 3.00 pm, under the president ship of Dr. S. Ahuja, Scientist-F, DST, Govt. of India. The students/ teachers had been given some feed back forms and discussed their views there itself. Many participants expressed their views in the meeting and they expressed that they were benefited tremendously during these days.

11.0 Research Collaboration

Name	Collaborators(s)	Research Area
Prof. Joyanti Chutia Material Science Division	Prof. Rabindranath Pal Saha Institute of Nuclear Physics Kolkata, India	Plasma Processing Microwave Technique for Plasma diagnostics
	Prof. D.S.Patil Laser Plasma Division Bhaba Atomic Research Centre, Mumbai	Plasma Polymerization
Dr. Heremba Bailung Material Science Division	Prof. Y Nakamura Institute of Space and Astronautical Science, Japan	Dusty Plasma, Plasma Diagnostics
	Prof. Rabindranath Pal Saha Institute of Nuclear Physics Kolkata, India	Plasma Processing Microwave Technique for Plasma diagnostics

Prof. Narendra Nath Dass Material Science Division	Prof. Aradhana Dutta Department of Chemistry, Dibrugarh University Assam,India	Polymer Science
	Prof. Ravi K. Khardekar Centre for Advanced Technology, Indore,India	Laser Polymer
	Prof. K.G.Bhattacharyya Gauhati University, Guwahati India	Physical Chemistry
	Dr. C.N.Saikia NEIST, Jorhat, India	Polymer Science
	Dr. S.D. Baruah Dr. N.N.Dutta NEIST, Jorhat, India	Membrane Science
Dr. Padum Azad Life Sciences Division	Prof. A.K.Verma JNU New Delhi, India	Microbial Biotechnology
	Prof. A.K.Yadav Regional Biofertiliser Development Centre, Nagpur, India	Microbial Biotechnology
	Prof. K.B.V.R.Tilak Hyderabad, India	Microbial Biotechnology
	Prof. D.K.Arora NBAIM, India	Microbial Biotechnology
Dr. Jibon Kotoky Life Sciences Division	Dr. Mukul Das Rastogi, Sr. Deputy Director, Food Toxicology Division, Industrial Toxicological Research Centre, Lucknow.	Food Toxicological Assessment
	Dr. P. Shukla, Sr. Scientist, CDRI. Lucknow.	Systemic Mycological Evaluation on Skin
	Mrs. J. Das, Scientist, DRL, Tezpur, working Partner for XIth 5-year Plan of the Division of Biotechnology, DRL, Tezpur, DRDO, Ministry of Defence, Govt. of India.	Dermatophytic Infection Evaluation and treatment using Herbal remedy on Skin Medicinal Plant Quality

	Dr. D. K. Petal, Sr. Scientist, Analytical Chemistry Division, Industrial Toxicological Research Centre, Lucknow.	Assessment with
	Dr. B. Baruah, Selection Grade Lecturer, Dept of Zoology, Cotton College, Guwahati.	Medicinal Plant Quality Assessment with
	Prof. Ze-Nai Chen, Dept. of Medicinal Chemistry, Shanghai Second Medical University, Shanghai, China.	Drug Development & Toxicology study .
	Dr. Gojen Sarma, Botany Dept., Gauhati University	Ethno-botany
	Dr. Jogen Kalita, Zoology Dept., Gauhati University	Hepatoprotective drug developments.
	Dr. A. Saikia, Chemistry Dept., IIT, Guwahati.	Crystallography of phyto-constituents
	Mr. Babular Das, Instrumentation Div. IIT, Guwahati.	Crystallography of phyto-constituents
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 of Entomological Sciences, Tokyo University, Japan	Protein Analysis

	Prof. D.K.Sharma Department of Zoology, Gauhati University, Assam, India	Insect Biochemistry
	Prof. M. Turchetto Department of Biology Paduva University, Italy	Entomology and insect protein chemistry
	Dr. Sisiro Farago Textile Institute, Milan, Italy	Fibre technology
	Dr. S, Cappellozza Institute of Sericultutre, Padova, Italy	Biology and breeding of silkworm
Dr. Rajlakhmi Devi Life Sciences Division	Dr S K Maulik Additional Professor Department of Pharmacology AIIMS, New Delhi	Cardioprotection by medicinal plant
	Dr A K Dinda Additional Prof Department of Pathology AIIMS, New Delhi	Histopathology of cell
	Dr Biju Dutta Department of Physiology Gauhati Medical College Guwahati	Human Physiology
	Prof. D C Deka Department of Chemistry Gauhati University Guwahati	*In-vitro* antioxidant activity, Trace element study of medicinal plants
	Prof D K Sharma Department of Zoology Gauhati University Guwahati	Cell Biologist
Dr. Sabitry Bordoloi Resource Management and Environment Division	Dr. Annemarie Ohler Dr. Ptrick David Department of systematique UMS 0602,25 rue Cuvier 75005 Paris, France	Amphibian Taxonomy Ophidian Taxonomy
	Dr. B.Singh Sydney University	Bioremediation
	Dr. N. Coleman Sydney University	Bioremediation
	Dr. Stephan Grosejan Paris, France	Tadpole Taxonomy

Dr. Suresh Deka Resource Management and Environment Division	Professor I. M. Banat University of Ulster, Northern Ireland, UK.	Microbiology, Molecular Biotechnology, Biosurfactant
	Dr. Banwari Lal, Director, Environment and Industrial Biotechnology Div., The Energy and Resources Instt. (TERI), New Delhi, India	Environmental Biotechnology
	Prof. K.G. Bhattacharyya Department of Chemistry, Gauhati University, India	Environmental Chemistry, Physical Chemistry
	Dr. A. Talukdar Department of Chemistry Gauhati University, India	Environmental Chemistry
	Dr. H.P.Sarma Department of Environmental Science, Gauhati University, India	Environmental Chemistry
	Prof. A. Dutta Department of Zoology, Gauhati University, India	Ecology, Fishery etc.
Dr. Arundhuti Devi Resource Management and Environment Division	Dr. Ashwani Kumar Industrial Toxicology Research Center, Lucknow, India	Environmental Biotechnology
	Prof. K.G. Bhattacharyya Department of Chemistry, Gauhati University, India	Environmental Chemistry
Dr. Binod Chandra Tripathy Mathematical Science Division	Professor B. Choudhary, Department of Mathematics; University of Botswana, Botswana.	Orlicz Type Sequences
	Professor Mikail Et; Department of Mathematics; Firat University; Turkey.	Sequences of Fuzzy Numbers
	Professor Yavuz Altin; Department of Mathematics; Firat University; Turkey.	Sequences of Fuzzy Numbers
	Professor Ayhan Esi; Department of Mathematics; Adiyaman University; 02040 Adiyaman; Turkey	Difference Sequence Spaces

	Professor Ayhan Esi; Department of Mathematics; Adiyaman University; 02040 Adiyaman; Turkey	Difference Sequence Spaces
Dr. Gautam Choudhury Mathematical Science Division	Prpf. K.C. Madan College of Mathematical Sciences and IT, Ahlia University, Kingdom Of Baharin. Prof. L.Tadj Department of Statistics and Operations Research , College of Sciences, King Saud University, Saudi Arabia.	Vacation models Control of queues
Dr. (Mrs) Lipi B. Mahanta	Prof. Dilip C. Nath Dept. of Statistics Gauhati University Guwahati, India. Dr. D. Dutta Majumder Professor Emeritus, Indian Statistical Institute, Kolkata Director and Secretary, Institute of Cybernetics Systems and Information Technology (ICSIT) Kolkata, West Bengal. Dr. Amal Chandra Kataki, Director, Dr. B. Barooah Cancer Institute, Guwahati. Dr. J.Dev Sharma, Chief Consultant, Pathology Dr. B. Barooah Cancer Institute, Guwahati.	Distribution Theory Image Processing Pattern Recognition Learning Models Image Processing Pattern Recognition Learning Models Image Processing Pattern Recognition Learning Models

12. Personnel Profile (as on 31st March, 2008)

Director

Prof. (Ms) Joyanti Chutia, MSc., Ph.D., F.N.A. Sc.

Scientists & Staff

Name, Qualification and Designation

Material Science Division

Heremba Bailung, M.Sc., Ph.D.	Associate Professor& Head (i/c)
N.N.Dass, M.Sc., Ph.D.,DIC	Honorary Professor
Neelotpal Sen Sarma, M.Sc.,M.Tech., Ph.D.	Assistant Professor
Arup Ratan Pal, M.Sc., Ph.D.	Assistant Professor
Nirab Ch. Adhikary, M.Sc.	Sr. Research Assistant
Prafulla Chetri, M.Sc. Ph.D.	Research Associate
Hitesh Das, M.Sc. Ph.D.	Research Associate
Munima Bora Saharia, M.Sc., Ph.D.	Women Scientist
Putul Kalita, M.Sc., Ph.D.	Women Scientist
Hemen Kakati, M.Sc.	SRF
Sankar Moni Borah, M.Sc.	SRF
Sumita K Sharma, M.Sc.	JRF
Kavita Devi, M.Sc.	JRF
Manoj K Deka, M.Sc.	JRF
Janardan Nath, M.Sc.	JRF
Md. Samiul Haque, M.Sc.	JRF
Krishna Kanta Swargiari	Mechanic

Life Sciences Division

Padum Azad, M.Sc., Ph.D.	Associate Professor (Extended)
K.C. Baruah, M.Sc., Ph.D.	Honorary Scientist
Jibon Kotoky, M.Sc., Ph.D.	Assistant Professor
Dipali Devi, M.Sc., Ph.D.	Assistant Professor
Rajlakshmi Devi, M.Sc., Ph.D.	Assistant Professor
Mr. Kaustav K Sharma, M.Sc.	Research Scholar

Mr. Rubul Saikia, M.Sc.	Research Assistant
Mahendra Kalita, M.Sc.	Teacher Fellow
Bijit Talukdar, M.Sc.	JRF
Ramesh Nath, M.Sc.	Teacher Fellow
Phulmoni Choudhury, M.Sc.	JRF
Dulal Chandra Boruah, M.Sc.	SRF
Tiluttama Mudoi, M.Sc.	JRF
Nashimun Nesa, M.Sc.	SRF
Saranga Pani Saikia, M.Sc.	Teacher Fellow (UGC)
Juli Bordoloi, B.Sc.	Lab. Assistant
Subrata Goswami, B.Sc.	Lab. Assistant

Resource Management & Environment Division

Sabitry Choudhury Bordoloi, M.Sc., Ph.D.	Associate Professor and Head i/c
Suresh Deka, M.Sc., Ph.D.	Associate Professor
Arundhuti Devi, M.Sc., Ph.D.	Assistant professor
Aparna Dutta, M.C.A.	Assistant Professor
Anjali Baishya, M.Sc	SRF
Mukut Kalita, M.Sc	SRF
Nzano Humtsoe, M.Sc	JRF(Rajib Gandhi National Scholarship)
Hemen Deka, M.Sc.	JRF
Anirudha Sarma, M.Sc.	Project Scientist
Banita Ningombam, M.Sc.	Project Scientist
Tutul Bortamulee, M.Sc.	Teacher Fellow (UGC)
Sushmita Saha, M.Sc.	Part time Ph.D studentMs Gitima
Deka, M.Sc	Part time Ph.D. student
Dhaneshwar Boro	Skilled Field Assisstant
Buddhadev Basumatari, M.Sc.	Project Scientist
Manmohan Huzuri, B.Sc.	Lab. Technician

Mathematical Sciences Division

Binod Chandra Tripathy, M.Sc, Ph.D.	Associate Professor and Head i/c
Jyoti Prasad Medhi, M.Sc., D.Sc.	Honorary Professor
Ganesh Chandra Das, M.Sc., Ph.D.	Honorary Professor
Basanta Kumar Bhattacharyya, M.Sc., Ph.D.	Honorary Professor
Gautam Choudhury, M.Sc., Ph.D.	Assistant Professor
Lipi B. Mahanta, M.Sc., Ph.D.	Assistant Professor
Bipul Sarma, M.Sc., Ph.D.	SRF Extended

Amar Jyoti Dutta, M.Sc., Ph.D.	SRF Extended
Kandarpa Deka, M.Sc.	JRF
Stuti Borgohain, M.Sc.	Project Fellow
Sanjib Kumar Sinha, M.Sc.	Research Investigator
Kanchan Jyoyi Barkotoki, M.Sc.	Research Investigator
Nur Mohmad, M.Sc.	Research Investigator
Dhrubajyoti Chakravorty, M.Sc.	Research Investigator

Library & Information Centre

Tarini Dev Goswami, M.L.I.Sc.	Asstt. Librarian
Niranjan Bhagobaty M.Sc(IT), PGDCA	Sr. Instructor
Kumud Baishya	Library Asstt.

Administrative Staff

Heremba Bailung,M.Sc., Ph.D.	Registrar (i/c)
Rajesh Sharma, B.A.	PRO
Juri Pathak, M.C.A.	Ex. Secy. to Director
Prabodh Ch. Deka, B.A.	UDA
Rabin Kalita, B.Sc.	LDA
Dwijen Deka, B.A.	LDA
Prabhat Barma	LDA
Saraswati Bora	LDA
Diganta Das, B.A.	Stenographer
Binoy Choudhury	Messenger
Madhu Ram Kalita	Electrical Helper

Engineering Cell

H.K.Saikia, B.E.	Civil Consultant
Montu Deka, B.E.	Junior Engineer
Munindra Singh	Console Operator

Accounts Section

Ganesh Ch, Bhuyan, M.Com.	Finance & Accounts Officer
Suresh Sarma, B.Com.	Accountant
Ramen Mahanta, B.Com.	Jr. Accountant

Laboratory Helper/ Watcher

Tarun Talukdar	Lab. Attendant
Madan Kalita	Lab. Attendant
Gora Gupta	Lab. Attendant
Bolin Das	Field Attendant
Ratul Baishya	Messenger
Srikanta Baishya	Field Attendant
Kabindra Deka	Lab. Attendant
Niren Sarma	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 Saud	Night Chowkidar
Satish Das	Day Chowkidar
Balabhadra Pathak	Watcher
Umesh Ch Deka	Messenger
Munna Basfor	Sweeper

Annual Accounts of 2007-08

Project Division wise summary of Receipt and payment accounts of the IASST for the year ended 31st March 2008 (2007-08)

Sl No	Head of Account	Opening Balance as on 1 April 07	Receipt During the year 2007-08	Total Amount Received	Payment During the year 2007-08	Closing Balance as on 31st March 08
1	Microwave reflectometry for plasma density measurement in Tokomak Plasma	-403779	403779	0	0	0
2	Study on some batch arrival queuing models with vacations	-99012	0	-99012	0	-99012
3	Nonlinear Waves in Plasma	-178293	0	-178293	0	-178293
4	Database of R&D Institution Assam	-104748	0	-104748	0	-104748
5	Studies on Native VAM Fungi	-231509	0	-231509	0	-231509
6	Studies on some retrial models ...of services	49380	190000	239380	288479	-49099
7	Ichthyofaunal diversity and fishery potential in the wetlands of Hajo	-69481	204927	135446	204916	-69470
8	Assessment of oil field soil for their eventual remediation and reclamation	205908	230231	436139	144100	292039
9	Conductivities of polymeric materials in solid state	22611	0	22611	125495	-102884
10	Status of Science teaching in secondary school of Assam	4450	239800	244250	244298	-48
11	Rehabilitation of Degraded soils of Upper Assam due to excessive mining of coal	-380518	630000	249482	351065	-101583
12	Fuzzy real valued convergent and statistically convergent sequences defined by orlicz function (U G C)	-65126	100400	35274	46301	-11027
13	Study of Post Magnetron Discharge Plasma	-386852	600000	213148	527874	-314726
14	Microbial Diversity of Dibru-soikhowa biosphere	-502558	0	-502558	0	-502558
15	Study of polymeric foam and their use in laser plasma experiments	0	226400	226400	201212	25188
16	Upgrading IASST	5021341	0	5021341	355452	4665889
17	Entry of polycyclic...Soil from Oil...degradation	-17091	0	-17091	55510	-72601
18	General Management	-18226470	20000000	1773530	11817752	-10044222
19	Land and Building	59623	0	59623	1376387	
20	A systematic study of physico-chemical...Muga silk fibre	30206	200000	230206	347445	-117239
21	CSIR (Fuzzy real)	-71541	245407	173866	312980	-139114
22	Education	-176	200000	199824	200017	-193
23	National and International Workshop (CMFT)	0	586203	586203	858876	-272673
24	Motivation programme for talented school students.	-36192	36000	-192	0	-192
25	Design synthesis and	0	1000000	1000000	9015	990985

	Characterization of Side chain liquid crystalline Polymers					
26	Evolution of Antioxidant property of some selected fruits of NE India	500000	0	500000	589203	-89203
27	Queuing system and applications	143393	0	143393	156531	-13138
28	Investigation on collective processes in laboratory dusty plasma	948000	0	948000	986714	-38714
29	Installment for 5% sample checking survey of DISE data	205700	0	205700	205700	0
30	Preparation of Blue print for alternative fishing management in the Northern side of Deepor beel.	12010	0	12010	19413	-7403
31	Basic Experiments on Multi component Plasma with negative ions.	1218580	260000	1478580	1554702	-76122
32	Development of liquid crystalline polymers	593492	0	593492	761664	-168172
33	Grainage of Antheraea assama Ww .Muga silk worm using indoor rearing technique	63810	100000	163810	142070	21740
34	Assam Sarba Siksha Aviyan Mission	90000	410000	500000	500000	0
35	Study of the effect of leaf extracts of clerodendron...	0	258960	258960	314420	-55460
37	Ab initio calculation of vibration and thermodynamic ...	0	431000	431000	393230	37770
38	Study of sheath phenomena & unstability in post-magnetron discharge ...	0	372000	372000	166379	205621
39	Development of RF plasma polymerization ... Muga silk fibre	0	1270000	1270000	351336	918664
40	Phytoremediation of hydrocarbon contaminated soil of Assam	0	555000	555000	524404	30596
41	Development of Broad spectrum remedies....	0	500416	500416	450918	49498
42	Development of safety evaluation.. For creams for skin care	0	498000	498000	17700	480300
43	Beel biodiversity assessment under AACP	0	400000	400000	490277	-90277
44	Plant diversity	0	500000	500000	228720	271280
45	**IASST General Fund**	**-575624**	**43573099**	**19043681**	**25786833**	**17210642**
46	Reserve Fund (Fixed Deposit)	1968568	0	0	0	1968568
47	Corpus Fund for leave salary encasement	311040	0	0	0	311040
	Grand Total	**1703984**	**43573099**	**19043681**	**25786833**	**19490250**

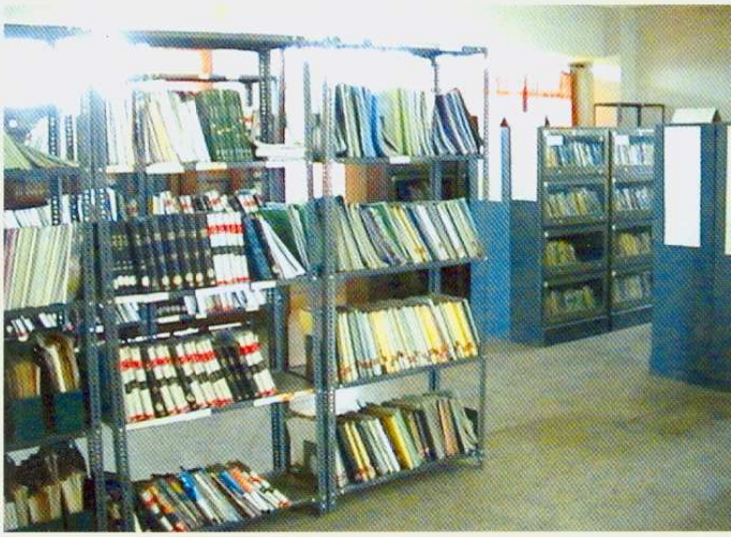
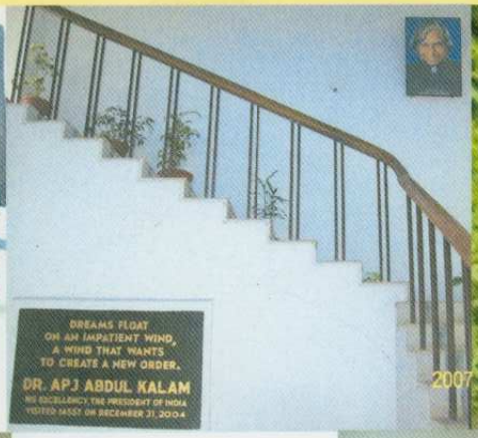


Photo 25. A view of the reading room and the books/journals section of the library at IASST

hoto 26. Dr. R.P. Gohain, Director of Forensic Science Laboratory, Assam and Dr. Jayanta Das delivering talks on th seminar on "Menace of drug addiction and strategies for control" at the IASST.

Photo 27. Dr. Joyanti Chutia, Director, IASST and Prof A. Ohler at moments during the talk on "Studies on frogs


DREAMS FLOAT
ON AN IMPATIENT WIND,
A WIND THAT WANTS
TO CREATE A NEW ORDER.
DR. APJ ABDUL KALAM
2007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INTERNATIONAL WORKSHOP