

# **DIRECTOR'S REPORT**

# FRIDAY, MAY 30, 2003

**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI** 

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### INTRODUCTION

His Excellency, the Governor of Assam and Chairman Board of Governors of IIT Guwahati, Lt. Gen. (Retd.) S. K. Sinha, Chairman, Space Commission and Secretary, Department of Space of the Government of India and the Chief Guest of today's convocation, Dr. K. Kasturirangan, Members of the Board of Governors, Members of the Senate, graduating students, distinguished guests, members of the press, faculty and staff of IIT Guwahati, ladies and gentlemen. It gives me great pleasure to extend a very warm welcome to all of you on the occasion of the fifth Convocation of the Indian Institute of Technology Guwahati. We are fortunate to have with us, Dr. K. Kasturirangan, who has made immense contributions to the Space Programme of the country. He has been associated with space research for over 30 years with notable contributions in the development and successful launching of satellites such as Aryabhatta and Bhaskara. He is also instrumental in planning an un-manned mission to the moon. His contributions have been recognised and he has been awarded the Sri Hari Om Ashram Dr. Vikram Sarabhai Prerit Award in 1981, the Padma Sri Award in 1982, the Shanti Swarup Bhatnagar Award in Engineering Sciences in 1983, the Padma Bhushan Award in 1992, the Dr. Y. Nayudamma Memorial Award in 1995, the Padma Vibhushan Award in 2000, to name a few. We extend a very warm welcome to you. Sir.

IIT Guwahati has entered the 9<sup>th</sup> year of its existence and today the following will be receiving their degrees: the fifth batch of B.Tech and the fourth batch of M.Tech. students in Computer Science and Engineering, Electronics and Communication Engineering and Mechanical Engineering; the second batches of B.Tech. and M.Tech. students in Civil Engineering, the second batch of B. Des. students in Design and the second batch of M. Sc. students in Physics, Chemistry and Mathematics. The Institute will also be awarding Ph. D. degrees to six research scholars today. I congratulate all the graduating students and wish them success in all their future endeavours.

I would now like to present before you a report of the activities of this Institute during the past one year.

### **ACADEMIC ACTIVITIES**

IIT Guwahati at present has the following academic departments Computer Science & Engineering (CSE)
Electronics & Communication Engineering (ECE)
Mechanical Engineering (ME)
Civil Engineering (CE)
Biotechnology (BT)
Chemical Engineering (CL)
Design (Des.)

Physics Chemistry Mathematics Humanities & Social Sciences (HSS)

The total number of students on the roll during the academic year 2002-2003 at the undergraduate, postgraduate and Ph.D. levels were :

# Undergraduate programme

### B. Tech. / B. Des.

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4th year: 112 (CSE = 41, ECE = 32, ME = 22, CE = 07, Des. = 10)
3rd year: 129 (CSE = 40, ECE = 33, ME = 21, CE = 17, Des. = 18)
2rd year: 127 (CSE = 33, ECE = 34, ME = 27, CE = 16, Des. = 17)
1st year: 210 (CSE = 38, ECE = 38, ME = 50, CE = 30, Des. = 14, BT = 20, CL = 20)
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# M.Sc. programme

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2<sup>nd</sup> year: 22 (Physics=07, Chemistry = 07, Mathematics & Computing=08) 1<sup>st</sup> year: 26 (Physics=08, Chemistry = 09, Mathematics & Computing=09)
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# Post Graduate Programme

### M.Tech.

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2<sup>nd</sup> year: 91 (CSE = 24, ECE = 22, ME = 27, CE = 18)
1<sup>st</sup> year: 90 (CSE = 27, ECE = 23, ME = 24, CE = 16)
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Ph.D.: 90 (CSE= 01, ECE= 09, ME= 10, CE= 10, Design= 03, Physics= 16, Chemistry= 20, Maths= 08, Humanities and Social Sciences= 13)

# Total no. of undergraduate and post-graduate students = 897

It is worth mentioning that a considerable number of undergraduate students at the 3<sup>rd</sup> year level have been selected for summer training this year by various firms in different countries apart from those in India, offering them stipend and travel grants. These include 17 students of Computer Science & Engineering and 13 students of Electronics and Communication Engineering, 6 students of Mechanical Engineering and 2 of Design.

The number of successful candidates who are to receive their B.Tech., B. Des., M. Sc., M. Tech. and Ph. D. degrees today are given below:

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B.Tech. / B.Des	
Computer Science and Engineering	41
Electronics and Communication Engineering	33
Mechanical Engineering	22
Civil Engineering	07
Design	09
Total	112
M.Sc.	
Physics	07
Chemistry	06
Mathematics and Computing	09
Total	22
M.Tech.	
Computer Science and Engineering	23
Electronics and Communication Engineering	18
Mechanical Engineering	24
Civil Engineering	12
Total	77
Ph.D.	
Chemistry	04
Physics	02
Total	06
Grand Total	217

# **New Programmes/Courses**

The two new departments of Biotechnology & Chemical Engineering started their B.Tech. programme from this academic year. Besides, various departments also introduced 62 new courses at the undergraduate and post-graduate levels under the existing programmes during the academic year.

### RESEARCH AND DEVELOPMENT ACTIVITIES

Research is an integral part of the academic activities of the Institute. Besides expanding the frontiers of knowledge, research activities give an extra edge to the teaching programme. In addition to research supported by the Institute, there are a number of sponsored research projects now in operation in different departments.

### **Sponsored Projects**

There are currently 60 ongoing sponsored projects in the Institute being sponsored by agencies like MHRD, DST, CSIR, ARDB etc. The total project value of these ongoing projects is approximately Rs.6.66 crores, an increase of 44.5% over the previous year. The projects received during the last financial year include:

# Department of Biotechnology

 Studies on the Metabolic Machinery Involved in the Assimilation of Alkane by Filamentous Fungi.

# Department of Civil Engineering

- Verification Test of a Prototype Base Isolated Two Storeyed RCC Framed Building Subjected to Actual Earthquake.
- National Programme on Earthquake Engineering Education.

# **Department of Chemistry**

- Utilisation of Freon in Organic Synthesis with Particular Emphasis on the Synthesis
  of Bioactive Molecules.
- New Selective Oxidation Catalysis.
- New Chiral Polymer Catalysts for Asymmetric Catalysis.
- Synthesis Characterization and Properties of Metal Complexes of Ligands Containing N and S Donor Centres.
- Generation of Nanomaterials and Nanostructures with Enhanced Optical Electronic Properties.

# Department of Computer Science and Engineering

 Microsoft Alliance Projects: Web Services for the Tea Industry; A High End Interface for Robots; Intelligent Assisting Agent for the Windows Desktop.

# Department of Design

UNDP Cane & Bamboo Project.

# **Department of Mathematics**

Convergence Analysis of Finite Element Method for Parabolic Interface Problems.

# **Department of Mechanical Engineering**

- Computation of Two Dimensional Incompressible Viscous Flow Through Cascade.
- Computer Aided Analysis & Design of High Speed Ball and Roller Bearings, An Elasto-Hydrodynamic Approach.
- Development of Twin Roll Casting Technique for Manufacturing Thin Castings.
- Setting up of Technical Backup Unit (TBU) at IIT Guwahati for R&D Interface with Khadi and Village Industries Sector.

# **Department of Physics**

- Preparation & Study of High Quality Hydrogenated Amorphous Silicon (a-Si:H) & Silicon Germanium (a-SiGe:H) Alloys Thin Films at the Onset of Microcrystallinity for Photovoltaic Applications.
- Study of Colossal Magneto-Resistivity on Pyrochlore Structure Based Material.

The total project cost of the new projects is approximately Rs.2.74 crores. In comparison to the previous year, the number of new projects have increased by 42% and the value of the new projects has increased by 214%.

# **Consultancy Projects**

In addition to the sponsored R&D projects, the Institute also offers consultancy services. The total value of the 56 ongoing consultancy projects is approximately Rs. 46.96 lakhs (an increase of 70% over the previous year), and during the year under report Rs.24.74 lakhs was received under this head. Consultancies have been offered to various Depts. of the Govt. of Assam, Central and State Enterprises in the North-East Region, and to a number of private organisations.

# LABORATORY AND OTHER FACILITIES

The Institute has been procuring state-of-the-art equipment for its various laboratories both for teaching and research. Some of the major equipment procured during the year are:

Description of Items	Department /	Value (Dayleles)
UV/VIS Spectrometer.	Centre Chemistry	(Rs. lakhs) 12.44
FT-IR Spectrometer.	Chemistry	13.29
Fluorocube		21.39
	Chemistry	
Multi Pump Test Rig	Civil Engg.	22.83
Laser Particle Size Analyser	Civil Engg.	23.49
Rapid Prototyping Machine	Design	92.45
2-Colour Offset Printing Press	Mass Media Centre	227.01
PULSE Multi-Analyser	Mechanical Engg.	19.93
Digitally Controlled Hydraulic 10 Ton		
Capacity Dynamic Testing Machine	Mechanical Engg.	69.91
Atomic Force Microscope	Physics	23.59
Induction Heating Equipment	Work shop	28.45

### INSTITUTE PROGRAMMES

### Interaction with other Institutions

An Academic Alliance between Microsoft USA and the Department of Computer Science & Engineering of IIT Guwahati was finalized. Under this programme, Microsoft is supplying source code of many of their products. They are also providing developer tools for most of their software. This year they are funding some research and student projects under this Academic Alliance.

An MoU was signed between Friedrich Alexander University (FAU), Germany and IIT Guwahati for academic co-operation. Under this programme, faculty, student and staff exchanges as well as joint research programmes will be undertaken.

IIT Guwahati has become a part of the DAAD-IIT Master Sandwich Programme under which a few M. Tech. Students do their M. Tech. Project work in a German University for a period of 9 months.

# Grassroots Innovations Augmentation Network- North East (GIAN-NE)

On the request of the National Innovation Foundation (NIF), IIT Guwahati provided office space and basic infrastructural facilities for setting up of GIAN–NE which aims at scouting local innovators and transform their innovations into products. Two innovators of the region have received the NIF National Award for the year 2002 from the honourable President of India, Dr. A. P. J Abdul Kalam.

# Conferences, Short Term Courses, Workshops and Seminars

The Department of Mathematics, IIT Guwahati and the Indian Statistical Institute organised an International Conference on Geometric Group Theory at the Institute during December 16-21, 2002 with support from the National Board of Higher Mathematics. The Conference was preceded by a two-week Instructional Workshop on Geometric Group Theory.

The 47<sup>th</sup> Congress of Indian Society for Theoretical and Applied Mechanics (ISTAM-2002), an International Meet was organised jointly by the Civil Engineering and the Mechanical Engineering Departments of the Institute during December 23-26, 2002.

IIT Guwahati along with the Ministry of Human Resource Development, Govt. of India organised an Official Language Seminar at IIT Guwahati during February 10-11, 2003.

Like previous years, the Mathematics Department organised a four-week training programme called "Mathematics Training and Talent Search" Programme in June 2002 for the fourth consecutive year. The department continued to organise the IIT Guwahati Mathematics Seminars in which several distinguished mathematicians were invited to give talks.

The department of Design organised a four-day exhibition, "Agoli Bah" in March 2003, which displayed cane and bamboo furniture designed for schools and hospitals, developed by the department. "Lakshya" the first exhibition showcasing the project and course work of the complete Design programme, was also organised by the department for three days.

The following short-term courses were organized:

- "Skill Development of National Hydroelectric Power Corporation Ltd. Engineers" during February 13-23 2003.
- "Renewable Energy Applications in North Eastern Region" during October 21-26 2002.
- Refresher Course on "Design and Construction of Steel Concrete Composite Structures" during December 30 2002 to January 1 2003 (jointly with the Institute of Steel Development and Growth, Kolkata).

 "Dynamic Analysis of a Dam Using Software SAP" to engineers of National Hydroelectric Power Corporation Ltd. (NHPCL) during February 13-23 2003.

Faculty and students of the Institute participated in the Winter Academy-2002 at IIT Kanpur during December 8-21, 2002, sponsored by DAAD, Germany.

# Visitors and Visits by Faculty

During the year as many as 21 distinguished visitors from India and abroad visited the Institute for varying lengths of time and delivered lectures, seminars and interacted with the faculty and students. A large number of faculty members also visited several countries abroad for presenting papers in International Conferences and also on short and long term assignments and fellowships during the year.

### **FACULTY ACTIVITIES**

The present faculty and staff strengths of the Institute are 111 and 205 respectively. The faculty of the Institute are actively involved in formulating new courses of study, in the setting up of the laboratories at the undergraduate and post graduate levels, and are actively involved in undertaking research and development activities at the Institute.

### Honours

Dr. G. Barua of the Civil Engineering Department was invited to deliver two lectures in the anniversary college on soil physics at the International Centre for Theoretical Physics (ICTP), Trieste, Italy in March, 2003.

Dr. R. Alam, Department of Mathematics was awarded the BOYSCAST fellowship 2002-03 by DST, Govt. of India.

Dr. Somnath Majhi of the ECE Department and Dr. S. C. Mishra of the ME Department were awarded the Alexander von Humboldt Post-doctoral Research Fellowship for the year 2002-03

### **Awards**

Dr. (Mrs) G. Madhavilatha of the Civil Engineering Department received the Best Paper Award by ISRMTT for the paper titled "Prediction of Stress-Strain Behaviour of Intact and Jointed Rocks in Triaxial Compression", published in the Journal of Rock Mechanics and Tunnelling Technology (2002)

Dr. (Mrs) G. Madhavilatha of the Civil Engineering Department received the Best Paper Award by Indian Geotechnical Society for the paper titled "Finite Element Analysis of Strip Footing Supported on Geocell Reinforced Sand Beds" published in the Indian Geotechnical Journal (2002).

Dr. S. K. Deb of the Civil Engineering Department received the Best Paper Award (Dr. Jaikrishna Gold Medal Award) by the Institution of Engineers (India) for the paper titled "Dynamic Analysis of Buildings with yielding Truss Elements of Bilinear characteristics".

### **Publications**

The faculty of the Institute have been publishing their research findings in various national and International journals and conference proceedings. The total publications during the year include:

Journal Papers : 51 International and 16 National Conference Papers : 92 International and 53 National

Compared to the previous year, there has been an 8% increase in the number of journal publications and an increase of 104% in the number of Conference publications.

The faculty have presented papers in 50 International and 32 National Conferences, and published 1 Technical Report, 1 Book and 9 chapters in books during the year.

### **Patents Filed**

The Department of Chemistry has filed three patents during the year. The titles are: "Process for the preparation of metal acetylacetones", "An improved process for pyridinium fluorochromate (PFC)" and, "An improved process for the preparation of quaternary ammonium tribromides". All the work was done under the guidance of Prof. M. K. Chaudhuri.

### INFRASTRUCTURE

# Campus Facilities Completed

Some of the academic and administrative activities of the Institute being carried out from the Transit Complex, have been shifted to the Main Academic Complex during the year under report. Two lecture galleries and 15 classrooms in the Academic Complex are being used for conducting all the undergraduate and postgraduate classes. The Departments of Design and Mathematics have fully shifted to the Academic Complex while the Departments of Chemistry and Humanities & Social Sciences have partly shifted there. Other departments will be shifting in the next few months.

The Administrative Building has been completed and was inaugurated on August 28, 2002 by Lt. Gen. (Retd.) S. K. Sinha, Governor of Assam and Chairman of the Board of Governors of IIT Guwahati. Interior work is now under progress. All the administrative activities will shift there during the year.

The main Academic Complex was inaugurated on January 26, 2003 by Prof. D. N. Buragohain, Founder Director of IIT Guwahati.

The Library and Computer Centre Building is under construction and is expected to be ready in a year's time.

The construction of 53 residential quarters was completed in the year with 2 units of type F, 6 of type E, 21 of type B and 24 of type A. 43 units, 2 of type F and 41 of type D, are nearing completion. With these, the Institute will have completed 47% of its faculty residences and 73% of its staff residences as per the targets for the end of the tenth plan (2006-2007).

The first phase of the Girls' Hostel with 168 rooms is expected to be completed by the end of next month. 163 rooms of a 300 room fourth Boys' hostel is also expected to be ready in a month's time.

### **Construction Programme**

The following works are being taken up in the coming year:

- Construction of a Flyover over the Railway lines as part of the approach road to the Institute. This work is being done by the State PWD.
- Sports Complex: The piling work for an Indoor Stadium is in progress. Land filling for playgrounds has been completed and the playgrounds will be prepared after the monsoons.
- Water Supply: The estimate and design of a water supply scheme involving a barge on the river Brahmaputra and a treatment plant, is complete. Tenders willbe invited shortly.
- Sewage Treatment Plant: The work of the sewage treatment plant has been awarded and work is expected to commence after the monsoons.
- Air Conditioning: A Central Air-conditioning System for the Academic Complex, Library & Computer Centre and the proposed auditorium has been designed. Work is expected to commence in a month's time.
- Boys' Hostel: Work on the next Boys' hostel is expected to commence after the monsoons.
- . Hospital and Auditorium : Activity on these two works will commence this year.

### INSTITUTE FACILITIES

# **Computing and Communication Facilities**

During the last year the campus Local Area Network has been extended to all the hostels and the new academic complex. Now students are accessing the central computing facilities of the Institute from their rooms provided they have their own computing systems. The Institute has enhanced its Internet bandwidth at the end of this year. The connection from ERNET is now at 2 Mbps with 1:2 compression ratio (from the earlier 1:3), and the connection from STPI has been enhanced to 1 Mbps (from 256 Kbps). Extension of the internal phone service to the residences and Guest House was almost completed this year. Residences will have phones in two weeks' time.

### **Central Library**

The Central Library currently has 52,456 volumes, including textbooks, reference books, conference proceedings, back volumes, standards, and non-book materials such as CD-ROMs, audio tapes, video tapes, and slides. The Library acquired and processed about 5930 books and back volumes and subscribed to 568 Indian and foreign journals during the year.

During the same period, the Library extended facilities to 1500 regular members and about 175 visitors from different parts of the country.

The Central Library has become a member of the INDEST Consortium (Indian National Digital Library in Science and Technology Consortium), under the aegis of the MHRD. Under this, online access to few important science and engineering abstracting database services and several full-text journals are being provided through the Internet.

### STUDENT ACTIVITIES

# **Cultural Activities**

'Alcheringa', 'Manthan', 'Technotsav' and 'Spirit' are the annual festivals of music & culture, technology and sports respectively, organized by the students. These festivals serve as excellent platforms for exchange of ideas and for development of talents among the students from various educational institutions of the country.

Techniche-02, the IIT Guwahati annual technical festival was held with a three-day programme on the 30<sup>th</sup> and 31<sup>st</sup> August and 1<sup>st</sup> September, 2002 in which students from as many as 23 colleges from all over the country participated. The festival was inaugurated

by the Director General, CSIR, an FRS, Dr. R. A. Mashelkar. *Techniche* is now undoubtedly the most popular rendezvous for exchange of technical knowledge amongst the student community not only of the North-Eastern Region but also of the entire nation. About 700 school children from Guwahati got a close look at "technology at work" with their visit to *Techniche-02*. A Technical Book Fair was also held during the festival with some leading publishers from all over the country and abroad.

Apart from the above regular festivals, artistes/sportspersons of national and international fame are invited to the Institute every year. This year, a number of cultural programmes were organized under the IIT Guwahati sub-chapter of Spic Macay. Renowned artistes such as Malabika Mitra and Kapila Venu amongst others performed at the Institute under the aegis of Spic Macay.

Along with the aforementioned festivals, eight clubs of the Cultural Council organized regular activities during weekends and other days. This year the clubs have started off with a number of activities and formed a number of societies viz., the Literary Society, the Environmental Society, the Photography Club, the Movies Club, the Fine Arts Society, the Dramatic Society amongst others.

# **Sports Activities**

A contingent of 64 students represented the Institute in the *Inter IIT Sports Meet* held at IIT Delhi from December 14 to 19, 2002. Our students participated in seven games and athletics and bagged one gold medal, one silver medal and one bronze medal. Apart from this, the sports section of the Institute held a series of friendly Volleyball, Football and Cricket matches with the local colleges of Guwahati.

### **Placement**

Campus placement activities for the year 2002-2003 began on August 01, 2002 and concluded on May 05, 2003. As many as 20 companies/ organizations including multinational companies, public sector and Govt. of India organizations participated in the above exercise. The percentage of the on-campus placement was 63.

### Student Achievements

Mr. Boppana Surendra and Burugupalli Srinivas, 4th year B. Tech. students of the Department of Electronics & Communication Engineering were selected to represent India in the final of the IEEE student paper contest for the Asia-Pacific Region.

Mr. Ashish Singhal, Mr. T. B. Naidu, and Mr. S. Trivedi, M. Tech. students, were the runners-up team in the All-India Microsoft Campus Challenge Software Development Competition, for their project "Web Services for the Tea Industry".

### CHALLENGES

This report will not be complete unless the challenges that lie ahead for the Institute are also highlighted.

In research, while the progress has been satisfactory, much more needs to be done. The average number of publications per faculty of the Institute per year is less than two. The average number of sponsored projects per faculty per year is 0.5 and the average value of ongoing sponsored research projects per faculty is Rs. 6 lakhs. While numbers alone do not paint a true picture, and the presence of a significant number of new faculty has an impact, these are indicators that more effort is required in the years to come if we are to be among the best Institutes of the world.

One of the keys to the success of the research programme of an organisation is the number and quality of Ph. D. and Masters' students. Getting Ph. D. students for the Engineering disciplines is a problem that is being faced by all leading Institutes of the country. Even though the number of Engineering graduates in the country is quite large, it is difficult to get good students for the Masters' programmes. Our location and the relative lack of local resources, makes the problems even worse for us, and the challenge to overcome them is therefore the greater.

The Institute needs to grow from a current faculty strength of 111 to a strength of 285 in the next four years. This is a huge challenge given the shortage of applicants, particularly in a few key Departments. Further, we have to contend with the recruitment requirements of other IITs where many faculty are retiring over this same period. As part of this, there is the issue of some of our faculty getting offers in other IITs and moving there for a variety of reasons, primary of which appears to be the place of origin of the faculty.

The Institute is located in the North East region of the country, but the number of students joining from this region is very low. While we have no direct control over this aspect as admissions are based on all-India examinations at both the undergraduate and postgraduate levels, we need to spread awareness of the requirements of these all-India examinations among the student community of the region.

The construction activity has not progressed at the rate it was hoped it would because of the difficulties of the terrain. Low lying areas have to be filled up and the soil allowed to settle. Then piles have to be laid as the newly laid soil is not firm. The challenge before us is to accelerate the pace of construction under these conditions. The growth of the Institute is getting slowed down because many buildings are not yet ready.

These challenges are being presented before you not to put up excuses for our shortcomings, or to lament our ill luck. They are being highlighted because we feel that with this stock-taking we will be in a better position to assess what needs to be done. The enthusiasm and dedication with which the faculty, the staff, and the students have been working makes me assert with confidence that the Institute will meet these challenges head-on to emerge as a leading Technical Institute of the world.

### CONCLUSION

In conclusion I would like to take this opportunity to express the gratitude of this Institute to two persons who made significant contributions to the establishment of this Institute.

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First of all, on behalf of the Institute I would like to express our gratitude to Prof. R. C. Malhotra, who, as the first Project Director of the then Society for IIT Guwahati, helped lay the foundation of the Institute. He was instrumental in the selection of the campus site. More importantly, he was responsible for preparing the Project Report of the Institute. This report has been the basis on which most of the plans of the Institute were formulated. I am glad to inform you that Prof. Malhotra is here among us today as a special guest of the Institute. Thank you Sir.

The Institute has reached this stage under the able leadership of Prof. D. N. Buragohain. He handed over charge as Director in March of this year following his super-annuation. For nine years, since February 1994 when he joined as a Project Director, taking over as the regular Director on September 1, 1994, he has led the Institute and has been our inspiration. From humble beginnings with three faculty members and cramped rented premises in 1995, to an Institute of 111 faculty, 900 students residing in an 185 hectare campus now, is the journey he has guided us through.Prof. Buragohain is also with us here. The Institution thanks you sir and will always cherish your contributions.

Finally I wish the outgoing students the best for their future. I am confident you will put to good use what we have been able to teach you. I am also confident that you will, by your deeds and actions, bring success and glory to yourself and to IIT Guwahati.

Thank you and Jai Hind.